



Application Effect and Empirical Analysis of 5S Management in Automobile Repair Enterprises

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Abstract. This paper mainly studies the application effect of 5S management in the field of automobile repair. 5S management, a production site management method originated in Japan, aims to improve the normalization, standardization and visualization of the workplace through five core steps: sorting, reorganizing, sweeping, cleaning and literacy, thereby improving work efficiency and product quality. This study selected a certain number of auto repair companies as samples, and through field research, questionnaire surveys and data analysis, found that the implementation of 5S management can significantly shorten the auto repair cycle, reduce the failure rate, and significantly improve customer satisfaction and reduce the return rate. . However, the implementation of 5S management also faces challenges such as employee resistance, insufficient training and insufficient support from management. In response to these challenges, the study proposed a series of countermeasures, including strengthening employee training and communication, improving incentive mechanisms, gaining full support from management, and setting up supervision teams and regular evaluations to ensure the smooth implementation and continuous improvement of 5S management. Therefore, 5S management has great application potential in automobile repair enterprises, and is of great significance for enhancing the management efficiency and maintenance quality of enterprises, improving overall competitiveness, and achieving sustainable development.

Keywords: 5S management, automobile repair enterprise, application effect, management efficiency, maintenance quality

1 Introduction

The current situation of the automobile repair industry is characterized by fierce market competition, rapid technological updates, and diversified customer needs[1]. In this context, how enterprises can improve management efficiency and ensure maintenance

quality has become the key to their survival and development[2]. 5S management, as a production site management method originated in Japan, aims to achieve standardization, standardization and visualization of the workplace through five steps: Seiri, Seiton, Seiso, Seiketsu and Shitsuke, thereby improving work efficiency and product quality[3].

The 5S management theory has great potential for application in auto repair companies [4]. First, by organizing the work area and tools and equipment, unnecessary items and waste can be eliminated, providing space for efficient work. Second, the organization work makes the tools and equipment layout reasonable and clearly labeled, which makes it easier for employees to find the required items quickly, reducing the search time and improving work efficiency. Cleaning work helps to keep the work environment clean and tidy, reduce equipment failures and safety hazards. In the cleaning stage, cleaning standards and inspection systems are established to ensure that the work environment is kept clean and tidy. Finally, the improvement of literacy enables employees to develop good work habits, consciously abide by rules and regulations, and form a positive corporate culture.

This study aims to explore the application effect of 5S management in auto repair enterprises, and to provide auto repair enterprises with a set of scientific and effective management methods through empirical analysis of the specific impact of 5S management on efficiency and quality. The study will focus on the following aspects: First, how 5S management can help auto repair enterprises improve management efficiency, including shortening repair cycles and reducing failure rates; second, how 5S management can improve maintenance quality, increase customer satisfaction and reduce return repair rates; third, the challenges that 5S management may encounter during implementation and the coping strategies.

This study will select a certain number of auto repair companies as case companies or samples, and collect relevant data before and after the implementation of 5S management through field research, questionnaire surveys and data analysis. In the process of data collection, the focus will be on repair efficiency indicators (such as repair cycle, failure rate, etc.) and quality indicators (such as customer satisfaction, return rate, etc.). By comparing and analyzing the data changes before and after the implementation of 5S management, the specific impact of 5S management on the efficiency and quality of auto repair companies is evaluated.

To ensure the scientificity and accuracy of the research, this study will use a combination of quantitative and qualitative analysis. Quantitative analysis mainly reveals the changes in efficiency and quality before and after the implementation of 5S management by statistically analyzing the collected data; qualitative analysis uses case analysis, interviews, and other methods to gain an in-depth understanding of the actual application of 5S management in auto repair companies, as well as the cognition and attitude of employees and management towards 5S management.

2 Literature Review

2.1 Theoretical basis of 5S Management

5S management originated from Toyota Motor's lean production method in Japan. It aims to enhance the competitiveness of enterprises by optimizing the production site, improving production efficiency, reducing production costs, and improving the working environment[5]. Sorting refers to distinguishing between necessities and non-necessities, removing useless items from the workplace, and providing space for efficient work. Sorting refers to the reasonable layout of tools and equipment, with clear labels, so that employees can quickly find the items they need, reduce searching time, and improve work efficiency. Cleaning refers to keeping the working environment clean and tidy, reducing equipment failures and safety hazards. Cleaning refers to establishing cleaning standards and inspection systems to ensure that the working environment is constantly clean. Literacy refers to improving the quality of employees, cultivating good work habits, consciously abiding by rules and regulations, and forming a positive corporate culture. These elements, through a series of implementation steps, together constitute a complete 5S management system[6].

2.2 Application Cases of 5S Management in Manufacturing and Other Industries

In the manufacturing industry, 5S management has been successfully applied. Many companies have effectively improved production efficiency, reduced production costs, improved the working environment, and enhanced their competitiveness by implementing 5S management[7]. For example, some companies have optimized the layout of production lines through 5S management, reduced material handling and waiting time, and thus improved production efficiency. In addition, 5S management has also been widely explored in the service industry and other industries[8]. For example, in the fields of medical care, education, logistics, etc., by introducing 5S management, companies have improved the working environment, enhanced service quality, and increased customer satisfaction. In the medical field, hospitals have optimized the layout and maintenance of medical equipment through 5S management, thereby improving the efficiency and safety of medical services[9]. In the field of education, schools have improved the cleanliness of classrooms and laboratories through 5S management, thereby enhancing students' learning environment and teaching quality[10]. In the field of logistics, enterprises have optimized warehouse layout and management through 5S management, thereby improving logistics efficiency and accuracy[11].

2.3 Management Status and Challenges in Auto Repair Enterprises

As an important part of the automotive industry chain, auto repair companies face many management challenges. Among them, low management efficiency is a common problem [12]. Due to the disorganized workplace and the random placement of tools and

equipment, employees often need to spend a lot of time looking for tools and equipment, resulting in low work efficiency. In addition, auto repair companies also face quality control problems. Due to the lack of effective quality control measures, the quality of repairs is difficult to guarantee and customer satisfaction is low. This not only affects the company's reputation and image, but may also lead to customer loss and a decline in market share. Therefore, auto repair companies need to introduce a scientific and effective management method to solve these problems. 5S management, as a mature management method, has broad application potential in auto repair companies. By implementing 5S management, auto repair companies can standardize the workplace and improve the quality of employees, thereby effectively solving the problems of low management efficiency and quality control, and management effect of enterprise using 5S was shown in figure 1. This will help improve the competitiveness of the company, enhance customer satisfaction, and promote the sustainable development of the company.

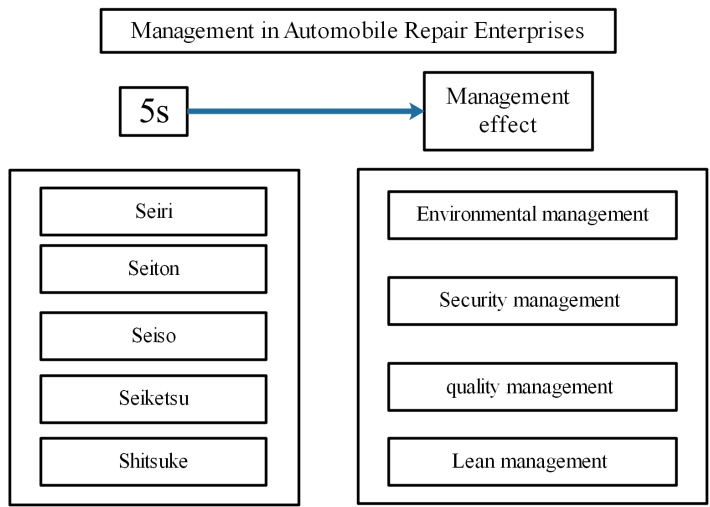


Fig. 1. management effect of enterprise using 5S

3 Implementation Strategy of 5S Management in Automobile Repair Enterprises

In the auto repair industry, the implementation of 5S management is an important way to improve the operational efficiency of enterprises and ensure the quality of repairs. In order to effectively promote 5S management in auto repair enterprises, it is necessary to systematically grasp the five core elements of sorting, reorganizing, cleaning, cleaning and literacy, and formulate corresponding implementation strategies, the meanings of 5S are shown in Table 1.

First of all, Seiri is the starting point of 5S management, which requires a thorough cleaning of the work area and removal of all useless items and materials. In auto repair companies, this includes obsolete parts, damaged tools, expired technical documents,

etc. Through Seiri, more work space can be freed up, creating a spacious, bright and orderly working environment for employees, thereby improving work efficiency.

The next step is Seiton, which is to arrange tools and equipment reasonably to ensure that employees can quickly find what they need. In auto repair, there are many types of tools and complex equipment. Therefore, in the sorting stage, tools and equipment need to be classified and labeled, and corresponding storage and access rules need to be established. Through sorting, employees can find the required tools in the shortest time, reduce searching time, and improve maintenance efficiency.

Seiso is the key to keeping the work area clean. A lot of oil, dust and debris will be generated during the car repair process. Therefore, it is necessary to establish a daily cleaning system to regularly clean and maintain the work area. This not only keeps the work environment clean, but also extends the service life of equipment and tools, reducing failures and downtime.

Table 1. The meanings of 5S

5S	Implementation highlights	Key points for implementation in automobile repair enterprises
Seiri	Emphasize cleaning up useless items, optimizing the working environment and improving work efficiency	1. Remove useless items such as old parts, damaged tools, expired documents, etc. 2. Free up work space and ensure the environment is spacious, bright and orderly. 3. Improve overall work efficiency through organization
	Improve accessibility of tools and equipment and reduce searching time through proper layout and labeling	1. Classify tools and equipment, clarify their functions and uses. 2. Mark the storage location of tools and equipment, and establish clear access rules. 3. Reduce the time employees spend looking for tools through reorganization and improve maintenance efficiency
Seiton	Emphasize daily cleaning and maintenance to keep the working environment and equipment clean and reduce the occurrence of failures	1. Establish a daily cleaning system and clarify cleaning responsibilities and frequency. 2. Regularly clean up oil, dust, debris and other debris to keep the environment clean. 3. Keep equipment clean by cleaning to extend its service life and reduce failures and downtime.
	Ensure the continuity and effectiveness of cleaning work by establishing standards and inspection systems	1. Establish cleaning standards and clarify cleaning quality and requirements 2. Regularly check cleaning work to ensure that standards are implemented.
Seiketsu	Emphasize employee quality improvement and self-management, and improve overall work quality and efficiency through training and culture shaping	1. Improve employees' professional quality and operational skills through training, and enhance their self-management ability. 2. Emphasize employee behavioral norms and cultivate good work habits.

Seiketsu stage requires the development of cleaning standards and inspection systems to ensure that the work environment is continuously clean. In an auto repair business, this requires regular inspections and evaluations of cleaning practices to ensure that employees comply with cleaning regulations and keep the work environment clean and orderly.

Finally, Shitsuke is the core of 5S management. It emphasizes the self-management and behavioral norms of employees, and the relationship of 5s was shown in figure 2. In auto repair enterprises, it is necessary to improve the professional quality and operational skills of employees through training and education, so that they can consciously abide by rules and regulations and operating procedures. At the same time, it is necessary to strengthen the construction of corporate culture, create a positive working atmosphere, and stimulate the enthusiasm and creativity of employees, so as to comprehensively promote the effective implementation of 5S management in auto repair enterprises.

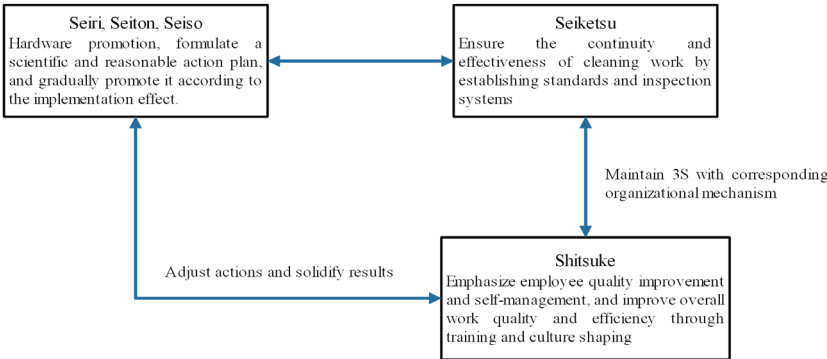


Fig. 2. Relationship between Figure 5S

4 Empirical Analysis of Application Effects

4.1 Data Collection and Comparative Analysis

In order to deeply explore the actual effect of 5S management in auto repair enterprises, we carefully designed the data collection and processing process. Repair efficiency and quality have become the two core areas of our concern. Specific indicators include customer satisfaction during the repair cycle and the return rate. These indicators can fully and accurately reflect the changes before and after the implementation of 5S management.

After the data collection work is completed, for a certain auto repair company, this article implements 5S management with December 2024 as the node, and obtains a comparison between December and November 2024. The comparison results are shown in Table 2.

Table 2. Comparison before and after implementation

Project	2024.11(Before)	2024.12(After)
Number of car repairs	177	152
Repair cycle/minute	57	53
Customer Satisfaction	85	92
Repair quantity	5	2
Repair ratio	2.8%	1.3%

The results showed that the number of car repairs was basically the same before and after the implementation of 5S, and the repair cycle was reduced from 57 minutes to 53 minutes after implementation, which was a significant improvement. This positive change is mainly due to the in-depth implementation of the Seiri and Seiton stages. By clearing out useless items and rationally arranging tools and equipment, employees' work efficiency has been significantly improved. At the same time, strict implementation of the Seiso and Seiketsu stages also ensures a clean and tidy working environment, further reducing the occurrence of equipment failures. In terms of quality, customer satisfaction has significantly improved, the number of vehicles returned for repair has been reduced from 5 to 2, which is a significant improvement, and the return rate has also been reduced from 2.8% to 1.3%.

4.2 Case Analysis and Discussion

In order to better understand the actual application effect of 5S management in auto repair enterprises, we also conducted detailed case analysis and discussion. By analyzing successful cases, we found that these enterprises focused on full employee participation and continuous improvement when implementing 5S management, forming a positive corporate culture atmosphere. These enterprises not only strictly follow the requirements of 5S management, but also actively encourage employees to put forward improvement suggestions and continuously improve management processes, thus achieving a dual improvement in efficiency and quality.

However, we have also noticed some failure cases. In these cases, the enterprises often failed to implement 5S management effectively due to employee resistance and lack of support from management. These failure cases provide us with valuable experience and lessons, reminding us that when implementing 5S management, we need to fully consider the acceptance of employees and the support of management, and formulate practical response strategies to ensure the smooth implementation and continuous improvement of 5S management.

The application of 5S management in automobile repair enterprises has significant effects and can comprehensively improve the efficiency and quality level of the enterprise. However, there are also many challenges in the implementation process, and companies need to formulate appropriate response strategies based on their own circumstances. Through case analysis and discussion, we can have a deeper understanding of the actual application effects of 5S management and provide useful reference and reference for future practice.

5 Challenges and Countermeasures

5.1 Challenges Encountered During Implementation

In the process of promoting 5S management in auto repair enterprises, the employee level first faces challenges. Employee resistance is a notable problem. Since 5S management may require employees to invest extra time and energy in organizing and re-organizing in the early stages, some employees may resist this, believing that these

additional tasks increase their workload. If this resistance is not guided and resolved, it will directly affect the implementation effect of 5S management.

In addition, insufficient training is also a major challenge. The successful implementation of 5S management depends on employees' in-depth understanding of its core concepts and implementation steps. However, in actual operations, due to limited training resources or improper training methods, employees may not have a deep understanding of 5S management and cannot effectively implement relevant requirements. This will not only affect the implementation effect of 5S management, but may also cause employees to misunderstand and be dissatisfied with management measures.

It affects the implementation effect of 5S management and may also cause employees to misunderstand and be dissatisfied with the management measures. In addition to challenges at the employee level, challenges at the management level cannot be ignored. Insufficient support from management is a key issue. The attitude of management towards 5S management directly affects its promotion and implementation effect within the enterprise. If management lacks awareness of the value of 5S management or fails to provide sufficient support and resources, it will directly affect its implementation effect. This lack of support may manifest itself in neglect of 5S management, uneven resource allocation or poor supervision.

In addition, the lack of continuous supervision is also a challenge at the management level. 5S management is a process of continuous improvement, which requires continuous supervision and evaluation to ensure its long-term effectiveness. However, in actual operation, due to various reasons (such as personnel changes, resource constraints, etc.), continuous supervision may be lacking, which in turn affects the implementation effect of 5S management. This lack of supervision may be manifested in lax inspection, untimely feedback or inadequate rectification.

5.2 Strategies to Address Challenges

In response to challenges at the employee level, we propose the following strategies. First, strengthen employee training and communication. Through regular training, on-site demonstrations, video teaching and other methods, improve employees' awareness and understanding of 5S management. At the same time, strengthen communication with employees, clarify the positive impact of 5S management on individuals and enterprises, and stimulate their enthusiasm for participation. This will help eliminate employees' resistance and improve their acceptance and execution of 5S management.

Secondly, improve the incentive mechanism. Establish a clear incentive mechanism to reward employees who actively participate in 5S management, including material rewards and spiritual rewards. This can enhance employees' sense of participation and belonging, and improve their enthusiasm and initiative in participating in 5S management.

We also proposed corresponding coping strategies for the challenges at the management level. First, strive for full support from the management. We conducted in-depth communication with the management, clarified the importance of 5S management to the development of the enterprise, and strived for their full support and resource invest-

ment. This included providing necessary training resources, financial support and staffing. At the same time, we incorporated 5S management into the enterprise performance appraisal system, linked it to the performance of the management, and enhanced their sense of responsibility and urgency.

Finally, set up a supervision team and regular evaluation. Set up a special 5S management supervision team to be responsible for regular inspection of implementation and ensure that all requirements are implemented. At the same time, establish a regular evaluation mechanism to evaluate and provide feedback on the implementation effect of 5S management. This helps to discover and solve problems in a timely manner and ensure the continuous improvement and effectiveness of 5S management. Through the implementation of these strategies, we can effectively overcome the challenges encountered by auto repair companies in the implementation of 5S management and ensure its smooth implementation and continuous improvement.

6 Conclusion

This study explored the application effect of 5S management in automobile repair enterprises through empirical analysis. The results show that 5S management plays an important role in improving repair efficiency and improving maintenance quality. After the implementation of 5S management, the automobile repair cycle was significantly shortened, customer satisfaction was greatly improved, and the return rate was significantly reduced. These positive changes are mainly due to the in-depth implementation of the five core elements of 5S management: sorting, reorganizing, cleaning, cleaning and literacy. Together, they promote the standardization, standardization and visualization of the workplace, thereby improving work efficiency and product quality. However, the implementation process of 5S management is not without challenges. Problems such as employee resistance, insufficient training and insufficient support from management may have a negative impact on its effectiveness.

In response to the challenges in the implementation process, this study proposed a series of coping strategies. These challenges can be effectively overcome by strengthening employee training and communication, improving incentive mechanisms, seeking full support from management, and setting up supervision teams and regular evaluations to ensure the smooth implementation and continuous improvement of 5S management. In summary, the application of 5S management in auto repair enterprises has broad prospects and is of great significance for enhancing the competitiveness and sustainable development capabilities of enterprises. This study provides a useful reference and reference for the auto repair industry, which will help promote the in-depth practice and optimization of 5S management in this field.

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