

Safety and health practices on preventive maintenance services of automotive shops in Guinobatan Albay

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Abstract

This study assessed the safety and health practices in preventive maintenance services of automotive shops in Guinobatan, Albay. Specifically, it examined the profile of automotive shops in terms of physical structure, manpower, tools, and equipment, as well as the extent of safety and health practices in automotive engine, drive train, suspension, and steering system maintenance. The study was anchored on the assumption that automotive shops differ in their profiles and safety practices and that these differences can be used to design an instructional guide. It employed a descriptive-correlational design involving 70 Senior High School TVL students from Marcial O. Ranola Memorial School assigned to seven automotive shops in Guinobatan, Albay.

Findings revealed that automotive shops have strong availability of basic facilities, trained manpower, and essential tools and equipment, but have notable deficiencies in hazardous materials storage, ventilation, and advanced diagnostic tools. Chi-square results showed no significant relationship between physical set-up and manpower profiles and safety practices, while significant relationships were found between tools and equipment availability and safety and health practices. Based on these results, a Practical Guide on Preventive Maintenance for Automotive Industry was developed to address gaps in PPE usage, chemical handling, and safety procedures. The guide includes systematic preventive maintenance procedures, safety policies, proper tool use, waste management, emergency preparedness, and safety reminders designed for Senior High School Automotive Technology students. The study concludes that while automotive shops demonstrate functional capability and moderate safety compliance, improvements are needed in safety infrastructure and equipment.

Keywords: Safety and health practices; Preventive maintenance services; Automotive shops; Descriptive-correlational design

1. Introduction

In today's rapidly evolving automotive industry, maintaining high standards of occupational safety and health (OSH) has become a global priority. Automotive service workplaces are inherently exposed to various hazards, including chemical exposure, mechanical injuries, fire risks, and ergonomic concerns. These risks not only threaten workers' well-being but also impact service efficiency, quality, and environmental sustainability. Hence, the implementation of comprehensive safety and health practices is essential in ensuring a safe working environment and improving overall productivity in the automotive sector.

Preventive maintenance is a fundamental aspect of automotive servicing that ensures the longevity, reliability, and performance of vehicles. It requires the use of specialized tools, equipment, and hazardous materials, making strict compliance with safety protocols necessary. Without proper implementation of safety measures, workers may be

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exposed to accidents, injuries, and long-term health risks. Thus, evaluating the extent to which safety and health practices are implemented in automotive shops is crucial for both worker protection and service excellence.

The automotive industry continues to expand due to the increasing number of vehicles operating nationwide, resulting in a higher demand for automotive services. Consequently, safety and health practices have become more critical in ensuring efficient and reliable vehicle maintenance and repair. Preventive maintenance services are not only aimed at delivering quality service but also at preventing damage to vehicle components and ensuring operational safety.

In Guinobatan, Albay, the number of automotive shops has significantly increased, from ten (10) shops in 2014 to approximately thirty-four (34) registered and non-registered establishments at present. These shops, mostly owned by local residents, provide repair and preventive maintenance services while striving to ensure quality service and environmental responsibility. However, despite this growth, there is a need to assess whether these establishments consistently implement proper safety and health practices in their operations.

Despite the presence of several standards and the increasing number of automotive shops, there is a need to evaluate whether safety and health practices are consistently and effectively implemented, particularly in preventive maintenance services. The growing demand for skilled automotive technicians further emphasizes the importance of ensuring that safety protocols are properly observed. Hence, this study is conducted to assess the safety and health practices of automotive shops, identify gaps in implementation, and develop a Preventive Maintenance Guide for the Automotive Industry. This guide aims to assist automotive shop operators and workers in improving their safety practices, enhancing service quality, and ensuring compliance with regulatory and environmental standards.

1.1. Statement of the Problem

This study aimed to assess the safety and health practices in the preventive maintenance services of automotive shops in Guinobatan, Albay. Specifically, it seeks to answer the following questions:

- What is the profile of automotive shops in Guinobatan Albay along:
 - Physical
 - Manpower
 - Tools
 - Equipment
- What are the safety and health practices on the preventive maintenance along:
 - Automotive Engine Maintenance
 - Maintenance of Drive Train
 - Maintenance of Suspension System
 - Maintenance of Steering System
- Is there a significant relationship between the profile and their safety and health practices?
- What instructional material can be proposed based on the findings?

1.2. Scope and Delimitation

This study primarily focuses on determining the profile of automotive shops in Guinobatan, Albay in terms of physical profile, manpower profile, and tools and equipment profile. It also examines the safety and health practices observed in preventive maintenance services, specifically in the areas of automotive engine maintenance, drive train maintenance, suspension system maintenance, and steering system maintenance.

The respondents of the study consist of seventy (70) Senior High School students under the Technical-Vocational-Livelihood (TVL) track who are undergoing work immersion at Marcial O. Ranola Memorial School in Guinobatan, Albay. These students are assigned to a total of seven (7) automotive shops within the municipality, comprising three (3) registered and four (4) non-registered establishments. A total enumeration sampling technique was employed to include all identified respondents and participating automotive shops in the study. The data collection period covered August 2024 to March 2026.

This study is delimited to the assessment of selected automotive shops within Guinobatan, Albay and is limited to the perspectives of student-respondents undergoing work immersion. It does not include automotive shops outside the identified locale, nor does it consider the perspectives of shop owners, professional mechanics, or customers.

Furthermore, the study is confined only to the specified aspects of preventive maintenance and does not cover other automotive services such as major repairs, diagnostics, or body works.

2. Materials and Methods

2.1. Research Method

This study employed the descriptive research method to gather and analyze the data needed in determining the safety and health practices on preventive maintenance services in automotive shops in Guinobatan, Albay. Descriptive research is a systematic method of investigation that aims to accurately and objectively describe the characteristics, behaviors, or conditions of a particular group or phenomenon as it naturally occurs, without manipulating any variables. It focuses on answering questions such as what, where, when, and how regarding a specific subject.

The descriptive method is appropriate for this study because it seeks to present the existing conditions of automotive shops and their safety and health practices without any experimental intervention. It allows the researcher to observe, document, and analyze real-life practices as they are currently implemented in the field. In this study, the method was used to provide a clear and factual description of how preventive maintenance services are carried out and how safety and health measures are practiced by automotive personnel.

Specifically, the method was used to describe the profile of automotive shops in terms of physical profile, manpower profile, and tools and equipment profile. It also examined the safety and health practices observed in preventive maintenance activities such as automotive engine maintenance, drive train maintenance, suspension system maintenance, and steering system maintenance. Through the responses of the participants, the study was able to present an accurate picture of the current operational practices of automotive shops in real settings.

According to Marczyk, DeMatteo, and Festinger (2014)¹, descriptive research is useful because it provides information about the average characteristics or performance of a group. In this study, this enabled the researcher to identify common patterns and practices among automotive shops and workers in Guinobatan, Albay. Similarly, Fraenkel, Wallen, and Hyun (2013)² stated that descriptive research aims to present a detailed and accurate picture of a situation, which supports the objective of this study to systematically describe the existing safety and health practices based on the respondents' experiences and perceptions.

Furthermore, Weiss (2011)³ emphasized that descriptive research helps identify what is currently happening and provides a basis for improvement by understanding existing conditions. In this study, the descriptive method was applied through the collection of data from automotive shop owners, mechanics, and helpers using appropriate research instruments such as surveys or questionnaires. The collected data were then analyzed and interpreted to determine the level of safety and health practices and their relationship to the profile of the automotive shops. Through this process, the study generated factual and evidence-based information that can serve as a basis for improving safety practices and developing instructional materials for Automotive Technology.

2.2. Respondents of the Study

The respondents of this study consisted of seventy (70) Senior High School students under the Technical-Vocational-Livelihood (TVL) track who underwent work immersion in the various automotive shops in Guinobatan, Albay

2.3. Data Gathering Tools

In this study, the primary instrument used for data gathering was a questionnaire-checklist, which was supplemented by informal interviews, library research, documentary analysis, and online sources.

Questionnaire The questionnaire served as the main research tool for collecting data from the respondents. It was designed to obtain relevant information regarding the safety and health practices in preventive maintenance services of automotive shops. The data gathered through the questionnaire were essential in analyzing and interpreting the responses, which enabled the researcher to arrive at valid conclusions.

Creswell (2012)⁴ stated that questionnaires are effective in exploring various aspects of a phenomenon under study. Similarly, Bulmer (2012) described the questionnaire as a well-established instrument in social science research for gathering information about participants' characteristics, behaviors, attitudes, and beliefs related to a specific topic.

Preparation of the Questionnaire. The questionnaire was prepared after an extensive review of related literature and studies, which served as the basis for constructing relevant items aligned with the objectives of the study. The researcher ensured that the questionnaire met the criteria set by Fox (2014), including clarity of language, specificity of content, singleness of purpose, linguistic completeness, grammatical consistency, and freedom from bias or leading questions. Consideration was also given to the time required for respondents to complete the instrument.

The initial draft of the questionnaire was submitted to the research adviser and the Dean of the Graduate School and Research for evaluation and critique. Their suggestions and recommendations were incorporated to improve the quality of the instrument. After revisions, the final draft was prepared for pilot testing.

Validation of Questionnaire. To ensure the validity and clarity of the instrument, a pilot test was conducted. This process helped identify issues such as vague wording, unclear directions, and duplication of items. The feedback gathered during the dry run was carefully reviewed, and necessary revisions were made.

A set of questionnaires was administered to selected Senior High School TVL students who were not part of the actual respondents. They were asked to provide comments and suggestions for each item. Based on their responses, the questionnaire was further refined to ensure its reliability and appropriateness for the study.

Administration and Retrieval of the Questionnaire. Prior to the administration of the questionnaire, a formal request was made to the automotive shop owners to seek permission to conduct the study among the respondents. Upon approval, the researcher personally distributed the questionnaires to the identified respondents.

After the completion of the questionnaires, the researcher collected and retrieved all responses. The data gathered were then systematically organized, tabulated, analyzed, and interpreted using both quantitative and qualitative approaches.

3. Results and Discussion

3.1. Profile of Automotive Shops in Guinobatan Albay

The profile of automotive shops in Guinobatan, Albay provides an essential basis for understanding their operational capacity and readiness in delivering preventive maintenance services. It encompasses key aspects such as the physical structure and layout of the shops, the qualifications and number of personnel, and the availability of tools and equipment necessary for automotive servicing. Examining these elements allows for a clearer assessment of how well-equipped and organized these establishments are in performing their functions. Moreover, analyzing the profile of automotive shops helps identify strengths and limitations that may influence the implementation of safety and health practices, thereby serving as a foundation for improving service quality and workplace conditions.

Physical. The physical profile of automotive shops in Guinobatan, Albay refers to the physical structure, layout, and overall working environment of the establishments where automotive services are conducted. It includes the size of the shop, workspace arrangement, ventilation, lighting, cleanliness, and availability of service areas for different types of preventive maintenance activities. Assessing the physical profile is important in determining whether the shops provide a safe, organized, and efficient working environment for both workers and trainees. It also helps identify possible physical constraints or deficiencies that may affect the quality-of-service delivery and the implementation of proper safety and health practices in automotive maintenance operations.

Table 1 Profile of Automotive Shops in Guinobatan Albay in terms of Physical

Indicators	Frequency	Percentage %
Tool Storage Area	68	97.14
Wash Area	67	95.71
Comfort Room	62	88.57
Storage Area for Chemicals Hazardous Materials	48	68.57
Waste Disposal and Recycling Area	63	90.00
Ventilation	51	72.86

Service Bay	63	90.00
Inspection and Diagnostic Area	61	87.14
Parts Storage Room	67	95.71
Customer Reception and Waiting Area	60	85.71
Office Area	63	90.00

Table 1 reveals that Tool Storage Area is the highest among all indicators, followed closely by Wash Area and Parts Storage Room, both at 95.71 percent. Several indicators such as Waste Disposal and Recycling Area, Service Bay, and Office Area also show high presence at 90.00 percent. This pattern indicates that most automotive shops prioritize facilities that directly support daily repair operations, workflow efficiency, and customer service functions. High availability of tool storage and parts storage reflects organized work systems that support faster retrieval of equipment and reduced service delays. High presence of wash areas and service bays indicates that most shops are structured to handle routine automotive servicing activities in a standardized manner. Comfort rooms, inspection areas, and customer reception spaces also show relatively strong presence, suggesting attention to both worker welfare and client accommodation.

Storage Area for Chemicals Hazardous Materials obtained the lowest percentage at 68.57 percent, followed by Ventilation at 72.86 percent. These results indicate limited compliance in areas directly associated with occupational safety and environmental protection. The low level of hazardous materials storage suggests that some shops may not have dedicated or properly designed containment systems for oils, solvents, batteries, and other toxic substances. This condition increases exposure risks for workers and raises the possibility of improper disposal practices. Limited ventilation indicates potential accumulation of fumes, dust, and chemical vapors inside work areas, which may affect respiratory health and overall workplace safety. Widyarsana, Mulayadi, and Tambunan (2022)⁵ found that inadequate hazardous waste systems in automotive shops contribute significantly to environmental contamination, particularly through improper handling of used oil and metal waste. Velazquez et al. (2023)⁶ reported that many automotive repair environments operate with insufficient safety infrastructure, exposing workers to chemical hazards and poor air quality conditions. Gyimah, Gyimah, and Stemn (2022)⁷ confirmed that poor waste handling practices in mechanic shops are linked to soil contamination and long-term environmental risks. These findings align with the present results, indicating that compliance is stronger in operational facilities compared to safety and environmental control systems. The pattern reflects a focus on service efficiency while safety infrastructure remains less developed in several establishments.

It can be inferred that automotive shops in Guinobatan Albay demonstrate functional readiness in terms of operational and customer service facilities, yet gaps in safety-oriented infrastructure remain evident. The uneven distribution of physical indicators suggests that development priorities are centered on productivity and service delivery rather than environmental protection and occupational health.

Manpower. The manpower profile of automotive shops in Guinobatan, Albay refers to the composition, qualifications, and adequacy of personnel working in the establishments. It includes the number of workers, their job positions such as mechanics and helpers, educational background, technical skills, training, and work experience in automotive servicing. Evaluating the manpower profile is essential in determining whether the shops have sufficient and competent personnel to perform preventive maintenance services effectively and safely. It also provides insight into the capability of workers to comply with safety and health standards, as well as their ability to carry out specialized automotive tasks with efficiency and accuracy.

Table 2 Profile of Automotive Shops in Guinobatan Albay in terms of Manpower

Indicators	Frequency	Percentage %
With Automotive Servicing NC 1 or 2	58	82.86
With relevant experience as mechanic	53	75.71
With relevant training in automotive	61	87.14
With driving experience	39	55.71

Table 2 shows that relevant training in automotive has the highest percentage at 87.14 percent followed by Automotive Servicing NC I or II at 82.86 percent. This indicates that most workers possess formal preparation and recognized certification related to automotive services, reflecting a generally competent workforce in terms of technical foundation. Relevant experience as mechanic at 75.71 percent suggests that a substantial number of workers acquired skills through practice in actual shop settings, reinforcing hands on capability in repair and maintenance tasks. Driving experience at 55.71 percent obtained the lowest result, indicating that almost half of the workforce may have limited exposure in operating vehicles which may affect diagnostic familiarity during road testing procedures. The presence of certification and training aligns with Pampolina, Moreno, and Reyes (2020)⁸ who emphasized that structured technical preparation strengthens maintenance efficiency and reduces operational errors in automotive work. Algabre, Argente, and Marudo (2020)⁹ supported that formal training systems contribute to improved service reliability and reduced equipment failure in automotive operations. Sanchez, Pacia, and Palmos (2020)¹⁰ noted that trained personnel demonstrate higher compliance with safety standards and better operational discipline in workshop environments. The pattern of results suggests that workforce competence is anchored more on formal training and certification than on practical driving exposure.

Tools. The tools profile of automotive shops in Guinobatan, Albay refers to the availability, condition, and adequacy of the instruments and machinery used in performing preventive maintenance services. It includes basic hand tools, diagnostic tools, lifting equipment, and other specialized devices necessary for automotive engine, drive train, suspension, and steering system maintenance. Assessing this profile is important in determining whether the shops are properly equipped to carry out maintenance tasks safely, efficiently, and in accordance with standard procedures. It also helps identify limitations in tools and equipment that may affect service quality, workplace safety, and the overall performance of automotive maintenance operations.

Table 3 Profile of Automotive Shops in Guinobatan Albay in terms of Tools

Indicators	Frequency	Percentage %
Tire pressure gauge	54	77.14
Fender cover	53	75.71
Seat cover	58	82.86
Shift Knob cover	43	61.43
Bucket	59	84.29
Floor mat cover	48	68.57
Pliers set	50	71.43
Screwdriver set	66	94.29
Belt Tension gauge	41	58.57
Spark plug wrench	60	85.71
Oil filter wrench	65	92.86
Spark plug gauge	47	67.14
Spark plug cleaner	39	55.71
Caddy	19	27.14
Oil bucket	51	72.86
Drain bucket	58	82.86
Box wrench set	60	85.71
Open end wrench set	64	91.43
Socket wrench set	67	95.71
Tire wrench	67	95.71
Torque wrench	59	84.29

Table 3 reveals that socket wrench set and tire wrench obtained the highest percentage at 95.71 percent followed by screwdriver set at 94.29 percent, oil filter wrench at 92.86 percent, and open end wrench set at 91.43 percent. These results indicate that most automotive shops are well equipped with essential hand tools used in routine repair, maintenance, and mechanical adjustment tasks. The strong presence of basic mechanical tools suggests that common servicing activities such as tire replacement, bolt tightening, oil filter removal, and general engine work are adequately supported across most establishments. Spark plug wrench, box wrench set, seat cover, bucket, drain bucket, and torque wrench also show high availability ranging from 82.86 percent to 85.71 percent, reflecting consistent access to tools that support both precision work and protection of vehicle components during repair procedures. Tire pressure gauge and fender cover reflect moderate availability, indicating that diagnostic and protective equipment is present but not uniformly prioritized in all shops.

Caddy obtained the lowest percentage at 27.14 percent followed by spark plug cleaner at 55.71 percent and belt tension gauge at 58.57 percent. These results indicate limited availability of specialized tools used for advanced diagnostics, cleaning precision components, and engine performance calibration. The low presence of caddy suggests that organized tool mobility systems are rarely used, which may affect efficiency in tool handling and workflow organization. Limited availability of belt tension gauge and spark plug cleaner reflects gaps in precision maintenance capability, particularly in engine tuning and performance optimization tasks. Widyarsana, Mulayadi, and Tambunan (2022) noted that many automotive shops prioritize general repair tools while specialized diagnostic equipment is often lacking due to cost and accessibility constraints. Velazquez et al. (2023) emphasized that insufficient advanced tools in workshops contribute to inconsistent maintenance quality and limited technical precision in servicing operations. Algabre, Argente, and Marudo (2020) highlighted that structured and complete tool systems improve efficiency and reduce service delays in automotive maintenance environments. The pattern of results suggests that tool availability is stronger in basic mechanical equipment compared to specialized diagnostic and organizational tools.

Equipment. Equipment in automotive shops refers to the machines, devices, and mechanical systems used in performing various preventive maintenance and repair activities. In automotive shops in Guinobatan, Albay, this includes equipment such as hydraulic lifts, air compressors, tire changers, wheel balancers, welding machines, and diagnostic tools that support efficient servicing of vehicles. The availability and proper functioning of equipment are essential in ensuring accurate, safe, and efficient automotive maintenance operations. Proper use and maintenance of these equipment also contribute to workplace safety and help prevent accidents and operational delays during servicing activities.

Table 4 Profile of Automotive Shops in Guinobatan Albay in terms of Equipment

Indicators	Frequency	Percentage %
Vehicle Lifter	38	54.29
Air Compressor	57	81.43
Air hose reel	51	72.86
Engine oil drain	57	81.43
Jack	69	98.57
Wedge	30	42.86
Trouble light	38	54.29
Service creeper	26	37.14

Table 4 reveals that jack obtained the highest percentage at 98.57 percent, showing that nearly all automotive shops depend on this basic lifting equipment for repair and maintenance tasks. The pattern suggests that most shops maintain basic functional equipment needed for repair work while advanced safety and ergonomic tools are less commonly available. Studies by Velazquez et al. (2023) found that many automotive repair shops operate with basic equipment and limited safety-support tools which affects worker protection and working conditions.

Automotive Engine Maintenance. Automotive engine maintenance refers to the set of preventive maintenance activities performed to ensure the proper functioning, efficiency, and safety of vehicle engines in automotive shops in Guinobatan, Albay. It includes routine inspection, cleaning, lubrication, tuning, and replacement of engine components such as filters, spark plugs, belts, and fluids. These activities are essential in preventing engine failure, reducing

breakdowns, and maintaining optimal vehicle performance. In relation to safety and health practices, automotive engine maintenance also involves the proper handling of tools, use of protective equipment, and observance of safety procedures to prevent accidents and exposure to harmful substances during servicing operations.

Table 5 Safety and Health Practices on the Preventive Maintenance along Automotive Engine Maintenance

Indicators	WM	VI	Rank
Raising organic hogs.	3.36	MoC	1
Raising organic small ruminants.	3.31	MoC	3
Raising organic goats and sheep.	3.33	MoC	2
Raising organic rabbits.	3.30	MoC	4
Average Weighted Mean	3.33	MoC	

Legend:

Scale	Range	Verbal Interpretation
1	1.00 – 1.79	Never (N)
2	1.80 – 2.59	Seldom (S)
3	2.60 – 3.39	Sometimes (So)
4	3.40 – 4.19	Often (O)
5	4.20 – 5.00	Always (A)

Table 5 shows that automotive shops consistently perform routine preventive maintenance activities that directly affect engine performance, fuel efficiency, and immediate operational reliability. These practices are closely linked to basic engine care procedures that are commonly required during regular servicing. Hinrichs and Prifti (2023)¹¹ highlighted that maintenance practices that are regularly applied contribute to better system performance and reduced operational risks. The present findings align with these studies since most engine maintenance practices are often performed, while some critical procedures remain inconsistently applied.

Maintenance of Drive Train. It involves the inspection, servicing, and repair of key components such as the clutch, transmission, driveshaft, differential, and axles. These components are essential in transferring power from the engine to the wheels, making their proper maintenance critical to vehicle performance and safety. In relation to safety and health practices, drive train maintenance requires the careful handling of heavy parts and tools, proper use of protective equipment, and strict adherence to standard procedures to prevent injuries and ensure safe and efficient servicing operations.

Table 6 The Summary of Results of the Level of Students' Competencies in Organic Agricultural Production through the Use of Hands-On Learning

Indicators	WM	VI	R
Wearing safety goggles	3.39	So	9
Using mechanic gloves	3.87	O	6
Wearing safety shoes	3.61	O	7
Wearing face mask	2.77	So	10
Using hoist when lifting heavy components like transmissions and differentials.	3.51	O	8
Ensuring tools are clean and in good condition before use	4.01	O	5
Always using the right tools to avoid damage and injury	4.31	A	2
Keeping floors free of oil spills	4.04	O	4

Using wheel chocks and secure the vehicle properly before working underneath	4.37	A	1
Having first aid kits and emergency contact numbers accessible	4.17	O	3
Average Weighted Mean	3.81	O	

Table 6 indicates that safety practices in drive train maintenance are generally well observed in terms of equipment handling and operational control, while personal protective behaviors remain less consistent. This suggests that workers prioritize accident prevention during mechanical operations but give less attention to personal health protection measures during servicing tasks.

4. Summary of Safety and Health Practices on Preventive Maintenance

This summary serves as an integrated view of the overall safety and health performance of automotive shops, highlighting their compliance with safety standards and identifying areas that may require improvement to ensure a safer and healthier working environment.

Table 7 Summary of Safety and Health Practices on Preventive Maintenance

Parameters	WM	VI	R
Automotive Engine Maintenance	3.67	O	4
Maintenance of Drive Train	3.81	O	2.5
Maintenance of Suspension System	3.81	O	2.5
Maintenance of Steering System	3.91	O	
Over-all Average Weighted Mean	3.80	O	

Table 7 presents the summary of safety and health practices on preventive maintenance. Automotive Engine Maintenance obtained an average weighted mean of 3.67 with verbal interpretation of often practiced and rank 4. Maintenance of Drive Train shows 3.81 with often practiced and rank 2.5. Maintenance of Suspension System indicates 3.81 with often practiced and rank 2.5. Maintenance of Steering System records 3.91 with often practiced and rank 1. The overall average weighted mean is 3.80 with verbal interpretation of often practiced.

Sanchez, Pacia, and Palmos (2020) emphasized that safety compliance improves when structured procedures are consistently reinforced in workshop operations. Velazquez et al. (2023) found that automotive workers tend to demonstrate higher adherence to operational safety controls compared to full compliance in all maintenance areas. Pampolina, Moreno, and Reyes (2020) highlighted that preventive maintenance practices improve efficiency and safety when systematically applied across all service functions. The present findings align with these studies, showing generally consistent safety practices with slight variation across maintenance areas.

5. Practical Guide on Preventive Maintenance for the Automotive Industry

The practical guide is organized into several parts to ensure clarity and ease of use. Part I explains the rationale for its development, highlighting gaps such as inconsistent PPE usage, improper chemical handling, and safety concerns related to tools and equipment. Part II presents the objectives, which focus on proper use of PPE, correct application of safety procedures, proper tool handling, waste management, and development of positive safety attitudes. Part III emphasizes a strong safety reminder, particularly the policy "NO PPE, NO WORK!", requiring the use of essential protective gear such as goggles, gloves, safety shoes, and face masks. Part IV contains the core preventive maintenance procedures for automotive systems such as the engine, drive train, suspension, and steering systems, with clear step-by-step instructions and safety precautions like allowing engines to cool, proper vehicle lifting, and safe fluid disposal. Part V focuses on the proper use, inspection, and maintenance of tools and equipment, as well as maintaining an organized workspace. Part VI discusses chemical handling and waste management, including proper storage, labeling, spill response, and disposal of hazardous materials. Part VII addresses emergency and first aid preparedness, including fire safety, emergency contacts, and accident reporting procedures. Part VIII includes a safety poster titled "SAFE AUTO SHOP: NO PPE, NO WORK!" which serves as a constant visual reminder and is recommended for display in automotive workshops.

The practical guide will be used during laboratory and workshop activities at MORMS Senior High School. Students may use it before, during, and after performing preventive maintenance tasks, while instructors may integrate it into daily teaching and skills demonstrations. Its continuous use is expected to enhance students' safety compliance, improve preventive maintenance skills, and strengthen a culture of safety in the automotive learning environment. For sustainability, safety posters and signage will be displayed inside automotive shops to continuously reinforce safety reminders.

6. Conclusion

Based on the findings of the study, the following conclusions were drawn:

- The overall profile of automotive shops in Guinobatan, Albay shows that while operational facilities, manpower competence, and basic tools and equipment are well established, there are still notable gaps in safety infrastructure and advanced technical resources, indicating a stronger focus on productivity compared to occupational safety and environmental protection.
- The safety and health practices in preventive maintenance across automotive shops in Guinobatan, Albay are generally "often practiced," with higher compliance observed in operational safety controls such as steering system maintenance and lower compliance in routine engine maintenance and consistent use of personal protective equipment.
- The Chi-square test results indicate that safety and health practices are not significantly influenced by physical set-up and manpower profiles, but are significantly influenced by the availability of tools and equipment, emphasizing their importance in ensuring proper safety compliance in automotive shops.
- The Practical Guide on Preventive Maintenance for the Automotive Industry serves as a comprehensive instructional resource that addresses identified gaps in safety practices by strengthening proper PPE use, standard maintenance procedures, and overall safety awareness among Senior High School Automotive Technology students.

Compliance with ethical standards

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Disclosure of conflict of interest

I declare that I have no conflicts of interest related to this research. I have no personal or financial relationships that could influence my work.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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