



**A STUDY ON END-OF-LIFE VEHICLE FOR USED PART
DEALERS: PROTON WIRA CASE STUDY**



**BACHELOR OF MANUFACTURING ENGINEERING
TECHNOLOGY WITH HONOURS**

2023



**Faculty of Mechanical and Manufacturing Engineering
Technology**



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PROTON WIRA CASE STUDY**

Subramaniam A/L Somasundram

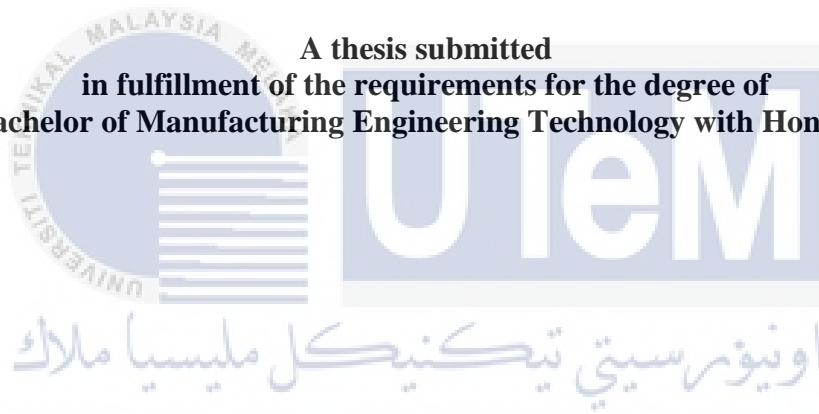
Bachelor of Manufacturing Engineering Technology with Honours

2023

**A STUDY ON END-OF-LIFE VEHICLE FOR USED PART DEALERS: PROTON
WIRA CASE STUDY**

SUBRAMANIAM A/L SOMASUNDRAM

**A thesis submitted
in fulfillment of the requirements for the degree of
Bachelor of Manufacturing Engineering Technology with Honours**



Faculty of Mechanical and Manufacturing Engineering Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2023

DECLARATION

I declare that this project entitled “A Study On End-Of-Life Vehicle For Used Part Dealers: Proton Wira Case Study” is the result of my own research except as cited in the references. The project has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature

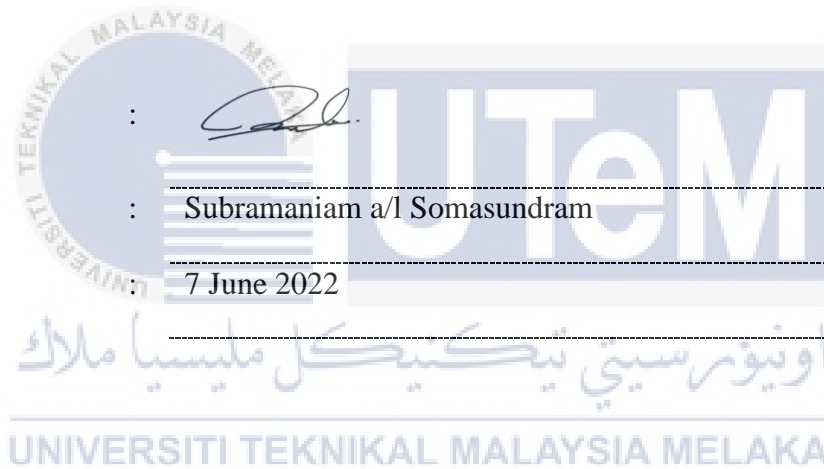
: 

Name

: Subramaniam a/l Somasundram

Date

: 7 June 2022



APPROVAL

I hereby declare that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the Bachelor of Manufacturing Engineering Technology (Bmmw) with Honours.

Signature :

Supervisor Name :

Prof. Madya Ts. Dr. Wan Hasrulizzam Bin Wan Mahmood

Date :

7 June 2022



DEDICATION

This dissertation is dedicated to my beloved parents, my supervisor Professor Madya Ts Dr Wan Hasrulnizam Bin Wan Mahmood and to those whose unwavering affection, guidance and encouragement have enriched my soul and driven me to undertake and complete this work.



ABSTRACT

An ELV is a vehicle that has reached the end of its usable life or services owing to ageing or the inability to use it due to a major accident with a high repair cost. In Malaysia, vehicles are often used, regardless of their age or condition. This issue does not only affect rural areas but it also affects major cities. Vehicle manufacturers normally anticipate their vehicles to survive 15 years, thus those that last longer are designated as End-of-Life Vehicles (ELV). The current stages for dismantling ELV cars are unregistered, dismantling, depollution, and dismantle. Each approach must follow the relevant guidelines. Extensive usage of ELV might lead to vehicle failure, putting the user's and other road users' safety at risk. Used part dealers(UPD) are particularly important in ELV management because they can substitute vehicle parts that aren't in good functioning order. This study is prepared to analyze the expectation of ELV product from used car parts dealers, to classify the types of automotive used part preferred by used car part dealers and to propose ELV product for Proton Wira as case study. This study also focused on case study about Proton Wira. This methodology used for this study is focuses on four types of data collection which are junk yard site observations on how the UPD deal with ELV vehicles, questionnaire survey, semi-structured interview with the junk yard owner and workers and finally capturing images of the vehicles used part items and the process of dismantling cars which are analyzed by performing a statistical analysis. All of these data are analyzed through Statistical Package for the Social Science (SPSS) software to identify the mean score of each elements in the questionnaire. Additionally, a few analysis such as reliability, correlation and factor analysis also have been conducted in this study. The results show the expectation and preferable used car part items by UPD. The results also show the understanding of ELV product acceptance of Proton Wira in the current market. According to the surveys, the UPD deals with the ELV parts in accordance with the current market demands, which means that the parts can be used as second-hand in good condition for a lower price. All of these considerations contribute to the importance of used part dealers in ELV. ELV is an emerging case study subject with a strong industrial presence. This project might provide them with references, crucial insights, and opportunities, as well as incentive to give greater attention to ELVs.

ABSTRAK

ELV adalah kenderaan yang telah mencapai akhir hayat atau perkhidmatannya yang boleh digunakan kerana penuaan atau ketidakupayaan untuk menggunakannya kerana kemalangan besar dengan kos pembaikan yang tinggi. Di Malaysia, kenderaan sering digunakan, tanpa mengira umur atau keadaan mereka. Isu ini bukan sahaja menjejaskan kawasan luar bandar tetapi juga mempengaruhi bandar-bandar utama. Pengeluar kenderaan biasanya menjangkakan kenderaan mereka bertahan selama 15 tahun, oleh itu mereka yang bertahan lebih lama ditetapkan sebagai kenderaan akhir hayat (ELV). Peringkat semasa untuk merungkai kereta ELV adalah tidak didaftarkan, pembongkaran dan pencemaran. Setiap pendekatan mesti mengikuti garis panduan yang berkaitan. Penggunaan ELV yang luas mungkin membawa kepada kegagalan kenderaan, meletakkan keselamatan pengguna dan pengguna jalan raya yang lain berisiko. Peniaga bahagian yang digunakan amat penting dalam pengurusan ELV kerana mereka boleh menggantikan bahagian kenderaan yang tidak berfungsi dengan baik. Kajian ini disediakan untuk menganalisis jangkaan produk ELV daripada peniaga bahagian kereta terpakai, untuk mengklasifikasikan jenis bahagian automotif yang digunakan oleh peniaga bahagian kereta yang digunakan dan untuk menyediakan prosedur operasi standard yang sesuai untuk operasi ELV produk dalam peniaga bahagian yang digunakan secara automatik. Kajian ini juga memberi tumpuan kepada kajian kes mengenai proton wira. Metodologi ini yang digunakan untuk kajian ini memberi tumpuan kepada empat jenis pengumpulan data yang merupakan pemerhatian laman web sampah tentang bagaimana UPD berurusan dengan kenderaan ELV, kaji selidik soal selidik, wawancara separa berstruktur dengan pemilik dan pekerja Junk Yard dan akhirnya menangkap imej kenderaan Bahagian bahagian yang digunakan dan proses pembongkaran kereta yang akan dianalisis kemudian dengan melakukan analisis statistik. Kesemua data ini dianalisis melalui perisian Statistical Package for the Social Science (SPSS) untuk mengenal pasti skor min bagi setiap elemen dalam soal selidik. Selain itu, beberapa analisis seperti kebolehpercayaan, korelasi dan analisis faktor juga telah dijalankan dalam kajian ini. Keputusan menunjukkan jangkaan dan item alat ganti kereta terpakai yang diutamakan oleh UPD. Hasilnya juga menunjukkan pemahaman tentang penerimaan produk ELV Proton Wira dalam pasaran semasa. Menurut tinjauan, UPD ini berkaitan dengan bahagian-bahagian kenderaan akhir hayat mengikut tuntutan pasaran semasa, yang bermaksud bahawa bahagian-bahagian itu boleh digunakan sebagai tangan terpakai dalam keadaan baik untuk harga yang lebih rendah. Kesemua pertimbangan ini menyumbang kepada kepentingan peniaga bahagian yang digunakan dalam kenderaan akhir hayat. Kenderaan akhir hayat adalah subjek kajian kes yang baru muncul dengan kehadiran perindustrian yang kuat. Projek ini mungkin memberi mereka rujukan, pandangan penting, dan peluang, serta insentif untuk memberi perhatian yang lebih besar kepada ELV.

ACKNOWLEDGEMENTS

In the Name of Allah, the Most Gracious, the Most Merciful

First and foremost, I would like to thank and praise Allah the Almighty, my Creator, my Sustainer, for everything I received since the beginning of my life. I would like to extend my appreciation to the Universiti Teknikal Malaysia Melaka (UTeM) for providing the research platform.

My utmost appreciation goes to my supervisor, Prof. Madya Ts. Dr. Wan Hasrulnizam Bin Wan Mahmood, Universiti Teknikal Malaysia Melaka (UTeM) for all his support, advice and inspiration. His constant patience for guiding and providing priceless insights will forever be remembered.

Last but not least, from the bottom of my heart I would also like to thank my beloved parents for their endless support, love and prayers. Finally, thank you to all the individual(s) who had provided me the assistance, support and inspiration to embark on my study.

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

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LIST OF ABBREVIATIONS

ADC	-	Authorized Dismantle Center
AI	-	Artificial Intelligence
ASR	-	Automotive Shredder Residue
CIWM	-	Chartered Institution of Waste Management
CO ₂	-	Carbon Dioxide
CoE	-	Certification of Entitlement
DFD	-	Design For Disassembly
DOHC	-	Dual Overhead Camshaft
EEV	-	Energy Efficient Vehicle
ELV	-	End-Of-Life Vehicle
EoL	-	End-of-Life
EPA	-	Environmental Protection Administration
EU	-	European Union
GDP	-	Gross Domestic Product
IMP3	-	Third Industrial Masterplan
KMO	-	Kaiser-Meyer- Olkin
LTA	-	Land Transport Authority
MAARA	-	Malaysian Automotive Recycling Association
MMC	-	Mitsubishi Motors Corporation
NAP	-	National Automotive Policy
OEM	-	Original Equipment Manufacturer
RFMB	-	Recycling Fund Management Board
RPM	-	Revolution Per Minute
SME	-	Subject Matter Expert
SOHC	-	Single Overhead Cam
SPSS	-	Statistical Package for the Social Science
UPD	-	Used Part Dealer
VQS	-	Vehicle Quota Scheme

- VTREC - Vehicle Theft Reduction Council of Malaysia
VVI - Voluntary Vehicle Inspection
WEEE - Waste from Electrical and Electronic Equipment
WRC - World Rally Championship



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CHAPTER 1

INTRODUCTION

1.1 Background

The global vehicle population is rapidly expanding. As the number of cars sold increases, so does the number of vehicles that are no longer in use, often known as end-of-life vehicles (ELVs) (Krishna Mohan & Amit, 2021). Vehicles are now considered a daily need, and annual manufacturing is expanding. As more new vehicle models join the market, this tendency will lead to a rise in End-of-Life Vehicles (ELVs). ELVs are governed by distinct rules and regulations in each nation. This is due to the various automobile circumstances in each nation (Akram Khan et al., 2021). Based on Wong et al., (2018) research, ELVs can arise in two ways: naturally (wear and tear) or prematurely (harm caused by accidents, explosion, floods, or theft).

An ELV is a deregistered vehicle that will be treated or recycled within the country using authorised techniques. It is a vehicle that has been or will be dumped by the owner. The vehicle is classified as ELV based on two factors. Because of the vehicle's age or because of extensive damage, it can no longer be utilised. They are characterized as scrap that can be thrown away. All of the car's components and parts are likewise considered waste (Harun et al., 2021).

Besides that, Akram Khan et al., (2021) stated that when a vehicle meets certain criteria, it is classified as an ELV. The age and mileage limit are two of the conditions. When the vehicles have reached the end of their useful life, they will be retired (by years or mileages). In Malaysia, the average vehicle life span is between 10 and 15 years, after which they are decommissioned. Aside from that, vehicles in Malaysia entered the ELV condition if they were deemed a “complete loss” as a result of a traffic accident, or if they were an old car classified as a junk car by the age of 25 or older. Figure 1.1 shows examples of vehicles that have been called as ELV.



Figure 1.1: Example of vehicles been classified as ELVs

ELV involves few process that disassemble the vehicles in a few phase. Initially, discarded vehicles are delivered to firms who dismantle them. Their fluids, batteries, tyres, and airbags are removed as a precaution. Following that, based on the vehicle type and market need, particular automotive parts are selected and removed to be resold as used spare components. Other process components are separated at this phase and re-cycled as alternative raw materials. The leftover autos are crushed and delivered to shredding companies, where they are crushed and metals are extracted mostly by magnetic separation. Finally, remnants are derived from automotive shredder residues (ASRs), which are mostly composed of plastics, foam, and textiles (Sato et al., 2019).

1.2 Problem Statement

Malaysia's automobile market has exploded as a result of the country's economic growth. As a result, the impact of ELV is growing in tandem with the number of vehicles on the road in Malaysia. However, there are high expectations for auto used part dealers in ELV because many vehicle owners choose to buy used parts rather than new parts, which may be costly. Alternator, distributor, crank shaft, and power steering pump are a few preferred car used component products at used part dealer. These are the most popular and in great demand used parts. However, many used part products are occasionally out of stock at used part dealers, and getting these items might be difficult due to strong demand in the market.

This project also focuses into proton wira end-of-life vehicle spare parts. According to the report, the Proton Wira is the most popular vehicle among thieves in Malaysia. Figure 1.2 shows the top 10 most stolen car 2020 in Malaysia. This is due to its strong demand for used parts. However, even with used parts, proton wira spare parts are still expensive until now.



Figure 1.2: Top 10 most stolen cars in Malaysia (Jerrica, 2021)

1.3 Research Questions

In regarding to the problem statement, there are research question which are identified.

- i. What is the expectation of ELV product from auto used part dealers?
- ii. What types of automotive used part preferred by auto used part dealers?
- iii. How ELV product for Proton Wira has been accepted with example in the current market?

1.4 Objectives

The objectives of this project can be outlined as the following:

- i. To identify the expectation of ELV product from used car parts dealers.
- ii. To clasify the types of automotive used part preferred by used car part dealers.
- iii. To propose ELV product for Proton Wira as case study.

1.5 Scope of Study

In order to meet the project objectives, a few scopes are given. The study initially emphasizes the expectation used car part dealers on ELV product. Furthermore, this study also focuses on the sorts of automotive used parts favoured by used car part dealers. Aside from that, this study also emphasizes on how used car part dealers get their auto parts. This study is conducted in auto used part dealers. For data collection several methods like observations, questionnaire survey of auto used part dealers and semi-structured interview have been conducted. The duration of this study is almost one year, which started on March 2022 and will be ended on January 2023. The results can be used as a reference for a further study and research.

1.6 Significance of study

The benefits of this study is as follows:

- i. Able to know the expectation of ELV product from auto used parts dealers
- ii. To learnt the the types of automotive used part preferred by used car part dealers
- iii. To understand the ELV product acceptance of Proton Wira in the current market.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter aims to explain about the End-Of-Life Vehicles process, definition, benefits and its importance in Malaysia. It also covers the driving factor for used part dealers to involve in end-of-life vehicles practices Besides, this section briefly describes the research studies related to this project regarding each main topics of the title given. There are several types of sources such as journals, books and newspaper will be utilized as a manual to decide the purpose and direction of this project. This literature review is important because it serves as a guide for the new study and a researcher can avoid repeating the same mistake by past researchers. In addition, the literature review can help to produce a better study.

2.2 End-Of-Life Vehicles: An Overview

The worldwide car population is growing at a rapid pace. As the number of vehicles sold grows, so does the number of outmoded automobiles, often known as end-of-life vehicles (ELVs) (Krishna Mohan & Amit, 2021). An ELV is defined as a deregistered vehicle that will be treated or recycled within the country using appropriate techniques. A vehicle can develop an ELV in 2 ways, according to researchers: naturally (wear and tear) or prematurely (harm caused by accidents, explosion, floods, or theft). Figure 2.1 shows vehicles that have been abandoned beside the streets and can be develop as ELV.



Figure 2.1: Example of abandoned vehicles

ELV encompasses a wide range of activities, including the ELV collection, components and part separation, product recovery methods, and waste disposal. Regardless of where they come from, they are all managed by the same reverse logistic chain. Besides, ELV is described as product recovery, which includes reusing, repairing, refurbishing, remanufacturing, cannibalism, and recycling (Wong et al., 2018).

As previously stated, ELV was defines as waste according to the Chartered Institution of Wastes Management (CIWM) of the United Kingdom, involving all of their components and materials. Waste is a term that has been defined as everything that is destroyed, intended to be discarded, or is forced to be abandoned. This contains materials that are recycled or reused. The average vehicle life lifetime in Malaysia is between 10 and