OWNING AND OPERATING COSTS OF PASSENGER CAR IN MALAYSIA

SYARIFAH NURSYARAFINA
BINTI SYED HUSSEIN

B. ENG(HONS.) CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

UNIVERSITI MALAYSIA PAHANG

DECLARATION OF THESIS AND COPYRIGHT

Author's Full Name : SYARIFAH NURSYARAFINA BINTI SYED HUSSEIN

Date of Birth : 5TH OCTOBER 1994

Title : OWNING AND OPERATING COSTS OF PASSENGER CAR IN MALAYSIA

Academic Session : 2016/2017

I declare that this thesis is classified as:

☐ CONFIDENTIAL	(Contains confidential information under the Official Secret Act 1997)*
☐ RESTRICTED	(Contains restricted information as specified by the organization where research was done)*
☑ OPEN ACCESS	I agree that my thesis to be published as online open access (Full Text)

I acknowledge that Universiti Malaysia Pahang reserves the following rights:

1. The Thesis is the Property of Universiti Malaysia Pahang
2. The Library of Universiti Malaysia Pahang has the right to make copies of the thesis for the purpose of research only.
3. The Library has the right to make copies of the thesis for academic exchange.

Certified by:

_____	_____
(Student's Signature)	(Supervisor's Signature)
_____	_____
941005-01-5020	Prof Madya Dr Sulistyo Arintono
Date:	Date:

NOTE : * If the thesis is CONFIDENTIAL or RESTRICTED, please attach a thesis declaration letter.

THESIS DECLARATION LETTER (OPTIONAL)

Librarian,
Perpustakaan Universiti Malaysia Pahang,
Universiti Malaysia Pahang,
Lebuhraya Tun Razak,
26300, Gambang, Kuantan.

Dear Sir,

CLASSIFICATION OF THESIS AS RESTRICTED

Please be informed that the following thesis is classified as RESTRICTED for a period of three (3) years from the date of this letter. The reasons for this classification are as listed below.

Author's Name	Syarifah Nursyarafina Binti Syed Hussein
Thesis Title	Owning And Operating Costs Of Passenger Car In Malaysia

Reasons (i)

(ii)

(iii)

Thank you.

Yours faithfully,

_____
(Supervisor's Signature)

Date:

Stamp:

Note: This letter should be written by the supervisor, addressed to the Librarian, *Perpustakaan Universiti Malaysia Pahang* with its copy attached to the thesis.

SUPERVISOR'S DECLARATION

I hereby declare that I have checked this thesis and in my opinion, this thesis is adequate in terms of scope and quality for the award of Bachelor Degree in Civil Engineering.

_____

(Supervisor's Signature)

Full Name : Prof Madya Dr Sulistyo Arintono

Position :

Date :

_____

(Co-supervisor's Signature)

Full Name :

Position :

Date :

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

_____

(Student's Signature)

Full Name : SYARIFAH NURSYARAFINA BINTI SYED HUSSEIN

ID Number : AA13194

Date :

OWNING AND OPERATING COSTS OF PASSENGER CAR IN MALAYSIA

SYARIFAH NURSYARAFINA BINTI SYED HUSSEIN

Thesis submitted in fulfillment of the requirements
for the award of the
Bachelor Degree in Civil Engineering

Faculty of Civil Engineering and Earth Resources

UNIVERSITI MALAYSIA PAHANG

JUNE 2017

ACKNOWLEDGEMENTS

In the name of God, the Gracious, the Merciful

I am grateful and would like to express my sincere gratitude to my supervisor Prof Madya Dr Sulistyo Arintono for his invaluable guidance, continuous encouragement and constant support in making this research possible. I really appreciate his guidance from the initial to the final level that enabled me to develop an understanding of this research thoroughly. Without his advice and assistance it would be a lot tougher to completion. I also sincerely thanks for the time spent proofreading and correcting my mistakes.

I acknowledge my sincere indebtedness and gratitude to my big family, Syed Hussein Alsagoff, Norzakiah Husin, Maktok Maimon Maon, Syed Fakhri, Syed Nahri, Syed Fikri, Nurish Marissa, Nurish Aliesya, Husin Arba Clan for their love, dream and sacrifice throughout my life. I cannot find the appropriate words that could properly describe my appreciation for their devotion, support and faith in my ability to achieve my dreams.

I would like extend my gratitude to team SAGE Automotive, Abang Yan and Ilyas for cooperation and help me to understand the basic knowledge of the car. Also to my best friend who always support and back up me in my studies, Lulu Hamzaki. A bunch of lovely friends who take care of me, Yaya Yusof, Sis Mijah, DC, Raman, Syafiq Ali, Adib, Ain Rahman, Farah Najwa, Nuha Arbi, Farah Ainul, Kak Mira and Kak Azra.

Lastly, I would take this opportunity to thank my university, Universiti Malaysia Pahang for providing me the good condition of facilities and equipment to complete this study and thanks to any person which contributes to my final year project directly or indirectly. I would like to acknowledge their comments and suggestions, which was crucial for the successful completion of this study.

ABSTRAK

Kajian memiliki dan mengendalikan kos kereta penumpang dijalankan untuk menentukan kos kecekapan antara menggunakan kenderaan persendirian dan pengangkutan awam. Kos yang terlibat adalah memiliki, operasi dan kos penyelenggaraan. Pertama sekali, perlu tahu model kereta dengan dan kos yang memiliki termasuk harga apabila dibeli, pembuatan tahun, perbatuan digunakan, cukai jalan dan insurans. Manakala bagi operasi dan penyelenggaraan, berdasarkan pemilik kereta sama ada mendapatkan perkhidmatan dari bengkel rasmi jenama atau bengkel biasa dan bergantung harga petrol semasa. Ia akan menjadi kos yang berbeza tetapi tidak mempunyai perbezaan yang ketara. Setiap elemen perlu membandingkan antara setiap model kereta di setiap kilometer. Tujuan kajian kos adalah untuk membandingkan dan menentukan kos perjalanan.

Perbandingan ini berlaku antara kenderaan persendirian mahupun pengangkutan awam adalah untuk meningkatkan kesedaran akan kelebihan alam sekitar dan ekonomi menggunakan bas secara tetap. Dalam kajian ini juga boleh menunjukkan bahawa permintaan untuk memiliki kenderaan adalah meningkat dari tahun ke tahun kerana ekonomi dan keperluan. Tetapi apabila menggunakan pengangkutan awam masih memberikan lebih banyak kelebihan daripada kekurangan.

ABSTRACT

The study of owning and operating costs of passenger car is carried out to determine the efficiency cost between using private vehicle and public transport. The costs involved are owning, operation and maintenance cost. First of all, need to know the model of the car with and the owning cost included the price when purchased, year manufacture, mileage used, road tax and insurance. While for operation and maintenance, based on the owner of the car either get a service from centre or workshop and depends the price of the gasoline. It will be a different cost but not a big gap. Each element need to compare between each model of the car in per kilometre. The purposes of study the cost is to compare and define the travel cost.

Purposed comparison happened between private and public is to increase the awareness the environmental and economic advantages of using bus on a regular basis. In this study also can show that demand of owning a vehicle is increase year by year due to economic and needs. But still using public transport can gives more advantages than disadvantages.

TABLE OF CONTENT

LIST OF TABLES

LIST OF FIGURES

LIST OF SYMBOLS

%	Percent
CO_2	Carbon dioxide

LIST OF ABBREVIATIONS

RM	Ringgit Malaysia
km	Kilometre
LRT	Light Rail Transit
ERL	Express Rail Link
MRT	Mass Rapid Transit
SUV	Sport utility vehicle
cc	Cubic centimeters
L	Litre
IPS	Intelligent Parking System
ITIS	Integrated Transport Information System
ATMS	Advance Traffic Management System
ATIS	Advanced Travellers Information System
Miros	Malaysian Institute of Road Safety
JPJ	Jabatan Pengangkutan Jalanraya

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND PROJECT

This study is to determine owning and operating costs of passenger car in Malaysia. Car registrations in Malaysia rose to 26301952 cars in 2015 from 20188565 in 2010.

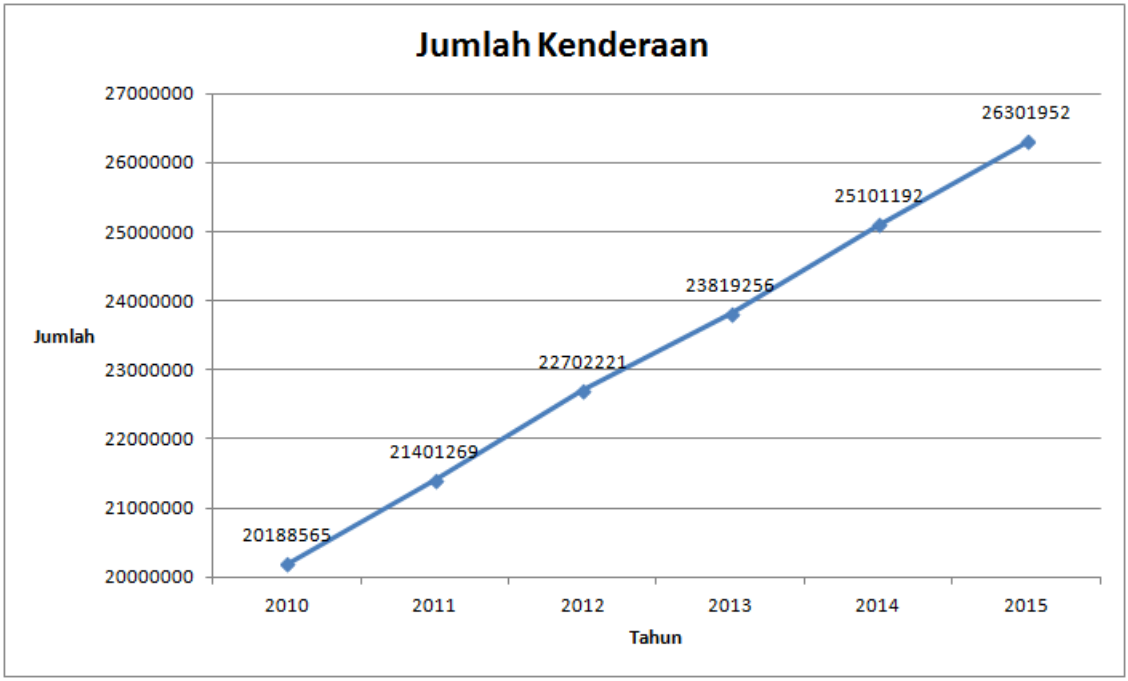

Figure 1.1 Statistic for motorcar registrations.

Source (Road Transport Department Malaysia)

Figure above shows that nowadays the owning of a vehicle increased every year in Malaysia. There are many causes why Malaysian buying a car such as easy-going and do not have time limit to use. Since Malaysia now is growth, government also prepare the public transport for people use in their daily life such as bus, taxi, LRT and ERL not only to save their cost but also to prevent traffic jammed on the road.

NEGERI *State*	MOTOSIKAL *Motorcycle*	MOTOKAR *Motorcar*	BAS *Bus*	TEKSI *Taxi*	KERETA SEWA PANDU SENDIRI *Hire & Drive Car*	KENDERAAN BARANG-BARANG *Goods Vehicle*	LAIN-LAIN *Others*	JUMLAH *Total*
PERLIS	4,642	1,035	1	0	0	16	15	5,709
KEDAH	42,157	6,415	16	12	14	1,068	448	50,130
PULAU PINANG	35,282	17,465	158	71	50	2,816	673	56,515
PERAK	34,463	9,860	98	1	0	2,288	786	47,496
SELANGOR	69,112	17,317	313	675	212	7,058	5,090	99,777
W.P. KUALA LUMPUR	63,036	86,882	858	1,314	4,426	9,393	2,544	168,453
NEGERI SEMBILAN	16,902	7,669	23	0	0	1,788	161	26,543
MELAKA	16,376	5,904	19	4	3	909	383	23,598
JOHOR	63,077	23,083	230	254	4	4,854	1,733	93,235
PAHANG	21,317	6,434	14	4	0	1,195	409	29,373
TERENGGANU	14,568	2,965	27	2	1	236	37	17,836
KELANTAN	21,702	5,510	40	1	0	542	85	27,880
SABAH	23,467	22,153	127	63	129	2,355	1,311	49,605
SARAWAK	34,383	23,581	31	31	94	2,793	2,249	63,162
PORTAL RAKAN NIAGA	5,041	435,513	0	28	7	804	55	441,448
MALAYSIA	465,525	671,786	1,955	2,460	4,940	38,115	15,979	1,200,760

SUMBER: JABATAN PENGANGKUTAN JALAN
Source: Road Transport Department

Figure 1.2 New Registered Motor Vehicles by Type and State, Malaysia,2015. Source (Road Transport Department Malaysia, 2015)

1.2 PROBLEM STATEMENT

Malaysian economy is growing so fast that most people can afford to have a private vehicle and therefore the vehicle population has also grown rapidly. The road is very crowded with all kinds of vehicles and passengers, travel at different speeds is the current state of the road in Malaysia. This was exacerbated by the lack of public transport facilities and parking.

People's perception on the cost of transportation is often misleading, e.g. merely the costs for fuel (gasoline), parking and toll charges, which makes traveling by private vehicle looked cheap and highly affordable. In fact, there are other indirect costs, which makes traveling by private vehicle significantly more expensive than by public transport.

The cost of car ownership is not as easy as what pay for car loan, but it also involves a daily cost of running the car. The total cost exceeds the purchase price when consider out-of-pocket expenses such as petrol and insurance, as well as the car loses in value over time (depreciation). There is a need to educate people to be more aware of this situation, that more and more will switch to public transport.

1.3 OBJECTIVE

These are the objectives for the study:

i. To assess the rate of utilization of private vehicle
ii. To analyse the owning and operating costs of private vehicle
iii. To compare travel cost by private vehicle and public transport

1.4 SCOPE OF STUDY

In this study used a passenger car and SUV as a private vehicles excluding vehicles for commercial purposes such as truck or bas. Passenger car is intended to carry passengers such as Perodua Myvi, Proton Preve, Hyundai Matrix and else. While SUV, is a vehicle similar to a station wagon or estate car, usually equipped with four-wheel drive for on- or off-road ability. Some SUVs include the towing capacity of a pickup truck with the passenger-carrying space of a minivan or large sedan. All those vehicle have a various size and engine capacity. In this case, it has been divided into 2 category; The Class of The Car Made Of and Size of The Engine Capacity.

Table 1.1 The Class of the Car Made Of

Local	**Import**
Perodua Kancil	Honda CRV
Perodua Myvi	Toyota Camry
Perodua Bezza	Suzuki Swift
Proton Perdana	Mitsubishi Lancer

Table 1.2 Size of Engine Capacity

<1000 cc	**1000-2000 cc**	**>2000cc**
Perodua Kancil	Perodua Myvi	BMW 530i
Perodua Kelisa	Proton Preve	Toyota Camry Hybrid
Perodua Kenari	Honda CRV	Toyota Vellfire
Perodua Axia	Toyota Camry 2.0	Proton Perdana
Perodua Viva	Suzuki Swift	Volvo CX9

1.5 SIGNIFICANT OF STUDY

The goal of this study is to identify the performance and the effectiveness of public transport system than private. Also to increase the awareness of the real costing of transportation when using a public transport rather than private car.

This case study is contributed to establish the most efficient method in term of cost, time and environmental friendly. The most significance aspect of this research is to improve the community awareness towards saving the environment and the important of saving a cost.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter covers the study on the traffic using different type of transport which because of population growth, high income and the rapid growth of cities and urbanization has brought an increase in travel demand. Service is not always up to the transport sector in the developing countries. Transport facilities mostly fail because of lack of planning and proper design. In addition, pedestrians and non-motorized vehicles are not considered when planning urban transport system that creates a mixture of traffic on the road and further complications. The Malaysian economy is growing so fast that most people can afford to have a private vehicle and therefore the vehicle population has also grown rapidly. The road is very crowded with all kinds of vehicles and passengers, travel at different speeds is the current state of the road in Malaysia. This study aims to assess the current status of the transport sector in Malaysia. Urban cities in developing countries have some of the factors that cause problems for the sustainable transport system.

There were many the consequences when using private transport than public which is the lack of public transport facilities and parking. Air pollution and other environmental hazards are not other concerns.

2.2 TRUE COST OF VEHICLE OWNERSHIP

The cost of car ownership is not as easy as when paying a car loan, but it also involves a daily cost of running the car. The total cost exceeds the purchase price when it consider out-of-pocket expenses such as petrol and insurance, as well as the car loses in value over time (depreciation).

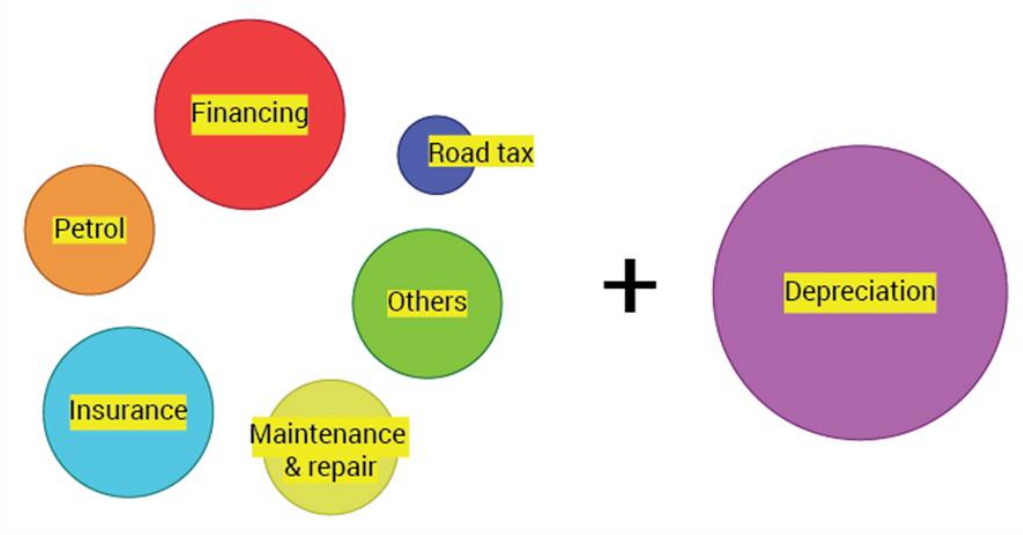

Figure 2.1: Cost of vehicle ownership.

Source (Iris Lee, 2015)

2.2.1 Finance

If people buy the car by cash, they do not have to worry about the financial. It means they already prepared the money and do not need a loan to buy a car. But if a person do not have enough money to pay full of the price, they have to find a best banker who will give them a best price of loan. They have to make the best decision for their needs and get advise from expert person about the loan to get the lowest monthly repayments for the car.

In this case, buyers need to consider about the advance payment, duration of payment and interest before doing any instalment of any car. The duration can relate with the amount of money that they had to pay. It means the longer the period, the less amount they had to pay every year.

2.2.2 Depreciation

Depreciation is one of the most highest costs to own a car. It is how the vehicle holds its value over time. This is important if keep the car for less than five years as the depreciation rate is always higher in the early years of ownership. Once receive the keys from the car dealer, he had lost thousands of ringgit, and this crazy phenomenon known as depreciation.

There may be other factors that could accelerate the rate of depreciation of the car, such as mileage, brands, and its reliability, the degree of wear and tear, modifications.

2.2.3 Petrol Consumption

The cost of petrol is the second-highest vehicle ownership. However, as gasoline prices fluctuate, this year, the driver can see a reduction in this part of the cost.

Choosing a car with good economic rated may help reduce these costs. Below shows the calculation of the petrol in km/L. Different car has a different fuel consumption.

Petrol price : $\frac{RM\ 1.98}{litre*}$ (RON 95)

Fuel consumption : 12 km/L *(each car has different fuel consumption)*

Operating cost : RM 1.98 / 12 = RM 0.165/L

****Above calculation is just an estimation based on the current petrol price. The cost of petrol consumption fluctuates according to petrol price.***

2.2.4 Maintenance and Repair

The key to keep the vehicles running well, and lower the cost of repairs to the road car ownership is to perform routine maintenance. While many new cars today come with a 5 year warranty, manufacturer's warranty usually does not cover the cost of services.

However, to be on the safe side, the general rule of thumb is to allocate 1% of the value of the car each year for maintenance purposes, and to have an emergency fund of 10% of the value of the car to an unexpected service costs. Maintenance car include normal service that needed such as engine oil, gear oil, oil filter, battery water etc.

For maintenance cost need to consider about the cost for various mileage, estimate average maintenance cost per year and per kilometre.

2.2.5 Road Tax

Road tax should be renewed every year and the price is consistent. The road tax price is based on the engine capacity of the car. Table 2.1 shows the price of the road tax based on the engine capacity.

Table 2.1 Comparison price of road tax for different engine capacity.

ENGINE CAPACITY (CC)	**PRICE**
<1000	RM 20
1001-1200	RM 55
1201-1400	RM 70
1401-1600	RM 90
1601-1800	RM 200
1801-2000	RM 280
2001-2500	RM 380
2501-3000	RM 880
>3000	RM 2 130

2.2.6 Insurance

Another annual cost of owning a car is motor insurance premiums. This can be much higher than the cost of the road tax because it depends on the value of the car. The price of insurance depends on the owner to choose the package. It means that possibility of the different price of insurance can happened at the same model.

2.2.7 Parking and Toll

Unfortunately, the cost of vehicle ownership does not end here. Still there are many other costs, which may seem insignificant, but it can add up to a considerable amount. Here are some hidden costs that it may not take into account. If he unfortunately enough to work in the city centre, be prepared to spend at least RM200 a month for a parking space. This does not include various parking fees that we pay when we go to meetings and shopping.

Assuming a driver cities spend about RM 230 a month in parking only. There is still a toll that must be considered. Nowadays, almost every major highways in the Klang Valley have a toll booth. At least, the driver paid RM 20 a month at the toll, if it happen to drive pass the toll road to work every day. In the last five years? Which will come up to RM 13,800 in parking fees and RM 1,200 for the tolls. That RM 15,000 cold out of pocket in the last five years.

The parking and toll costs can vary depending on where how driver handling the car. If someone does not commute to the city centre, and quite fortunate to get free parking at work, can see a very low cost in this category. This makes individuals have to pay RM 70,948.40 to have a local car for five years. While it is easy to become car owners in Malaysia, it is one of the main reasons why our disposable income is as sad as it is now. Owning a car can still be important to us, but it certainly did not come easily. With the MRT and LRT line comes, have a car that is less than the requirement for Malaysians.

Figure 2.3 Toll rate for Plaza Tol Sunway.

Source (Fiq Shafiq, 2014)

2.3 URBAN POPULATION IN MALAYSIA

As mention early, economic and urban development is both dependent and influenced by transport. Its dependence on a variety of other factors such as industry, the life of a growing population and environmental impact of socio-economic status, carefully designed and incorporated transport facilities is essential for the world's cities. Malaysia's economy grew rapidly during this time. The number of private cars is increasing by growing. Like most countries other British colonized, Malaysia also has the urbanization process initiated by the occupation.

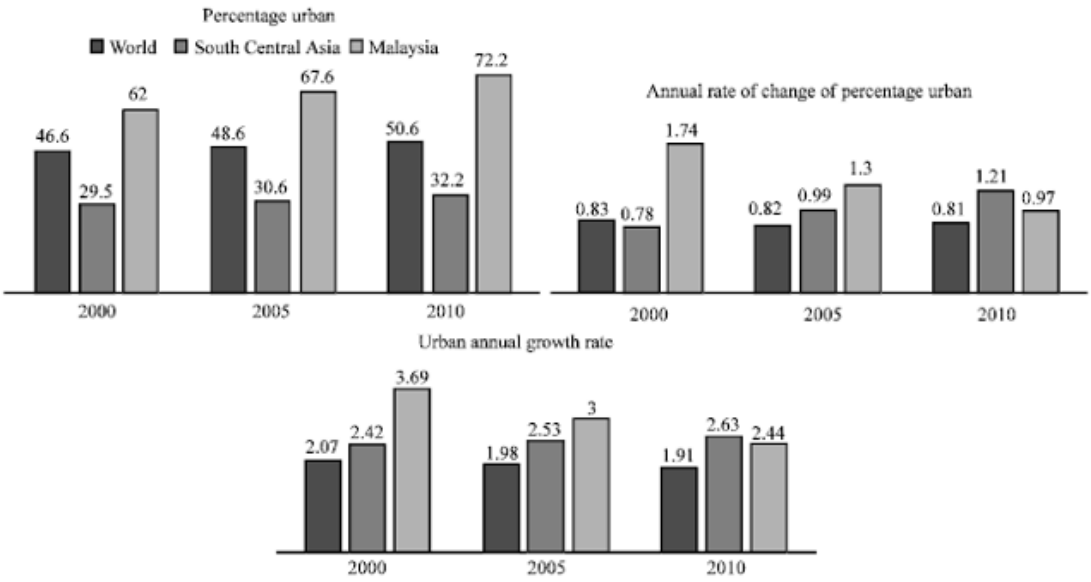

Figure 2.4 Urban development in Malaysia in the years 2000, 2005 and 2010. Source (World Bank, 2008)

2.4 PROBLEM IN TRANSPORTATION SYSTEM

Most people prefer the train because the degrees of freedom, accessibility, passion for cars and driving, comfort, or at times, negative perception of the public transport. Furthermore, the use of public transport can put them in between traffic and thus wasting their time. We have to admit the lack of service of public transport system in Malaysia which is very poor and therefore, private transport has grown by approximately 24% increase was observed in the use of private transport between 1985-2005.

2.4.1 Time Travel

Fears of pedestrians, cyclists and bus users are less considered in Malaysia. The existing public transport system, including buses, trains and taxis provided by the government. Public transport facilities are modern but do not have the quality of service. Even in the capital city of Kuala Lumpur, the bus arrived late. One study modelling the transport behaviour in Kuala Lumpur suggest the need of an efficient public transport system to attract car owners. Nothing different is not the case with the railway. Rail public transport system was introduced in the 1980s can not reduce the popularity of private vehicles. Among many Asian countries, it is Malaysia that has low

rates of public transport use. The increase in car ownership has created a road network is insufficient in this case.

Build roads to meet the demand that is not so easy, especially in Kuala Lumpur. In addition to factors such as travel time and travel costs, the distance from home to public transport and the distance from home to work is a contributing factor influencing capital shift from car to public transport in Malaysia.

Table 2.2 Comparison using bas and car from Kuantan to Kuala Lumpur.

ASPECT	**BUS**	**CAR**
Time travel	Fixed	Not fixed
Cost (toll+fuel)	RM 24	RM 60
Position	Passenger	Driver
Distance in time	3 hours	2 hours and half
Safety	Good	Good

From table above, it can conclude why Malaysian prefer using a private transport than public transport. They will getting tired because they need to be a driver, but it will give them more satisfaction when in travel though they will have a loss of money in cost.

2.4.2 Parking

Parking is a basic need for transportation. It is a common problem in almost all cities in the world. As the number of vehicles increases, the need for parking facilities are proportional increase. Certain place in Malaysia, usually the space is very limited. Parking is really a headache to the customer car park at a cost and frustration. Parking management and policies are important to prevent traffic congestion, traffic accidents, pollution and fuel consumption, which is undesirable. Increased car ownership, changes in the regulation of traffic and reduced soil compaction creates supply parking facilities.

Some of the problems that customers face parking is lack of knowledge about the parking location, hours of operation and the cost of parking and, most notably, the

availability of parking upon arrival. Parking is correlated with many other factors such as the behaviour of consumers, use of space, the design of the parking zone, safety and security and other. Common type parking system visible in the shared parking system turn-time. This type of parking creates less supply than demand. However, they have demonstrated in their study that there are zones where additional parking space can be provided and meet the demand. Smart parking system initially started in Europe, the United States, United Kingdom and Japan.

This type of parking system is suitable for both car park operators and customers in addition to environmental conservation. It helps car park operators to design policies and future development with parking information that has been collected. This prevents excessive travel by car and air pollution is less. Customers on the other hand the benefit with more secure efficient, minimum parking time, while avoiding traffic congestion and illegal parking. They were able to point out the empty parking lot.

There is also a system or technology that can deliver information on the availability and location of the car park. Use IPS can provide better information on the availability of parking. It also reduces the parking time and frustration caused by congestion. In addition, it can also be congestion, illegal parking and air pollution.

It is the building and the store owner who has a car park as their chief concern, especially in the peak shopping season and weekend. Customers do not like to move to find a parking space and trekking from one shopping centre to another. In 2005, the Malaysian Highway Authority, Public Works Department and the Ministry of Transport in Malaysia jointly set up a traffic management system called ITIS. This system has been established to monitor traffic, accidents, construction and other conditions that occur on the roads and highways in Kuala Lumpur and the Klang Valley. The system consists of two main components such as ATMS and ATIS. All use of this technology to provide better transport services.

2.4.3 Road Safety

Road safety is a major issue in urban transport in the whole world. Injuries road labelled as 9th leading cause of disability in the world. Due to rapid motorization and urbanization, the rate of fatal accidents is growing at a faster rate. Employed persons and children are the majority of victims of road accidents. Urban population growth, industrialization, motorization, economic development all contribute to road accidents in cities. As far as Malaysia is concerned, all these factors have increased over time since independence. The Malaysian government has also established the MIROS in 2007 to conduct research and development on road safety. They are designing road safety standards, audit and database for safe vehicles and other

In Malaysia, there was an increase in fatal accidents from time to time. Crossed the 6,000 fatal accidents in 2009 that number is <5500 until 2002. Although, there is a decreasing trend in fatalities over the past 7 years, the causes of mortality needs to be addressed.

Table 2.3 Road fatality statistics of Malaysia (type of injury).
Source (Malaysia Road Safety Department, 2010)

	Years									
Parameters	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Accident injury type										
Fatal accident	5,440	5,230	5,378	5,634	5,674	5,604	5,711	5,672	5,952	6,218
Serious injury	8,067	6,942	6,696	7,163	7,444	7,600	7,375	7,384	7,020	6,978
Minor injury	28,778	30,684	30,259	31,357	33,413	25,928	15,596	13,979	12,893	12,072
Total accident injury	42,285	42,856	42,333	44,154	46,531	39,132	28,682	27,035	25,865	25,268
Total accidnet without injury	208,144	222,319	237,378	254,499	280,283	289,136	312,550	336,284	347,182	371,926
Total accident	250,429	265,175	279,711	298,653	326,814	328,268	341,232	363,319	373,047	397,194
Injury type										
Fatal	6,035	5,854	5,891	6,286	6,228	6,188	6,287	6,282	6,527	6,745
Serious injury	9,790	8,689	8,425	9,040	9,229	9,397	9,254	9,273	8,866	8,849
Minor injury	34,375	35,974	35,236	37,415	38,631	31,429	19,884	18,444	16,901	15,823
Total injury	50,200	50,517	49,552	52,741	54,088	47,014	35,425	33,999	32,294	31,417

Table 2.4 Fatality report: mode of vehicle.

Source (MIRSR, 2010)

Road user	2002 (%)	2008 (%)	2009 (%)
Motorcycle	58.21	59.72	60.30
Car	17.37	20.45	20.83
Pedestrian	11.03	9.16	8.73
Bicycle	4.43	3.11	3.32
Van	2.65	1.47	1.35
Bus	0.76	0.75	0.46
Lorry	1.26	1.62	1.16

The least numbers are shown by bus which may be attributed to the low rate of bus service in the country. Another factor to accidents is the festive season which makes the road filled with vehicles and 5% of fatal accidents occur during the festive season. There is no action from the government to reduce the accident rate. As part of this, RM 200 million has been allocated in the 9th Malaysia Plan for road repair to reduce the accident rate in the 5 dangerous places.

2.4.4 Air Pollution

Urban air pollution has both short- and long-term adverse effects on human health and increase the mortality rate. Motorcycle is a major contributor to air pollution in Malaysia. The hydrocarbons, lead and nitrogen oxide and others, cause severe health problems. Diseases such as asthma, chronic lung disease and neurological and others, occurred as a result of air pollution. Rapid increase in CO_2 emissions from the large number of vehicles on the road is a concern for policy makers and the scientific community is more concerned about global warming produced. Approximately 1% increase in the population increase of 1.42% from the average CO_2 emissions (Shi, 2003). Reducing greenhouse gases is a challenging task for a developing country like Malaysia.

Rising income levels and creating more private vehicles CO_2 emissions. In 2000 itself, Malaysia's per capita CO_2 emissions are 5.4 tonnes more than the global average (3.9 tonnes per capita) and the Asian average (2.2 tonnes per capita). CO_2 emission in Malaysia can be reduced by reducing the number of motor vehicles, reducing the travel distance of the motor vehicle using proper land planning etc.

Table 2.5 Total CO_2 emissions (million metric ton of CO_2).
Source (World Resource Institute, 2007)

Places	2000	2003
World	23,832.70	25,575.99
Asia (excluding middle east)	7,272.53	8,477.90
Malaysia	116.19	140.95

CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

Methodology is the chapter that explain in detailed the used of method during the case study has been conducted. From the case study, chapter of research methodology will explain on how the data is collected, the exact cost of owning and operating cost of passenger car in Malaysia. This chapter also will be discuss the objective of this case study which is to assess the rate of utilization of private vehicle, to analyse the owning and operating cost of private vehicle and to compare travel cost by private vehicle and public transport.

3.2 CASE STUDY

Private vehicle is one of the transports that are used in Malaysia. There are different type of size, engine capacity, and brand. This vehicle also can be categorised into different type of owner. The owner of motorcycle could be student or employee. Therefore, the study is used to know the exact cost of owning and operating cost of private vehicle.

In order to complete the research, the interview was conducted in several areas such as in company who selling the vehicle, insurance companies, public transportation department Malaysia (JPJ), and people that using the private vehicle as their main transport.

3.3 FLOWCHART OF RESEARCH METHODOLOGY

Figure 3.1 shows flowchart of research methodology that involves the process of interview. The data for the cost can get using the formula stated in literature review, which is chapter 2. The combination of results from the interview and the formula can be the exact cost of owning and operating cost of private vehicle in Malaysia.

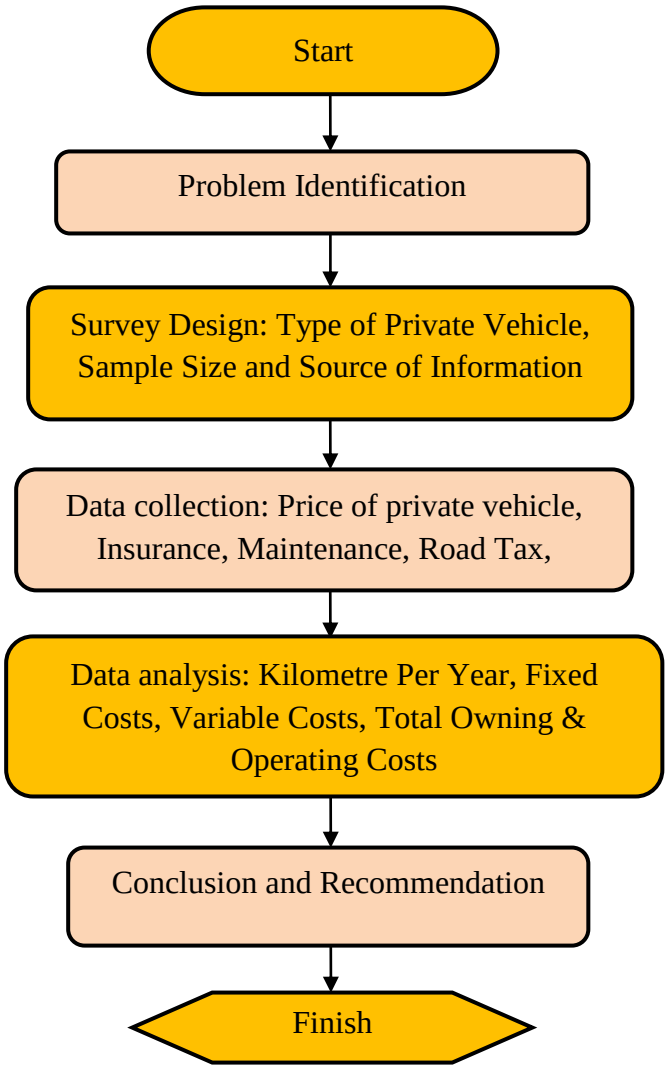

Figure 3.1 Flowchart of Research Methodology.

3.4 METHODOLOGY AND DATA RESOURCES

This method of this research is case study which involves interview session. Interview is a process to get the data needed and some solution to solve the problems. For this case study, the data needed were collected using following resources:

i. Internet

ii. Interview

iii. Journals

iv. Books and references

v. Newspaper

3.5 SURVEY DESIGN

The data for this research can be categories into several types such as the capacity of the vehicle (engine size) and the brand of the vehicle (local or import). For the source of information, the data can be getting from the interview.

3.6 DATA COLLECTION

The data for the cost the road tax, maintenance, insurance and financing for the private vehicles can be collected based on two source of information which is:

i. Private vehicle dealer (the price of car, road tax, insurance and maintenance costs)

ii. Private vehicle owner (Model of the car, the capacity of the engine, the year of manufacture and total kilometre used)

3.7 DATA ANALYSIS

After collecting the data, the data need to be analysis based on the kilometre per year. With the sample size, take the average of kilometre used per year of vehicle . Besides, analysis can be based on the fixed and variable cost. The fixed cost is the cost of maintenance, road tax, insurance and the price of vehicle. For the variable cost, it is the cost of the petrol fuel. The cost of petrol fuel fluctuated every month and almost every week. Next is the total owning and operating costs. This cost is combination of fixed and variable cost. Lastly, the data from the analysis need to be compared to the public transportation.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 INTRODUCTION

4.1.1 Class of the Car

In this case study, it has been categorised the car based on 2 classes; the car made of and the engine cap

Table 4.1 The Class of the Car Made Of

LOCAL	**IMPORT**
Perodua Kancil	Honda CRV
Perodua Myvi	Toyota Camry
Perodua Bezza	Suzuki Swift
Proton Perdana	Mitsubishi Lancer
Proton Preve	BMW 530i

Table 4.2 The engine capacity

<1000 cc	**1000-2000 cc**	**>2000 cc**
Perodua Viva	Perodua Myvi	BMW 530i
Perodua Kenari	Proton Preve	Toyota Camry Hybrid
Perodua Kancil	Honda CRV	Toyota Vellfire
Perodua Kelisa	Toyota Camry 2.0	Proton Perdana V6
Perodua Axia	Suzuki Swift	Honda Accord 2.4

4.1.2 Operational Cost

Operational cost had been divided into 2 which is fixed cost and operation cost. The fixed cost in this study include the price of the car (RM/km), road tax (RM/km) and insurans (RM/km). While for the operation cost included the service cost of the car (RM/km) and petrol price (km/L). All the costs will divide into RM/km based on the kilometre used.

Table 4.3 Operational cost for engine capacity less than 1000cc.

Car Model	**Year Manufacture**	**Price of The Car (RM)**	**Kilometre Used**	**Road Tax (RM/year)**	**Insurance (RM/year)**
Perodua Kenari	2009	41 800	100 000	20	500
Perodua Viva	2008	30 000	170 000	20	700
Perodua Axia	2016	34 700	20 000	20	650
Perodua Kelisa	2007	24 900	289 000	20	600
Perodua Kancil	2009	26 000	175 900	20	451

Table 4.4 Operational cost for engine capacity between 1000 to 2000 cc

Car Model	**Year Manufacture**	**Price of The Car (RM)**	**Kilometre Used**	**Road Tax (RM/year)**	**Insurance (RM/year)**
Perodua Myvi	2009	50 178	118 548	70	1 255
Perodua Alza	2012	59 190	111 435	90	1 255
Proton Exora	2010	67 670	30 000	90	1 477
Proton Preve	2014	63 020	71 890	90	1 388
Proton Saga	2007	27 000	165 000	70	300
Proton Persona	2010	49 800	230 000	90	1 130
Honda Jazz	2016	109 800	26 000	90	1 865
Honda City	2015	90 480	45 000	90	1 633
Honda CRV	2015	155 850	40 000	380	2 671

Honda Civic 1.8 sedan	2009	114 980	100 000	280	2 299
Hyundai Matrix	2010	67 896	203 546	90	2 821
Suzuki Swift	2016	77 888	57 487	90	1 432
Toyota Vios	2014	88 500	81 000	90	1 000
Toyota Innova	2010	10 0619	190 000	380	2 616
Toyota Avanza	2010	77 100	110 566	70	1 797
Toyota Camry	2010	164 900	305 000	380	2 616
Kia Rio	2014	75 850	68 000	70	1 639
Audi A4	2014	235 000	65 000	380	4 837
Mazda CX-5	2016	137 000	28 000	380	3 625
Mitsubishi Lancer	2011	123 980	64 737	380	2 487

Table 4.5 Operational cost for engine capacity more than 2000 cc

Car Model	**Year Manufacture**	**Price of The Car (RM)**	**Kilometre Used**	**Road Tax (RM/year)**	**Insurance (RM/year)**
BMW 530i	2015	459 800	67 436	680	7 936
Toyota Camry Hybrid	2014	174 900	120 000	880	3 569
Toyota Vellfire	2008	355 000	210 000	830	7 081
Honda Accord 2.4	2012	172 800	158 435	780	3 652
Volvo CX90	2004	355 000	230 000	880	7 081
Proton Perdana V6	2009	101 485	183 410	380	2 983

Table 4.6 Total Owning Cost

Model Of The Car	Fixed Cost (RM/km)	Maintenance Cost (RM/km)	Operating Cost (RM/km)	Total Cost (RM/km)
Perodua Kenari	0.34	0.03	0.15	0.52
Perodua Viva	0.20	0.03	0.18	0.41
Perodua Axia	0.15	0.01	0.21	0.37
Perodua Kelisa	0.11	0.03	0.15	0.29
Perodua Kancil	0.12	0.01	0.15	0.28
Perodua Myvi	0.32	0.05	0.21	0.58
Perodua Alza	0.30	0.10	0.22	0.62
Proton Exora	0.79	0.18	0.18	1.15
Proton Preve	0.30	0.04	0.18	0.52
Proton Saga	0.17	0.05	0.21	0.43
Proton Persona	0.17	0.03	0.19	0.39
Honda Jazz	0.46	0.09	0.15	0.70
Honda City	0.44	0.07	0.18	0.69
Honda CR-V.	0.90	0.10	0.18	1.26
Honda Civic 1.8 sedan	1.03	0.07	0.20	1.30
Hyundai Matrix	0.31	0.05	0.21	0.57
Suzuki Swift	0.15	0.04	0.21	0.40
Toyota Vios	0.35	0.05	0.18	0.58
Toyota Innova	0.56	0.07	0.15	0.78
Toyota Avanza	0.44	0.04	0.15	0.63
Toyota Camry	0.41	0.28	0.15	0.84
Kia Rio	0.38	0.06	0.18	0.62
Audi A4	1.2	0.06	0.21	1.47
Mazda CX-5	0.60	0.07	0.21	0.88
Mitsubishi Lancer	0.89	0.07	0.18	1.14
BMW 530i	1.00	0.20	0.20	1.40
Toyota Camry Hybrid	0.90	0.18	0.20	1.28
Toyota Vellfire	1.71	0.18	0.21	2.10

Honda Accord 2.4	0.63	0.18	0.21	1.02
Volvo CX90	2.26	0.11	0.18	2.55
Proton Perdana V6	0.40	0.40	0.18	0.98

4.1.3 Price List of Public Transport

Bus is the mostly famous and used among the netizen since they have many choices of the company. It also a very comfortable transportation for a person to going anywhere if they do not choose to drive. Below is the bunch of list of certain famous route with certain company who handling the services.

I. Route from Kuantan – Kuala Lumpur

Distance : 233 km

Table 4.7 Company of the bus with the ticket price to Kuala Lumpur

NAME OF THE COMPANY	NORMAL PRICE	PRICE (RM/KM)
SP BUMI	RM 24.20	0.09
TRANSNASIONAL	RM 24.10	0.09
CEPAT DAN CEKAP EXPRESS	RM 18.00	0.08

II. Route from Kuantan – Johor Bahru

Distance : 344 km

Table 4.8 Company of the bus with the ticket price to Johor Bahru

NAME OF THE COMPANY	NORMAL PRICE	PRICE (RM/KM)
SP BUMI	RM 30.80	0.10
TRANSNASIONAL	RM 29.10	0.09
CEPAT DAN CEKAP EXPRESS	RM 29.30	0.10

CHAPTER 5

CONCLUSION

5.1 INTRODUCTION

This chapter is about concluding the result whether the objective is achieved or not. All the recommendations is given for better solutions in the future. Concluding section is about to summarize the findings performance and result and try to find a better solution if the current findings is not good enough.

5.2 CONCLUSION

Based on the overall result from the entire survey conducted, the study has found that using a public transport it more worth it in terms of cost than using a private vehicle.

After going through all the statistic, it has proven that nowadays people still using a public transport because every main place has their own terminal. It is easy for them to get another bus or another place. They can save more money and relax because they no need to drive.

In terms of time, public transport lack in time where they take more time to arrive than using private vehicle. But to person not in hurry, it has nothing to worry since they can take their precious time to take a rest. It also can minimize the accident happen to driver who is sleepy while driving.

5.3 RECOMMENDATION

While research is conducted, lots of effort need to use to ensure the objectives of the research is achieved. There are so many things that can be improved so that the research can run smooth and easily. Moreover, owning and costing need to be study more in the future to make the dream of environmental friendly when using public tarnsport with low cost and maintenance become reality. There are a few suggestions that need to look forward in order to make the research more efficient. This recommendation and suggestion hopefully can give a better understanding and can assist and improves the techniques for future research:

- Many info of the old model of the car do not have in their brand's website. It was difficult to get the info especially about specification and pricing

- Should give a clear and complete question to respondent for giving their complete answer for reference.

REFERENCES

Budiono, O.A. (2009b).Perceived Satisfaction in Public Transport.(Project for Master Thesis Work edn.).

Vuchic, V.R. 2009.Urban Public Transportation System. Transportation Engineering and Planning 1: (181-207)

Smith, M.J. & Clarke, R.V. (2000).Crime and Public Transport Crime and Justice : A review of research, 27 .

Http://www.jpj.gov.my/ms/utama. Portal Jabatan Pengangkutan Jalan Malaysia.

APPENDIX A

QUESTIONNAIRE SURVEY FORM

Owning Costs of Passenger Car in Malaysia

This questionnaire is meant for fulfilling the final year project of Bachelor of Civil Engineering in Universiti Malaysia Pahang (UMP). Your anonymity is ensured as the questionnaire does not required you to identify yourself. Thank you for your cooperation and we highly appreciate it.

INSTRUCTION : Each form per car ONLY.

*Required

BRAND OF THE CAR (example: Honda, Toyota, Proton) *

Your answer

MODEL OF THE CAR (Example: Preve, Accord, Toyota) *

Your answer

CAPACITY OF THE ENGINE *

- ◯ <1000cc
- ◯ 1000-2000cc
- ◯ >2000cc

YEAR MANUFACTURE (Example : June 2015) *

Your answer

TOTAL KILOMETRE USED *

Your answer

CAR PRICE DURING PURCHASE *

Your answer

ROAD TAX PRICE *

Your answer

APPENDIX B

MODEL OF THE CAR	NEW PRICE (RM)	COST OF PURCHASE (RM/year)	HOW LONG BEEN USED (years)	KILOMETRE USED	RATE OF USE (km/year)	COST OF PURCHASING (RM/km)	ROAD TAX + INS (RM/year)	ROAD TAX + INS (RM/km)	COST OF OWNING (RM/km)	TOTAL COST (RM/km)	Estimate average maintenance cost per year (RM/year)	MAINTANANCE COST PER KM (RM/km)	FUEL CONSUMPTION km/L	OPERATING COST RM/km
Perodua Kenari	41800	3762	8	100000	12500	0.30096	520	0.0416	0.34256	0.38416	375	0.03	14	0.151428571
Perodua Viva	34700	3123	9	170000	18888.88889	0.165335294	720	0.038117647	0.203452941	0.241570588	496.3333333	0.026276471	12	0.176666667
Perodua Axia	24900	2241	1	20000	20000	0.11205	670	0.0335	0.14555	0.17905	200	0.01	10	0.212
Perodua Kelisa	30000	2700	10	289000	28900	0.093425606	620	0.021453287	0.114878893	0.13633218	758.5	0.026245675	12	0.176666667
Perodua Kancil	24000	2160	8	175900	21987.5	0.098237635	471	0.021421262	0.119658897	0.141080159	558.375	0.025395111	12	0.176666667

MODEL OF THE CAR	NEW PRICE (RM)	COST OF PURCHASE (RM/year)	HOW LONG BEEN USED (years)	KILOMETRE USED	RATE OF USE (km/year)	COST OF PURCHASING (RM/km)	ROAD TAX + INS (RM/year)	ROAD TAX + INS (RM/km)	COST OF OWNING (RM/km)	AVERAGE COST (RM/km)	Estimate average maintenance cost per year (RM/year)	MAINTANANCE COST PER KM (RM/km)	FUEL CONSUMPTION km/L	OPERATING COST RM/km
Perodua Myvi	56178	4516.02	8	818544	102318.5	0.044136886	1325	0.012949376	0.057086646	0.070039436	307	0.003000435	10	0.212
Perodua Alza	59190	5327.1	5	111435	22287	0.239022749	1345	0.060344082	0.299371831	0.359716914	197	0.008839234	10	0.212
Proton Exora	67670	6090.3	7	30000	4285.714286	1.42107	1567	0.365633333	1.786703333	2.152336667	775	0.180833333	12	0.176666667
Proton Preve	63030	5671.8	3	71890	23963.33333	0.236488605	1478	0.061677563	0.298166167	0.359843731	854	0.03563778	12	0.176666667
Proton Saga	27000	2430	10	165000	16500	0.147272727	370	0.022424242	0.169696697	0.192121212	850	0.051515152	10	0.212
Proton Persona	49800	4482	7	230000	32857.14286	0.136408696	1220	0.037130435	0.173539013	0.210669565	893	0.027178261	11	0.192727273
Honda Jazz	109800	9882	1	26000	26000	0.380076923	1955	0.075192308	0.455269231	0.530461538	2456	0.094461538	12	0.176666667
Honda City	90480	8143.2	2	45000	22500	0.36192	1723	0.076577778	0.438497778	0.515075556	1632.5	0.072555556	12	0.176666667
Honda CR-V	158360	14024.5	2	400000	200000	0.07011325	3051	0.015263	0.08613875	0.10056425	3125.5	0.0156275	14	0.151428571
Honda Civic 1.8 sedan	114980	10948.2	8	100000	12500	0.827856	2579	0.20632	1.034176	1.240496	651.75	0.05214	14	0.151428571
Hyundai Matrix	67896	6110.64	7	203546	29078	0.210146503	2911	0.100110049	0.310256551	0.4103666	803.2857143	0.027625205	10	0.212
Suzuki Swift	77888	7009.92	1	57487	57487	0.121990221	1522	0.026475551	0.148465772	0.174890323	2352	0.040913598	10	0.212
Toyota vios	88500	7965	3	81000	27000	0.295	1090	0.040370037	0.335370037	0.375340741	1248.333333	0.046234568	12	0.176666667
Toyota innova	100619	9055.71	7	190000	27142.85714	0.333631421	2996	0.110378947	0.444010368	0.554388316	1136.571429	0.041873684	14	0.151428571
Toyota Avanza	77100	6939	7	110566	15795.14286	0.439312266	1867	0.118200894	0.557513316	0.675714053	1106.857143	0.070075732	14	0.151428571
Toyota Camry	164900	14841	7	305000	43571.42857	0.340613115	2995	0.068733705	0.40935082	0.478084525	12030.42857	0.276108197	14	0.151428571
Kia Rio	75850	6826.5	3	68000	22666.66667	0.301169118	1709	0.075397059	0.376566176	0.451963235	1421.666667	0.062720588	12	0.176666667
Audi A4	235000	21150	3	65000	21666.66667	0.976153846	5201	0.240046154	1.2162	1.456266154	1232.666667	0.056892308	10	0.212
Mazda CX-5	137000	12330	1	28000	28000	0.440357143	4493	0.160464286	0.600821429	0.761285714	1943	0.069392857	10	0.212
Mitsubishi Lancer	123980	11158.2	6	84717	10789.5	1.034172112	3267	0.352794383	1.386966495	1.739760879	713	0.066082766	12	0.176666667

MODEL OF THE CAR	NEW PRICE (RM)	COST OF PURCHASE (RM/year)	HOW LONG BEEN USED (years)	KILOMETRE USED	RATE OF USE (km/year)	COST OF PURCHASING (RM/km)	ROAD TAX + INS (RM/year)	ROAD TAX + INS (RM/km)	COST OF OWNING (RM/km)	AVERAGE COST (RM/km)	Estimate average maintenance cost per year (RM/year)	MAINTANANCE COST PER KM (RM/km)	FUEL CONSUMPTION km/L	OPERATING COST RM/km
BMW 530i	459800	41382	2	678436	339218	0.121992347	8616	0.025399596	0.147391943	0.172791538	7568	0.022310137	12	0.176666667
Toyota Camry Hybrid	174900	15741	3	120000	40000	0.393525	4449	0.111225	0.50475	0.615975	3284.333333	0.082108333	12	0.176666667
Toyota Velfire	355000	31950	9	210000	23333.33333	1.369285714	7911	0.339042857	1.708328571	2.047371429	1813.888889	0.077738095	10	0.212
honda accord 2.4	172800	15552	5	158435	31687	0.490800644	4432	0.139868085	0.630668729	0.770536813	2570.6	0.081124751	12	0.176666667
Volvo CX90	355000	31950	13	230000	17692.30769	1.805869565	7961	0.449969565	2.25583913	2.705808696	1940.769231	0.109695652	12	0.176666667
Proton Perdana V6	101485	9133.65	8	723410	90426.25	0.101006621	3363	0.037190528	0.138319715	0.175387678	3517	0.038893573	12	0.176666667