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**SERVICE PAPER ON
EFFECTIVENESS OF VEHICLE MAINTENANCE AND REPAIR
PROCESS IN SRI LANKA NAVY**



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INTRODUCTION

1. Transportation is one of the crucial factor in any organization in present day context. Hence, maintenance of healthy vehicle fleet is vital. In particular, the Sri Lanka Navy (SLN) spend huge amount of money to attend maintenance and repairs of vehicles annually in order to maintain healthy vehicle fleet. However, it is known fact that, most of the vehicles cannot be guaranteed for their quality of the repairs in accordance with the expected general standards.
2. In this endeavor, SLN loose the effectiveness of maintenance as well as the repair of vehicle fleet which surprisingly leading to lose the productivity and economy of the country. Such disparity must be addressed in different perspective and hence greater concern is required in order to streamline the final outcome.
3. There are many direct and indirect factors that affect for frequent defects in vehicle available in SLN. With the past experience in automobile field, those factors that include unskilled and inexperienced labor, ineffective utilization of vehicles, not adhering to good engineering practices, ineffective use of logistics management system, poor quality control procedure of spareparts, frequent changes of transport assistants, poor basic technical knowledge of transport assistants, use of inferior quality spareparts, poor road link conditions, environmental factors, lack of policy decision to use of centralized spareparts distribution center, not adhering to given routine maintenance schedule, negligence of transport assistants and conduct of poor morning routine are some of the specific key factors that could be highlighted in automobile field.

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4. Further, attending breakdown repairs in remote establishments always found crucial since, most of the vehicle repairs attended by inexperienced labor and that are frequently prone to fail and repetition of failure occur until it becomes major repair. Hence, it is prudential to study on these aspects in terms of workable argument. On the other hand, the government of Sri Lanka is allocating huge amount of monetary requirement for repairs and maintenance of vehicles in every financial year. Hence, it is much important to yield productive outcome for the betterment of the navy and the economy of the country. In particular, SLN need to focus on huge price escalation of spareparts, labour cost and present market value of new vehicles.

5. In this backdrop, the paper at the beginning will discuss what are the factors affect for effectiveness of vehicle repair and maintenance and what are the existing vehicle repair facilities in order to uplift the effectiveness of vehicle maintenance and repair in SLN. Finally, the paper will discuss how SLN could be incorporate the vehicle repair process from sister services and some of the policy options that can be implemented within the SLN.

AIM

6. The aim of this paper is to examine the effectiveness of present vehicle maintenance and repair in SLN and give recommendations to achieve the possible effectiveness.

FACTORS AFFECTING FOR EFFECTIVENESS

7. **Definition of Effectiveness.** Before embarking into the paper, it is prudential to oversee what exactly effectiveness means. As per the oxford dictionary, the definition of effectiveness is the fact of producing the results that is wanted or intended; fact of producing a successful result. According to Liu et al, (2022), effectiveness can be observed as the outcome of actions, where actions refer to the maintenance treatment.

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8. **Acquisition of Vehicle.** There are wide range of light and heavy vehicles available in SLN vehicle fleet, that most of the vehicles were purchased under Indian credit line or acquired from different organizations or purchased under operational leasing method as new acquisition to the SLN.

9. It is experienced that most of the Indian vehicles and acquired old vehicles from other organizations become dilapidated condition and prone to frequent defects due to their inherent manufacturing defect and due to environmental effects from coastal sea breeze. These aspects directly influence on effectiveness of vehicle repairs and it is unable to keep the vehicle fleet 100% operational throughout the considerable duration.

10. **Ageing.** Particularly, most of the assets are purchased or acquired in early 80s where they are still used by attending major modifications/repairs and minor repairs in order to cater the SLN requirement. In general, these vehicles are frequently attending suspension, brake, engine, and tinkering and painting repairs which need to spend huge amount of money. According to the Commander of the Navy's Naha 5 Memorandum dated 16 Oct 16, SLN has adopted a vehicle obsolete system, where most of the vehicles were discarded from SLN fleet under the direction of Ministry of Defence. However, study revealed that most of the vehicles which are acquired from LTTE and vehicles beyond economical repairs such as extensively damaged vehicles due to accidents were discarded due financial constraints. Nevertheless, there are many vehicles are in use by spending huge amount of money due to nonexistence of proper vehicle depreciation plan.

11. Further, according to available international literature, it has been proven that older vehicle having more probabilities to increase repair cost than the younger generation which generally leads to more down time for a particular period.

12. **Emission Test.** Aside from the health and environmental benefits, the Vehicle Emission Test (VET) is a useful diagnostic tool for identifying combustion issues in engine. When the vehicle emits a lot of carbon, it's a sign that vehicle also burning a

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lot more fuel. The VET helps to achieve improved fuel efficiency and save money on annual fuel consumption.

13. However, SLN is not practicing this procedure as it has been exempted due to ageing of the vehicles. Even though, SLN is practicing the bottle test every three months to check the fuel consumption, it is not producing the important measures like carbon content and other emissions coming from the vehicle which lead to durability of the vehicle and unable to identify existing issues of an engine.

14. **Lack of Professionalism & Training.** The SLN conducts initial training for ET sailors for six months at Naval & Maritime Academy, where they directly embark into workshops with limited hands-on experience. In this nature, most of the ET sailors not receive much opportunities to follow intermediate training from outside institution in order to keep the continuous knowledge sharing on new technologies. This aspect is directly affected for poor standard of repairs due to incompetency and adhere to follow good engineering practices when engaging on relevant jobs. Hence, this will directly affect for reoccurrence of same repair or affect to incorporated repairs.

15. **Common Factors.** There are many common factors leading to frequent defects on vehicles can be depicted as below:

- a. Not attending repairs on time.
- b. Not adhering to one TA for one vehicle concept due to scarcity of TAs.
- c. Use of non-road worthiness Tyres and improper inflation.
- d. Poor vehicle management system and continuous engagement of vehicles in duty without pre-plan.
- e. Use of malfunctioned ODO meters and adapt to generic method which leads to human errors whilst calculating fuel consumption.
- f. Use of inferior quality spares, leads to durability of vehicle

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g. Improper maintenance of vehicle log book (G 267), daily running chart (G 268), vehicle service record book (AB 2), record of defects observed after monthly service and vehicle IN/OUT record book.

16. It is identified that, above factors are widely affected for the vehicle defects directly or indirectly over the period of time. Maintenance of proper running hours (for earth moving vehicles and tractors) or distance run is a critical factor where that will decide the exact servicing time and even to identify the trend pattern of repeated defects occurred for the analyzing purpose. Therefore, effectiveness of vehicle repairs and maintenance cannot be guaranteed.

17. **Importance of Effective Vehicle Repair and Maintenance.** It is highlighted that proper vehicle maintenance at its acceptable standards will leads to following inherent benefits:

- a. Increase reliability of vehicle and reduce risk of vehicle breakdown.
- b. Reduce long-term maintenance cost.
- c. Save fuel and money which leads to economy of the country.
- d. Reduce time between overhauls.
- e. Minimize tendency of major repairs.
- f. Reduce frequent reoccurrences of minor repairs.
- g. Minimize secondary failures.
- h. Mitigate wear and tear of major systems leading to reduce maintenance cost.

EXISTING VEHICLE REPAIR FACILITIES

18. SLN has achieved some moderate remarkable milestones with respect to repair facilities over the past few decades whilst focusing only to few main naval areas. These

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repair facilities include; EFI diagnostic tool, wheel balancing, wheel alignment, fully conditioned panting booths, service rams with single and double post hoisting lifts, hydraulic jack etc was merged to SLN very recently. However, knowledge sharing among ET sailors on such equipment found to be limited.

19. Further, it is required to enhance repair facilities in remote areas due to limited access to fulfill such repairs. It is obvious that, these facilities have major impact on effectiveness of vehicle repairs and maintenance. Use of inferior quality filters leads to healthy working condition of the engine. In particular, entire service stations in the Navy need to be audited and streamlined for the proper functioning.

SYSTEM ADOPTED BY SRI LANKA AIR FORCE

20. The Sri Lanka Air Force presently adopted computer monitored system known as General Engineering Repair Monitoring System (GERMS). This system generally focuses to monitor and maintain data related to vehicles scheduled repairs and monitor the vehicle In and Out procedure. This enables to track the automated monitoring of vehicle servicing schedules and keep them updated in real time. GERMS will give notifications prior vehicle due for servicing and it is also given the opportunity to trace the vehicle In and Out which will be restricted to vehicle departure from the particular base if vehicle servicing is not done. This system will eliminate human errors such as miscalculations, error data entry and provide adherence to definite service schedule.

21. **Benefits of GERMS.** There are many advantages while using the GERMS as depicted below:

- a. Can easily monitor the progress.
- b. Reliable, easy and very efficient.
- c. Extend vehicle health and life span.
- d. Reduces paper work, money and time.
- e. Ensure safety and reliability of vehicles.

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- f. Can maintain accurate and reliable records of vehicles.
- g. Allow less fatigue for technicians who involve in repairs.
- h. Time consume for vehicle repair monitoring would be reduced.
- i. Spareparts on order procedure would be enhanced and reduced time wastage for procuring spares.

22. **Common Practices Adapted by SLN for Vehicle Repairs.** Present vehicle repairs procedure adopted by SLN is based on corrective maintenance which means maintenance or repairs will be attempted after system fails. This will inevitably lead to vehicle for prolong non-operational period until repair action initiated through outside firm or by ordering required spares to attend the repairs. Due to present procurement procedure, most of the vehicles kept at workshops for more than one year which will indirectly lead to secondary failure of other systems of vehicles. Hence, it is required to adhere conditioned based maintenance procedure which will leads for early identification of the defect and rectify before it becomes breakdown. In many occasions, SLN attend breakdown repairs due urgency without concerning the genuineness of spares which will affect on cost effectiveness and probability of failing such repairs are highly likely.

23. **Concept of Central Auto Spareparts Distribution Center.** Maintaining a central auto spareparts distribution center would eliminate the use of inferior quality spares for repair and maintenance and lead time of spares. Further, it will eliminate repetition of same repair for a considerable period, avoid administration difficulties, reduce retention time inside the workshop premises, and most importantly same will be added advantage for repair cost due to price escalation of spares.

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CONCLUSION

24. Since SLN being a multi tasked organization, transportation plays a vital role in order to maintain smooth functioning of day-to-day duties. Hence, effectiveness of vehicle repairs and maintenance is essential. In this endeavor, following factors are recommended in order to uplift the effectiveness of vehicle maintenance and repair process:

- a. Introduce secondary/intermediate training facilities for ET sailors in collaboration with outside organizations.
- b. Integrate computer-based monitoring system for vehicle maintenance and repair including vehicle tracking system for entire vehicle fleet except earth moving vehicles.
- c. Establish central spareparts distribution center at Western Naval Area and Eastern Naval Area.
- d. Introduce three years plan to enhance repair facilities in remote areas.
- e. Continue frequent awareness programmes for ET sailors and TAs with a comprehensive syllabus by giving more emphasis on practical aspects.
- f. Establish proper vehicle depreciation policy in accordance with government regulations.

REFERENCE

Liu, Z., Balieu, R., Kringos, N., 2022. Integrating sustainability into pavement maintenance effectiveness evaluation: A systematic review. Transportation Research Part D: Transport and Environment 104, 103187.