

Service Quality of Car Maintenance and Repair Centers in Thailand:

A Comparison between Electric and Internal Combustion Engine Vehicles

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Abstract

The global push for sustainable and eco-friendly transportation options has intensified the debate between electric vehicles (EVs) and internal combustion engine (ICE) vehicles. Each engine type presents distinct advantages and challenges, influencing consumer choice based on the power source, environmental impact, performance, cost, and infrastructure. This study focuses on Thailand's car maintenance and repair service industry, exploring how service quality dimensions vary between EVs 102 users and ICEV 259 users and analyzing customer perceptions across different service aspects. This research aims to fill that gap, offering insights into the comparative service quality of EV and ICE vehicle maintenance, and informing stakeholders including service providers, manufacturers, policymakers, and consumers. When comparing these two groups of car users, the results indicate that EV and ICEV user perceptions of the level of service quality provided by car maintenance and repair centers were statistically different. The implications for car maintenance and repair centers are provided.

Keywords: 1) Car maintenance and repair centers 2) Service quality 3) Electric vehicles 4) Internal combustion engine vehicles

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Introduction

Electric vehicles (EVs) and internal combustion engines (ICE) have been the subject of much debate in recent years as the world looks for more sustainable and eco-friendly transportation options.Both vehicles have pros and cons, and it can be challenging to determine which type of car is the better option for users. One of the most significant differences between EVs and ICE vehicles is the way they are powered. Electric vehicles are powered by electric motors and rechargeable batteries, while internal combustion engines rely on gasoline or diesel fuel to power the vehicle (Biró and Kiss, 2023, p. 74; Saini, et al., 2023, p. 2089). This fundamental difference significantly impacts the overall performance and environmental impact of each type of vehicle. EVs are often touted for their environmental benefits, as they produce zero emissions and do not rely on fossil fuels. This makes them a much cleaner and more sustainable option than internal combustion engine vehicles. In addition, electric vehicles are often more energy-efficient, as they convert more energy from their fuel source into power for the vehicle. On the other hand, ICE vehicles have been the standard for decades and have a well-established infrastructure for fueling and maintenance. They also tend to have a more extended driving range and can be refueled quickly, making them a more convenient option for long-distance travel (Naik and Nabi, 2024, p. 177).

Regarding performance, EVs are known for their quick acceleration and quiet operation, while internal combustion engine vehicles are often praised for their power and torque. This makes them better suited for towing and hauling heavy loads. When it comes to cost, electric vehicles are often more expensive to purchase upfront, but they typically have lower maintenance and fuel costs over time. In contrast, ICE vehicles have lower upfront costs but can be more expensive to maintain and fuel. EVs are a more sustainable and environmentally friendly option, while ICE vehicles have a more established infrastructure and better performance in certain areas (Mastoi, et al., 2022, p. 11). As technology continues to advance, both options will likely become more viable and competitive in the coming years.

To provide service for a growing number of automobiles in the market, the car maintenance and repair service industry plays a crucial role in ensuring the functionality and longevity of vehicles (Jain, Singh and Kaushik, 2020, p. 117). This industry encompasses various services, including routine maintenance, diagnostics, repairs, and parts replacement. Understanding the dynamics, challenges, and trends within this industry is essential for stakeholders, including service providers, manufacturers, policymakers, and consumers. Despite abundant research highlighting the significance of service quality in car maintenance and repair centers, previous studies have not employed customized dimensions to evaluate customer perception in this context. Therefore, this study attempts to examine the level of each service quality dimension, specifically for the car maintenance and repair service industry in Thailand. Moreover, it aims to compare different perceived service quality dimensions based on engine type (EVs and ICE vehicles). **Objectives**

1. To study the level of service quality of car maintenance and repair service centers in Thailand

2. To compare the level of service quality of car maintenance and repair service centers in Thailand between EVs and ICE vehicles

Literature Review

The Car Maintenance and Repair Service Industry

The car maintenance and repair service industry is essential to the global economy, providing vital services that ensure vehicle safety, efficiency, and longevity. This industry is undergoing significant transformations driven by various trends and factors, including technological advancements, consumer preferences, economic conditions, and regulatory frameworks. Modern vehicles (EVs and ICE) are equipped with advanced systems and components, including electronic control units, sensors, and onboard computers, requiring specialized knowledge and diagnostic tools for maintenance and repairs. One prominent trend is the increasing complexity of vehicle technology. As shown in a study conducted by Jin, et al. (2016, pp. 35-38), they highlight the increasing use of the Internet of Things (IoT), sensors, network communication, and machine automation in real-time diagnostics and prognostics. These technologies enable service providers to enhance equipment monitoring, predict failures, and prevent unexpected downtime. This complexity presents challenges for service providers regarding skill requirements, training, and investment in technological infrastructure. Additionally, advanced technologies such as artificial intelligence (AI) and (IoT) are being increasingly integrated into service practices, enhancing diagnostics and service efficiency (Liu, et al., 2020, pp. 7084-7087).

The shift towards electric and hybrid vehicles is another significant trend impacting the car maintenance and repair service industry. A study by Grosso, et al. (2021, pp. 5-9) supports technology trends in EV maintenance and repair centers by focusing on specialized training, advanced diagnostic tools, battery management, software updates, charging infrastructure, sustainability practices, and remote diagnostics to cater to the unique requirements of electric vehicles. Moreover, car maintenance and repair service providers are implementing environmentally responsible practices to minimize their carbon footprint and reduce environmental impact. This trend reflects customers' growing awareness of environmental issues among consumers and regulatory pressure to adopt sustainable business practices (Gu, et al., 2024, pp. 3-5). For example, Danilecki, et al. (2021, pp. 6-9) attempted to find suitable inventory management to minimize the environmental impact of ICE diesel and petrol automobiles. They found several options, such as frequent replacement of engine oil. Due to fierce competition, this industry faces several challenges, including a widening skill gap caused by insufficient new workers trained to handle modern vehicles (Reolfi, Fuchs and Karplus, 2023, pp. 5-9).



Moreover, car maintenance and repair centers are increasingly challenged by stringent environmental regulations that affect how they operate and the types of services they can offer.

This industry has been continuously flourishing in Thailand, given the country's growing number of vehicles and the shift towards more sustainable transportation options such as EVs. A qualitative study by Preedakorn, Butler and Mehnen (2023, pp. 14-16) showed the opportunities and challenges for the EV industry. For instance, EV usage is expected to decrease air pollution and energy consumption in the country. However, EVs still need help with pricing and technical performance instead of ICE vehicles, hindering their widespread adoption. Building user confidence in EVs requires addressing issues such as charging infrastructure and technological capabilities among Thai manufacturers. For example, Pollio and Rubini (2021, pp. 372-374) compared Thailand's automotive policies with China's, noting that while Thailand attracted foreign investments and became a manufacturing hub, it also faced challenges like a weak local production base and dependency on foreign technologies. About the car maintenance and repair service industry in Thailand, this industry is poised for growth, driven by several key factors. First, the increasing vehicle population in Thailand, fueled by rising middle-class income and consumer preference for private vehicle ownership, indicates a growing demand for maintenance services. Secondly, the shift towards electric vehicles (EVs) necessitates specialized services that many existing auto shops

are currently not equipped to provide. Third, Thailand's strategic automotive policies, aimed at bolstering the domestic auto industry, also extend to the maintenance and repair sector. A study by Lee, Qu and Mao (2021, p. 278) indicates that Thai government incentives and training programs are designed to upscale the capabilities of local auto shops, aligning them with global standards.

Maintenance and repair service serves as a crucial component in facilitating the development of the automobile industry and its associated supply chain at all tiers. This business is essential for ensuring the functionality and longevity of both EVs and ICE vehicles, encompassing a wide range of services including routine maintenance, diagnostics, repairs, and parts replacement. Thai car maintenance industry has been adjusting its service capabilities to cater to electric vehicles, which require different maintenance routines and technical expertise compared to traditional ICE vehicles. The research in Thailand conducted by Osatis and Asavanirandorn (2022, p. 98) shows that there is a growing need for training and equipment upgrades to handle EV-specific issues such as battery management and electrical system diagnostics. Thus, this situation can potentially affect the service offered by EV maintenance and repair centers in comparison to those for traditional ICE vehicles.

Service Quality of Car Maintenance Center

Service quality in the car maintenance and repair industry is a critical area of focus that has garnered significant scholarly attention, particularly as it relates to customer satisfaction and business performance. Despite the importance of service quality, measuring it in the car maintenance and repair industry presents challenges. Variability in-service experiences, subjective customer expectations, and the technical nature of services make standardization difficult. Measuring service quality in car maintenance and repair can be broken down into several dimensions, including tangibles, reliability, responsiveness, assurance, and empathy. These dimensions have been widely discussed in the literature to assess how they influence customer perceptions and satisfaction levels. An influential study by Parasuraman, Zeithaml and Berry (1988, p. 12) introduced the SERVQUAL model, which has been applied in various studies, including those focusing on the automotive after-sale service sector. For example, Balinado, et al. (2021, pp. 117-119) examine the impact of service quality dimensions on customer satisfaction in automotive after-sales service, specifically at Toyota Dasmarinas-Cavite, and found that tangibility, responsiveness, and assurance were identified as having less influence on customer satisfaction compared to reliability and empathy. Later research by Jain, Singh and Kaushik, (2020, p. 117), surveyed interactions with customers at single-brand service centers in India's national capital region and found that responsiveness, reliability, and empathy were identified as significant drivers for customer satisfaction and word-of-mouth in the automobile maintenance and repair industry. More recently, Zygiaris, et al. (2022, pp. 3-6) delves into the impact of service quality on customer satisfaction in the context of the auto care industry in Saudi Arabia post the pandemic. The study found a strong association between SERVQUAL dimensions (tangibles, reliability, responsiveness, assurance, empathy) and perceived service quality, which then affects customer satisfaction. Velimirovic, Duboka and Velimirovic (2022, p. 131) examined the level of service quality dimensions (reliability, special features, responsiveness and empathy, transparency, visual impression, comfort, confidence and assurance, communication) of after-sale vehicle maintenance activities in Serbia. They found that service providers in automotive service stations have equal responsibility to provide the requested high quality to all customers, without a difference in terms of gender, age, and education level.

In Thailand, many service providers attempt to enhance their competitiveness by promoting service standards such as certified trucking services (Patsopa, Bungbua and Krajangjaeng, 2023, p. 43). In addition, service quality of maintenance center for EVs and ICEVs are considerably different. Given the long-standing presence of ICEVs in the market, the service infrastructure and quality expectations differ markedly from the relatively nascent and limited EV service centers. Maintenance centers for ICEVs have had decades to establish and optimize their physical environments. The scope of this study is largescale maintenance and repair centers that are often well-equipped with comprehensive facilities, comfortable waiting areas, and advanced diagnostic tools. On the contrary, EV service centers are generally fewer in number and might still be in the process of scaling up their physical environments. Moreover, newer

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EV centers often feature modern designs and high-tech facilities to match the innovative image of electric vehicles. Although there are several previous studies have investigated the service quality in the service sector in Thailand, very few have examined the factors in the automobile maintenance and repair industry. For example, Chaichinarat, et al. (2018, pp. 104-106) explored the application of the SERVQUAL model to assess customer satisfaction in Thai automotive service sectors, specifically Suzuki Motor. They emphasized that service quality significantly influences customer satisfaction and retention in the Thai market. Their study reveals a strong correlation between perceived service quality and customer loyalty in the automotive service industry. However, since



Methods

Questionnaire Development and Measures

The questionnaire consisted of three sections: demographic information, service quality dimensions, and continuance and recommendation intentions. Initially, the questionnaire was created in the English language and then translated into Thai by research associates proficient in both languages. This translation process was repeated until the the original five dimensions were derived from diverse industries such as finance and retailing, their applicability to the car maintenance and repair service sector may be limited. Therefore, this study aims to incorporate novel dimensions of service quality that are relevant to maintenance and repair centers.

Conceptual Model

The conceptual model illustrates the relationship between the dependent variable, Engine Type, and the independent variable, Service Quality. The engine type, which includes EV and ICEV, is influenced by various dimensions of service quality. The model aims to understand how different aspects of service quality affect the perceptions and preferences of EV and ICEV users, as shown in Figure 1.

Service Quality

- 1. Physical Environment
- 2. Reliability
- 3. Responsiveness
- 4. Empathy
- 5. Price Fairness
- 6. Queue and Waiting Management

Figure 1 Conceptual model

two versions of the questionnaire had no differences in meaning. The final version of the questionnaires was reviewed by industry experts and regular customers in the automobile service industry to improve its validity by addressing any unclear language and uncertainties. Furthermore, the ethics committee of the institutional research board reviewed and approved the final questionnaire prior to conducting the full-scale survey.

Each construct has multiple items drawn from established literature sources. A five-point Likert scale, ranging from 1 (Strongly disagree) to 5 (Strongly agree), was employed to assess all variables. In terms of service quality, The physical environment was assessed using four items sourced from E. Collier, et al. (2014, p. 61) and Chih-Hung Wang (2012, p. 128). Reliability was assessed using four items sourced from Andaleeb and Basu (1994, p. 376), Gencer and Akkucuk (2017, p. 110) and Jain, Singh and Kaushik, (2020, p. 117). Responsiveness was assessed using five items sourced from Andaleeb and Basu (1994, p. 376). Empathy was assessed using three items sourced from Andaleeb and Basu (1994, p. 376). Price fairness was assessed with three items from Dhasan and Aryupong (2019, p. 83) and Andaleeb and Basu (1994, p. 376). Queueing and waiting management were measured using three items from Liang (2016, p. 257) and Liang (2019, p. 543).

Samples and Data Collection

This research employed a quantitative methodology, utilizing a questionnaire survey to collect a significant number of responses. Participants were chosen based on specific criteria, including being aged 20 or older, owning an EV 102 users and ICEV 259 users, and having availed of maintenance and repair services for their EV in the last year. These selected participants play a crucial role in predicting future behaviors such as continuance intention and recommendation intention.

Data Analysis

The data collected in this study were securely stored on a computer protected by

a password and analyzed using statistical software (SPSS). To assess the reliability of each construct, the researchers calculated Cronbach's alpha. The resulting values for Cronbach's alpha coefficient for all the dimensions ranged from 0.700 – 0.897, as shown in Table 2. These values exceeded the threshold value of 0.70, indicating that the scale used in the study was reliable (Nunnally and Bernstein, 1994, p. 275). Descriptive statistics, such as frequency, percentage, and average mean, were used to examine the characteristics and perceptions of the respondents regarding service quality. In the multi-group comparison, inferential statistics such as the t-test were executed.

Results

Participants' demographics

In total, the researchers distributed 500 questionnaires to target participants, of which 397 questionnaires were deemed valid upon their return, resulting in a response rate of approximately 79.4%. Table 1 shows the demographic profiles of the participants, indicating that 50.4% of the respondents were females. Regarding age, 35.3% of the participants belonged to the 30-39 age group, and 37.3% reported being unmarried. In terms of educational background, the majority of the respondents (71.3%) possessed a bachelor's degree, while 43.6% reported a monthly income exceeding 30,001-40,000 Baht.



Demographic	Туре	Frequency	Percentage(%)
Gender	Male	197	49.6
	Female	200	50.4
Age	20-29 years old	138	34.8
	30-39 years old	140	35.2
	40-49 years old	80	20.2
	Above 50 years old	39	9.8
Marital status	Single	148	37.3
	Married without children	119	30.0
	Married with children	130	32.7
Educational attainment	Underbachelor's degree	84	21.2
	Bachelor's degree	283	71.2
	Master's degree	30	7.6
Salary (Baht)	20,001-30,000 Baht	107	26.9
	30,001-40,000 Baht	173	43.6
	40,001-50,000 Baht	65	16.4
	Above 50,001 Baht	52	13.1

Table 1 Demographic Details of Respondents

Table 2 displays the customers' perceptions of the service quality at maintenance and repair centers. Reliability received the highest rating score ($\bar{x} = 4.70$), followed by empathy ($\bar{x} = 4.49$), responsiveness ($\bar{x} = 4.44$), price fairness ($\bar{x} = 4.42$), queuing and waiting management ($\bar{\mathbf{x}} = 4.37$), and physical environment ($\bar{\mathbf{x}} = 4.27$), respectively. These results offer a novel perspective on the different levels of service quality dimensions provided by maintenance and repair centers in Thailand.

Table 2 Perceived service qu	juality of m	naintenance a	and repair	centers
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Construct	Mean	Standard Deviation	Level
Physical Environment (Cronbach's Alpha = 0.799), adapted	4.27	0.68	Very High
from E. Collier et al. (2014), and Chih-Hung Wang (2012)			
- The facility has enough space for customers.	4.34	0.61	Very High
- The facility provides an environment free from danger.	4.25	0.67	Very High
- The entrance of this facility is accessible.	4.27	0.66	Very High
- Visual signs and messages for customers are provided.	4.23	0.78	Very High
Reliability (Cronbach's Alpha = 0.700), adapted from	4.70	0.52	Very High
Andaleeb and Basu (1994)			

Construct	Mean	Standard Deviation	Level
- This center did the work that was promised.	4.78	0.52	Very High
- The service personnel were well trained.	4.65	0.51	Very High
- The service personnel were competent.	4.80	0.52	Very High
- This center fixes faults in cars at the promised time.	4.60	0.53	Very High
Responsiveness (Cronbach's Alpha = 0.812), adapted from Andaleeb and Basu (1994)	4.44	0.63	Very High
- The facility had my appointment scheduled promptly.	4.43	0.65	Very High
- The facility scheduled my appointment near the date I desired.	4.42	0.64	Very High
- Service advisor serves customers promptly.	4.46	0.59	Very High
- Service advisor responds to customers' inquiries.	4.51	0.61	Very High
- The service personnel explained the work to be performed.	4.40	0.66	Very High
Empathy (Cronbach's Alpha = 0.897), adapted from Andaleeb and Basu (1994)	4.49	0.55	Very High
- Service advisors make an effort to understand custom- er needs.	4.52	0.54	Very High
- Service advisors deal with customers in a caring manner.	4.55	0.52	Very High
- Service advisors were polite and helpful.	4.41	0.59	Very High
Price Fairness (Cronbach's Alpha = 0.861), adapted from Dhasan and Aryupong (2019), and Andaleeb and Basu (1994)	4.42	0.55	Very High
- I consider the maintenance and repair pricing policy as fair	4.62	0.56	Very High
- I consider the maintenance and repair pricing policy as ethical.	4.34	0.54	Very High
- I consider the maintenance and repair pricing policy as acceptable	4.30	0.55	Very High
Queuing and waiting for management (Cronbach's Alpha = 0.887) adapted from Liang (2016) and Liang (2019)	4.37	0.56	Very High
- The facility had my appointment scheduled promptly.	4.45	0.51	Very High
- The facility scheduled my appointment near the date I desired.	4.31	0.59	Very High
- I can cope with the waiting time because the the company can control the queuing place effectively.	4.35	0.58	Very High



Multi-group Analysis of Service Quality

A multi-group analysis was conducted to gain a better understanding of the adoption of service quality strategies by car maintenance and repair centers. Specifically, we analyzed two groups; EVs and ICEVs. When comparing these two groups of car users, we found that EV and ICEV user perceptions of the level of service quality provided by car maintenance and repair centers had differences had differences in some dimensions. According to the findings in Table 3, there are a statistically significant differences in the service quality dimensions, such as physical environment, reliability, responsiveness, empathy, and queue and waiting management, between users of EVs and ICEVs but there are no statistically significant differences in price fairness.

Dimensions	Electric vehicles		Internal combustion		oustion	Difference Between	р	
		(EVs)			e vehicles	s (ICEVs)	Evs and ICEVs (t-test)	
	Ā	Rank	SD	Ā	Rank	SD		-
Physical Environment	4.40	6	0.55	4.21	6	0.72	2.38a	0.01*
Reliability	4.89	1	0.31	4.62	1	0.57	4.55a	0.00*
Responsiveness	4.59	3	0.55	4.38	4	0.65	2.87a	0.00*
Empathy	4.69	2	0.47	4.41	2	0.57	4.32a	0.00*
Price Fairness	4.48	4	0.50	4.39	3	0.58	1.30	0.14
Queue and Waiting	4.46	5	0.54	4.34	5	0.57	1.90b	0.05*

Table 3 Comparison of service quality of maintenance and repair centers by engine type

^a Significant at the p<0.05 level; b significant at the p<0.10 level

In detail, when comparing the importance of each dimension, EV users rated physical environment, reliability, responsiveness, empathy, and queue and waiting management as more important than ICEV users.

Conclusion and Discussion

In general, the findings of this study show that the customers' perceptions toward the service quality at maintenance and repair centers emphasize reliability the most, followed by empathy, responsiveness, price fairness, queuing and waiting management, and physical environment, respectively. For both user groups, reliability emerges as the paramount concern, underscoring the universal demand for dependable and consistent service in the automotive sector. This finding suggests that vehicle manufacturers and service providers should prioritize the development and communication of reliable services and features to meet user expectations effectively. As found in the research conducted by Jain, Singh and Kaushik (2020, p. 117) found that reliability was the key driver to enhance customer satisfaction and generate positive WOM. By ensuring that service promises are kept, faults are handled effectively, and services are delivered accurately, service providers can build trust and loyalty among customers. Differences between the groups become apparent in the subsequent rankings of service quality dimensions. These results offer a novel perspective on the different levels of service quality dimensions provided by maintenance and repair centers in Thailand. For EV users, empathy and responsiveness are highly valued, coming in second and third, respectively. This may reflect a desire for more personalized interactions and swift service from providers, possibly driven by the relatively novel and evolving nature of EV technology, where users might seek more reassurance and prompt responses to inquiries and issues.

Conversely, ICEV users place a greater emphasis on empathy and price fairness, followed by responsiveness. The higher ranking of price fairness among ICEV users could be attributed to the mature and competitive market for ICE vehicles, where cost considerations play a significant role in consumer satisfaction and loyalty. This suggests that ICEV service providers need to maintain transparent and competitive pricing to satisfy their customer base.

Interestingly, both groups rank queue and waiting management similarly, indicating a shared expectation across vehicle types for efficient service delivery. However, ICEV users also highly value communication, a dimension that appears less critical for EV users. This could imply that ICEV users, dealing with a more established technology, expect more regular and detailed communication regarding their vehicle service management.

The physical environment ranks lower for EV users, possibly indicating that while important, the tangible aspects of service facilities are overshadowed by interpersonal interactions and the efficiency of service delivery. In contrast, communication ranks lowest for EV users, perhaps due to a stronger reliance on digital communication platforms typically associated with newer technology sectors like EVs.

In addition to the different rankings, EV users rated all service quality dimensions statistically higher than ICEV users, including price fairness. In terms of physical environment, the significantly higher scores for EV users in the physical environment dimension could be reflective of the modern and technologically advanced facilities that often accompany new electric vehicle services. These environments might be designed to align with the innovative image of EV technology, enhancing customer experiences through better aesthetics and functionality.

Regarding reliability, this could be due to the perceived or actual advantages of electric drivetrains, which are often marketed as being less prone to breakdowns and easier to maintain than traditional internal combustion engines. In terms of responsiveness, this might be attributed to the newer business models and customer service practices adopted by EV companies, which may be more agile and customer-focused in responding to inquiries and problems. For empathy, the higher scores for EV users suggest that staff interactions within EV services might be more personable or empathetic, potentially due to targeted training programs aiming to enhance customer relations as a differentiation strategy in the com-



petitive automotive market. Regarding queue and Waiting Management, it indicates that EV services might be better managed in terms of wait times and overall efficiency, possibly leveraging technology to streamline operations.

Surprisingly, no significant differences were found in perceptions of price fairness between EV and ICEV users. This lack of disparity suggests that while EVs might often be more expensive upfront, the perceived value or cost-benefit analysis from the customer's perspective could be comparable to that of ICEVs, likely influenced by factors such as lower ongoing maintenance costs and fuel savings.

Implications and Future Research

According to the findings of this research, here are some targeted implications and strategies for car maintenance and repair centers in Thailand.

Enhancing Physical Environment: Since EV users reported higher satisfaction with the physical environment, repair centers should consider upgrading their facilities to be more welcoming and technologically advanced. This could include modernizing waiting areas, improving the cleanliness and organization of the service floors, and integrating more digital tools for customer engagement.

Focusing on Reliability: Reliability being a significant factor for both EV and ICEV users suggests that repair centers should prioritize high-quality and dependable repair services. This includes using genuine parts, employing certified technicians, and possibly offering extended warranties on repairs to boost customer confidence and satisfaction. Improving Responsiveness: The higher scores in responsiveness among EV users indicate the need for repair centers to adopt quicker and more efficient communication channels. Implementing online booking systems, ensuring timely updates on repair status, and training staff to handle inquiries promptly could address these expectations.

Cultivating Empathy: Training staff to exhibit greater empathy and understanding towards customers can create a more personable service experience. This is particularly important for EV users who might have a high regard for customer service interactions. Programs focusing on customer service skills and understanding the specific needs and concerns of car owners can be beneficial.

Streamlining Queue and Waiting Management: Although the differences were less pronounced in this dimension, improving queue management and reducing wait times can enhance customer satisfaction. Solutions could include more accurate time estimates for services, scheduling optimizations to prevent overbooking, and the use of mobile apps to allow customers to track service progress in real-time.

Addressing Price Fairness: Given that there were no significant differences in perceptions of price fairness, repair centers must ensure transparent and competitive pricing. This includes clear communication about service costs, no hidden charges, and perhaps price-matching policies to reinforce fairness.

Future research can provide a comprehensive and statistically robust examination of the impact of service quality dimensions on automobile user satisfaction by employing multiple regression analysis. This approach will not only validate and extend the current study's findings but also offer valuable insights for enhancing service quality in the automotive sector, ultimately leading to higher user satisfaction and loyalty. Moreover, future research can incorporate a qualitative approach that provides a richer, more nuanced understanding of the impact of service quality on automobile user satisfaction. Qualitative research can uncover deeper insights into the reasons behind user perceptions and satisfaction levels, complementing the findings from quantitative data.

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