
Level of Preparedness of Roadside Mechanics for Handling Modern Vehicle Maintenance in Adamawa State

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Abstract: The main aim of the study was to determine the level of preparedness of roadside mechanics for handling modern vehicle maintenance in Adamawa State. The study was guided by three specific objectives as well as three research questions. The study used a descriptive survey research approach and was conducted in Adamawa State. 755 roadside mechanics made up the study's population. The sample size was 254 respondents selected using a simple random sampling technique based on Krejcie and Morgan's (1970) sample size table. Roadside Mechanics Modern Vehicle Maintenance Handling Questionnaire (RMMVMHQ), a structured questionnaire fashioned by the researcher, was the tool utilized for data collection. Utilizing the Cronbach alpha reliability approach, the instrument's reliability coefficient was determined to be 0.86. The study's data were gathered by the researchers with assistance from two research assistants. The three research questions were answered using the mean statistic. The study revealed that Despite the comfort of advanced diagnostic tools, the apparent lack of technical know-how on essential equipment effectively handling modern vehicle maintenance in the Adamawa State; roadside mechanics' do not have access to up-to-date information and technical resources for diagnosing modern vehicles. The study recommended that the Government should develop and implement a comprehensive training program specifically tailored to equip roadside mechanics with the skills and knowledge required for modern vehicle maintenance; the government should enhance access to up-to-date technical information, tools, and equipment necessary for diagnosing and repairing modern vehicles.

Keywords: *Preparedness, Roadside Mechanics, Modern Vehicle, Maintenance.*

1. INTRODUCTION

The automotive industry in Nigeria has undergone significant transformations in recent years, driven by advancements in vehicle technology and a growing consumer market. With modern



vehicles increasingly equipped with sophisticated electronic systems and complex mechanical components, the demand for skilled roadside mechanics capable of handling their maintenance and repair has surged. This demand is particularly pronounced in regions like Adamawa State, where roadside mechanics serve as the primary point of contact for vehicle owners seeking maintenance services. However, there are concerns about the preparedness of these mechanics to effectively service modern vehicles, given the rapid pace of technological evolution in the automotive sector. This evolution has prompted a corresponding need for modernized maintenance practices to ensure the optimal performance and longevity of vehicles traversing the region's roads. However, the transition towards modern vehicle maintenance presents both opportunities and challenges for automotive professionals and stakeholders in Adamawa State, Nigeria.

Ibrahim and Abdullahi (2019) pointed out the importance of adapting maintenance practices to accommodate the complexities of modern vehicles. Ibrahim and Abdullahi highlighted the inadequacy of traditional repair methods in addressing issues arising from electronic control units (ECUs), sensor networks, and other advanced systems prevalent in contemporary vehicles. This underscores the imperative for automotive technicians in Adamawa State, Nigeria to acquire specialized training and technical expertise to effectively diagnose and rectify modern vehicle malfunctions.

Furthermore, the integration of digital diagnostic tools and computerized systems has become indispensable in modern vehicle maintenance, as demonstrated in a study by Yusuf (2020). Yusuf emphasized the role of diagnostic equipment in accurately identifying faults and streamlining repair processes, thereby minimizing vehicle downtime and optimizing operational efficiency. Consequently, the adoption of such tools represents a crucial step towards enhancing the capabilities of automotive professionals to meet the demands of modern vehicle servicing. Moreover, the advent of electric and hybrid vehicles presents novel challenges and opportunities for modern vehicle maintenance. Ahmad and Musa (2021) asserted the need for mechanics to acquire specialized skills and knowledge to service these environmentally friendly alternatives effectively. From battery management to electric drivetrain components, the maintenance requirements of electric and hybrid vehicles diverge significantly from their conventional counterparts, necessitating ongoing training and upskilling initiatives within the automotive workforce.

In addition to technical proficiency, the provision of high-quality spare parts and consumables is paramount in modern vehicle maintenance. Adamu and Ibrahim (2018) expressed concerns among automotive professionals in Nigeria regarding the proliferation of counterfeit parts in the market, which compromise vehicle performance and safety. Addressing issues related to parts quality and authenticity is essential to safeguarding the integrity of maintenance operations and ensuring customer satisfaction in the Adamawa State.

The role of preventive maintenance strategies cannot be overstated in the context of modern vehicle servicing in Adamawa State, Nigeria. Research by Abubakar (2019) emphasized the importance of proactive maintenance practices in mitigating the risk of unexpected breakdowns



and costly repairs. By adhering to manufacturer-recommended service intervals and conducting routine inspections, automotive technicians can prolong the lifespan of vehicles and minimize operational disruptions for drivers in Adamawa State, Nigeria.

However, despite the evident benefits of modernizing vehicle maintenance practices, challenges persist in terms of infrastructure, access to training, and regulatory frameworks. Bello and Garba (2020) reported the scarcity of specialized training facilities and accredited certification programs for automotive technicians in Adamawa State, Nigeria, limiting their opportunities for skills development and professional advancement. Additionally, the absence of robust regulatory oversight exacerbates concerns regarding service quality and consumer protection within the automotive sector.

The preparedness of roadside mechanics for handling modern vehicle maintenance in Nigeria remains a mixed bag. While many mechanics possess a wealth of practical experience garnered through years of hands-on work, a significant portion lack formal training in modern automotive technologies (Oduami, 2017). This deficiency becomes glaring when faced with the complexities of contemporary vehicles, including electronic systems and computer-controlled components. Limited access to up-to-date information and technical resources further exacerbates the situation, leaving roadside mechanics ill-equipped to diagnose and repair modern vehicles efficiently. Consequently, they often resort to makeshift solutions or trial-and-error methods, which may compromise the quality and safety of maintenance and repairs.

Moreover, addressing the preparedness of roadside mechanics requires a multifaceted approach that encompasses not only technical training but also access to financial resources and business management skills. Okoli and Njoku (2019) emphasized the importance of entrepreneurship education for mechanics to improve their business acumen and financial sustainability. By equipping mechanics with the tools and knowledge needed to manage their enterprises effectively, stakeholders can empower them to thrive in an increasingly competitive automotive market while delivering quality maintenance services to vehicle owners in Adamawa State and beyond. In conclusion, the level of preparedness of roadside mechanics for handling modern vehicle maintenance in Adamawa State is a multifaceted issue with far-reaching implications for economic development, road safety, and consumer satisfaction.

Statement of the Problem

Adamawa State, like many states in Nigeria, relies heavily on roadside mechanics for vehicle repair and maintenance due to limited access to formal automobile workshops. However, with the rapid advancements in automotive technology, particularly in modern vehicles equipped with electronic systems and computer-controlled components, it becomes crucial to assess whether roadside mechanics in Adamawa State are adequately equipped with the necessary skills, knowledge, and resources to meet the demands of modern vehicle maintenance. This study seeks to identify the challenges faced by roadside mechanics in Adamawa State in adapting to modern vehicle technologies and explore potential strategies to enhance their preparedness for addressing these challenges effectively.



Purpose of the Study

The main purpose of the study was to determine the level of preparedness of roadside mechanics for handling modern vehicle maintenance in Adamawa State. Specifically, the study sought to:

1. Roadside mechanics in Adamawa State require evaluation to determine if they possess adequate training to manage the complexities associated with modern vehicle maintenance.
2. Assessing whether roadside mechanics in Adamawa State have access to the necessary up-to-date information for diagnosing and repairing modern vehicles is imperative.
3. Identifying the primary challenges obstructing roadside mechanics in Adamawa State from effectively addressing modern vehicle maintenance issues is essential for devising targeted solutions.

Research Questions

The following research questions guided the study

1. Are roadside mechanics in Adamawa State adequately trained to handle the complexities of modern vehicle maintenance?
2. Do roadside mechanics have access to up-to-date information and technical resources necessary for diagnosing and repairing modern vehicles?
3. What are the main challenges hindering roadside mechanics in Adamawa State from effectively handling modern vehicle maintenance?

2. RELATED WORK

Adesanya, Adeniyi, and Aremu (2018) conducted a comprehensive study examining the myriad challenges encountered by roadside mechanics in modern vehicle maintenance. These challenges include diagnosing complex electronic systems, limited access to up-to-date technical information, and inadequate training in handling modern vehicle technologies. Their research underscores the critical need to address these challenges to enhance the preparedness of roadside mechanics for contemporary automotive repair tasks. Afolayan and Babalola (2019) further explored the effectiveness of existing training programs for roadside mechanics in handling modern vehicle maintenance tasks. Their findings highlighted the necessity of implementing tailored educational initiatives to address skill gaps and provide comprehensive training on electronic diagnostics, computer-controlled components, and other aspects of modern automotive technology. In a complementary study, Adetunji and Obasanya (2020) conducted an in-depth analysis of the challenges faced by roadside mechanics in accessing technical resources such as tools, equipment, and technical manuals. Their research emphasized the critical need for improved infrastructure and the establishment of resource centers to facilitate easier access to essential resources necessary for modern vehicle diagnostics and repairs. Meanwhile, Ojo and Adeyemi (2016) delved into the phenomenon of resistance to technological change among roadside mechanics, identifying factors contributing to reluctance in adopting new repair techniques and equipment. Their findings underscored the importance of interventions aimed at promoting the adoption of modern repair methods to enhance the preparedness of roadside mechanics for contemporary automotive repair tasks.

3. METHODOLOGY

The study used a descriptive survey research approach. According to Gall, Gall, and Borg (1996), a descriptive survey is a type of research that gathers data from a sample that has been chosen to reflect a population to whom the study's results may be applied through the use of a questionnaire or an interview. The research area is Adamawa State, which lies between latitude 6.260 East and longitude 4.920 North East of the country. latitudes 7.6306° E and longitudes 12.3797° N. Adamawa State, located in northeastern Nigeria, is bordered by several states within the country and shares international boundaries with neighboring nations. To the northeast, it is bordered by Borno State, while Gombe State lies to its south. To the southwest, Taraba State marks the boundary, and to the southeast, it shares a border with Cameroon. Additionally, Adamawa State's eastern border is defined by the Republic of Chad. These borders encompass the geographical extent of Adamawa State, delineating its territory both within Nigeria and concerning its international neighbors. 755 roadside mechanics made up the study's population. The sample size was 254 respondents selected using a simple random sampling technique based on Krejcie and Morgan's (1970) sample size table. Roadside Mechanics Modern Vehicle Maintenance Handling Questionnaire (RMMVMHQ), a structured questionnaire fashioned by the researcher, was the tool utilized for data collection. The questionnaire's responses were organized using a 5-point Likert scale. Three experts from the Department of Technology Education at Modibbo Adama University in Yola, Adamawa State, validated the questionnaire. Utilizing the Cronbach alpha reliability approach, the instrument's reliability coefficient was determined to be 0.86. The study's data were gathered by the researchers with assistance from two research assistants. The three research questions were answered using the mean statistic. The decision rule for all items were such that any item scoring 3.50 or higher was regarded as "Agreed", and those scoring less than 3.50 as "Disagreed".

4. RESULTS & DISCUSSION

Research Question 1: Are roadside mechanics in Adamawa State adequately trained to handle the complexities of modern vehicle maintenance?

Table 1: Mean and Standard Deviation of Roadside Mechanics Trained to Handle the Modern Vehicle Maintenance

S/No.	ITEMS	N= 254		
		\bar{x}	δ	Remark
1.	Roadside mechanics in Adamawa State have received sufficient training to diagnose and repair modern vehicle electronic systems	2.19	0.59	Disagreed
2.	Roadside mechanics in Adamawa State possess formal training in handling modern vehicle technologies, such as electronic control units (ECUs) and computer diagnostics	2.09	0.30	Disagreed



3.	Roadside mechanics in Adamawa State actively seek opportunities to update their knowledge through training programs focused on modern vehicle maintenance	3.81	0.44	Agreed
4.	Roadside mechanics in Adamawa State have access to the necessary tools and equipment to effectively handle repairs involving modern vehicle components	2.81	0.40	Disagreed
5.	Roadside mechanics in Adamawa State can efficiently interpret technical manuals and diagnostic codes related to modern vehicle systems	3.70	0.70	Agreed
6.	Roadside mechanics in Adamawa State are comfortable using advanced diagnostic tools for troubleshooting modern vehicle issues	4.09	0.30	Agreed
7.	Roadside mechanics in Adamawa State are aware of the latest advancements in automotive technology vehicle maintenance practices	3.59	0.30	Agreed
8.	Roadside mechanics in Adamawa State believe their training adequately prepared them to handle the complexities associated with modern vehicle maintenance	3.79	0.57	Agreed
9.	Roadside mechanics in Adamawa State actively seek out opportunities to enhance their understanding of modern vehicle technologies and repair techniques	3.92	0.33	Agreed
10.	Roadside mechanics in Adamawa State are confident in their ability to keep up with the evolving demands of modern vehicle maintenance	3.81	0.56	Agreed
	Grand Mean	3.38	0.45	Disagreed

In Table 1, roadside mechanics in Adamawa State demonstrated the highest level of comfort in using advanced diagnostic tools for troubleshooting modern vehicle issues, as evidenced by a mean score of 4.09 with a low standard deviation of 0.30, indicating high agreement among respondents. Conversely, the lowest mean was observed regarding the perception of having access to the necessary tools and equipment to effectively handle repairs involving modern vehicle components, with a mean score of 2.81 and a standard deviation of 0.40, suggesting some variation in responses but overall disagreement with the statement. This contrast highlights the disparity between the perceived proficiency in utilizing diagnostic tools and the perceived accessibility of necessary equipment among roadside mechanics in Adamawa State. Despite the comfort of advanced diagnostic tools, the apparent lack of access to essential equipment poses a significant challenge to effectively handling modern vehicle maintenance in the Adamawa State.

Research Question 2: Do roadside mechanics have access to up-to-date information and technical resources necessary for diagnosing and repairing modern vehicles?

Table 2: Mean and Standard Deviation of Roadside Mechanics Access to Up-To-Date Information and Technical Resources for Diagnosing Modern Vehicles

S/No.	ITEMS	N= 254		Remark
		\bar{x}	δ	
11.	Roadside mechanics have easy access to up-to-date technical manuals and guides for modern vehicle diagnostics and repairs	3.19	0.59	Disagreed
12.	Roadside mechanics receive frequent training or updates on the latest advancements in automotive technology	3.09	0.30	Disagreed
13.	There is sufficient availability of specialized tools and equipment required for diagnosing/repairing modern vehicles at roadside mechanic workshops	2.91	0.30	Disagreed
14.	Roadside mechanics feel confident in their ability to utilize electronic diagnostic tools effectively for troubleshooting modern vehicle issues	3.59	0.30	Agreed
15.	Roadside mechanics have access to databases containing information on modern vehicle systems components	3.91	0.59	Agreed
16.	Roadside mechanic workshops regularly invest in upgrading their technical resources to keep pace with advancements in automotive technology	3.67	0.49	Agreed
17.	Roadside mechanics encounter challenges in accessing timely resources necessary for diagnosing and repairing modern vehicles	3.89	0.30	Agreed
18.	Roadside mechanics feel adequately supported by manufacturers in terms of providing technical assistance	2.81	0.44	Disagreed
19.	There is a lack of training programs available to improve the skills of roadside mechanics in handling modern vehicle maintenance	3.79	0.51	Agreed
20.	Better access to up-to-date information and technical resources would enhance the ability of roadside mechanics to diagnose and repair modern vehicles effectively	3.99	0.30	Agreed
	Grand Mean	3.48	0.41	Disagreed

Table 2 presents the mean and standard deviation of roadside mechanics' access to up-to-date information and technical resources necessary for diagnosing and repairing modern vehicles. Notably, the item with the highest mean score, indicating agreement among respondents, is "Roadside mechanics have access to databases containing information on modern vehicle systems components" ($\bar{x} = 3.91$, $\delta = 0.59$). Conversely, the item with the lowest mean score, indicating disagreement, is "There is sufficient availability of specialized tools and equipment required for diagnosing/repairing modern vehicles at roadside mechanic workshops" ($\bar{x} = 2.91$, $\delta = 0.30$). The grand mean score of 3.48 indicates an overall disagreement regarding roadside mechanics' access to up-to-date information and technical resources for diagnosing modern vehicles.



Research Question 3: What are the main challenges hindering roadside mechanics in Adamawa State from effectively handling modern vehicle maintenance?

Table 3: Mean and Standard Deviation of Main Challenges Hindering Roadside Mechanics Effectively Handling Modern Vehicle Maintenance

S/No.	ITEMS	N= 254		
		\bar{x}	δ	Remark
21.	Lack of formal training in modern vehicle technologies	3.93	0.80	Agreed
22.	Limited access to up-to-date technical information	4.09	0.83	Agreed
23.	Insufficient availability of specialized tools and equipment	4.19	0.74	Agreed
24.	Resistance to change and reluctance to adopt new technologies	4.33	0.65	Agreed
25.	Complexity of modern vehicle systems	4.14	0.73	Agreed
26.	Lack of access to formal certification programs	4.29	0.85	Agreed
27.	Inadequate infrastructure and workshop facilities	4.24	0.70	Agreed
28.	Difficulty in diagnosing electronic and computer-controlled systems	4.10	0.70	Agreed
29.	High cost of acquiring modern diagnostic equipment	3.86	1.06	Agreed
30.	Lack of support and collaboration from automobile manufacturers	3.90	1.09	Agreed
	Grand Mean	4.12	0.82	Agreed

Table 3 presents the mean and standard deviation of the main challenges hindering roadside mechanics in Adamawa State from effectively handling modern vehicle maintenance. Among the challenges identified, the highest mean was recorded for "Resistance to change and reluctance to adopt new technologies" ($\bar{x} = 4.33$, $\delta = 0.65$), indicating that roadside mechanics in Adamawa State face significant hurdles in embracing and incorporating new technological advancements into their practices. On the other hand, the challenge with the lowest mean was "High cost of acquiring modern diagnostic equipment" ($\bar{x} = 3.86$, $\delta = 1.06$). The grand mean was 4.12, with a standard deviation of 0.82, indicating a general agreement among respondents regarding the challenges faced by roadside mechanics in Adamawa State in handling modern vehicle maintenance effectively.

Findings of the Study

1. Roadside mechanics in Adamawa State actively sought opportunities to update their knowledge through training programs focused on modern vehicle maintenance and are comfortable using advanced diagnostic tools, yet they lack sufficient training to diagnose and repair modern vehicle electronic systems and possess formal training in handling modern vehicle technologies, resulting in a disagreement on the overall adequacy of their training.
2. The roadside mechanics in Adamawa State encounter do not have access to up-to-date technical resources necessary for diagnosing and repairing modern vehicles.
3. Roadside mechanics in Adamawa State face challenges such as insufficient formal training, limited access to up-to-date technical information, inadequate tools and equipment,



resistance to technological change, complexity of modern vehicle systems, absence of formal certification programs, inadequate infrastructure, difficulty in diagnosing electronic systems, high equipment costs, and lack of support from automobile manufacturers.

Findings

The findings revealed that roadside mechanics in Adamawa State actively sought opportunities to update their knowledge through training programs focused on modern vehicle maintenance and are comfortable using advanced diagnostic tools, yet they lack sufficient training to diagnose and repair modern vehicle electronic systems and possess formal training in handling modern vehicle technologies, resulting in a disagreement on the overall adequacy of their training. The finding is in agreement with Adeniyi et al. (2020) found that a significant portion of roadside mechanics expressed a lack of confidence in their training level regarding modern vehicles. This finding is consistent with Ogunmuyiwa and Akinlabi (2021) and Osuagwu (2018), who similarly identified a gap in formal training among roadside mechanics in Nigeria. The absence of adequate training poses a significant challenge for roadside mechanics, limiting their ability to effectively diagnose and repair modern vehicles, which are increasingly complex due to advancements in technology.

The lack of access to up-to-date technical resources among roadside mechanics in Adamawa State reflects a pervasive challenge that hampers their ability to effectively diagnose and repair modern vehicles. Adesanya (2018) roadside mechanics often operate in environments where technological infrastructure and resources are limited, hindering their access to current technical information essential for keeping pace with advancements in automotive technology. This limitation is further stressed by Afolayan and Babalola (2019), who emphasize the struggles of mechanics in regions like Adamawa State, where access to up-to-date technical resources is constrained by factors such as geographical remoteness and inadequate technological infrastructure. The findings of Ogunmuyiwa and Akinlabi (2021) add weight to this argument, stressing the urgent need to enhance access to technical information for roadside mechanics, particularly through the utilization of mobile technology, in areas where traditional means of resource dissemination are lacking or inefficient.

Roadside mechanics in Adamawa State encounter a myriad of challenges that significantly impede their effectiveness in the realm of modern vehicle maintenance. Chief among these challenges is the deficiency in formal training, a critical issue highlighted by Adesanya (2018), as many mechanics often rely on informal apprenticeships or self-learning methods, lacking structured education on modern vehicle technologies. Compounding this is the limited access to up-to-date technical information, a problem exacerbated by connectivity issues and the inadequate availability of updated manuals and resources, as underscored by Afolayan & Babalola (2019). Moreover, roadside mechanics face hurdles stemming from the absence of specialized tools and equipment essential for diagnosing and repairing modern vehicles, as pointed out by Adetunji & Obasanya (2020).



5. CONCLUSION

In conclusion, the study sheds light on the current state of preparedness of roadside mechanics in Adamawa State for handling modern vehicle maintenance. Findings reveal significant challenges ranging from inadequate formal training and limited access to up-to-date technical information to insufficient tools and equipment, resistance to technological change, and complexities in modern vehicle systems. Moreover, the absence of formal certification programs, inadequate infrastructure, difficulty in diagnosing electronic systems, high equipment costs, and lack of support from automobile manufacturers further exacerbate the situation. Addressing these multifaceted challenges requires collaborative efforts among stakeholders, including government agencies, educational institutions, automobile manufacturers, and grassroots organizations, to provide tailored training programs, improve access to resources, and enhance infrastructure to ensure the competency and efficacy of roadside mechanics in meeting the demands of modern vehicle maintenance in Adamawa State.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. The Government should develop and implement a comprehensive training program specifically tailored to equip roadside mechanics with the skills and knowledge required for modern vehicle maintenance.
2. The government should enhance access to up-to-date technical information, tools, and equipment necessary for diagnosing and repairing modern vehicles. This can be achieved through initiatives such as establishing resource centers equipped with technical manuals, and providing subsidized access to diagnostic tools and equipment.
3. There should be a foster collaboration and support mechanisms between government agencies, educational institutions, automobile manufacturers, and roadside mechanic associations to address challenges such as infrastructure development, certification programs, and access to financial assistance to roadside mechanics to effectively handle modern vehicle maintenance challenges in Adamawa State.

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