UNIVERSITI TEKNOLOGI MARA

MATHEMATICS AND STATISTICS

UNDERGRADUATE RESEARCH PROCEEDINGS 2025

UiTM CAWANGAN NEGERI SEMBILAN

An Analysis of Factors Affecting Automobiles Resale Value in Malaysia

Syahmina Humaira Binti Hizir[1], Noorezatty Binti Mohd Yusop[1,*]
[1]*Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Negeri Sembilan, Kampus Seremban, Malaysia*
[*]noorezatty@uitm.edu.my

Abstract

Used car buyers often face challenges in understanding the factors that influence the resale value of cars. Identifying these key factors can be difficult, as many elements, such as brand, model, age, mileage, condition, and maintenance history, affect how much a used car is worth. Without understanding the factors that impact used car values, buyers may risk overpaying, especially for those unfamiliar with the used car market. This study examines the resale value of used cars in Malaysia, focusing on the Perodua brand, by analyzing how transmission types, car age, mileage, engine capacity, and body types affect resale value. Secondary data from the Carro website was utilized for this study, covering the period from July 2024 to October 2024. The dataset consisted of 156 observations, focusing only on Perodua cars. Multiple Linear Regression (MLR) was used to identify significant factors affecting the resale value of Perodua cars. All assumptions of Multiple Linear Regression (MLR) were met to ensure the validity of the analysis, which were linearity, normality, homoscedasticity, absence of outliers, multicollinearity and autocorrelation. The regression results concluded that transmission types, mileage (km), age of car (month), engine capacity, and body types were significant factors of the resale value. Recommendations for future studies include extending the data collection period, extracting data from multiple sources, and exploring additional factors.

Keywords*:* Perodua, Multiple Linear Regression, Resale value

Introduction

Presently, most individuals rely on personal modes of transportation, such as cars, with emphasis on the latest models, often without adequate knowledge about used cars. The term ‘used cars’ or ‘resale cars’ refers to cars previously owned by one or more individuals who intend to sell them [1]. In addition, used cars undergo repairs and upgrades involving mechanical issues, thorough cleaning of both interior and exterior and replacing worn-out components to enhance the car’s quality to resell the car to another owner [2]. In this study, the term automobile was also called car, and the term resale value was used to represent the asking price of a used car.

The used car market thrives by offering consumers affordability, a wider range of models, and lower depreciation costs compared to new cars. It appeals to budget-conscious buyers, first-time car owners, and those seeking specific older models or features. Used cars also avoid the

steep initial depreciation of new vehicles, making them a practical option for many. According to Mordor Intelligence, Malaysia's used car market is projected to grow from RM105.65 billion in 2024 to RM148.08 billion by 2029, with a compound annual growth rate (CAGR) of 5.40%. This highlights the growing importance and potential of the sector.

Other factors influencing car purchases include the car's attributes like type, color, model, transmission (automatic or manual), and registration year [1]. Buyers often select MPVs for larger families, while sedans and hatchbacks suit single individuals or small families. SUVs, coupes, and convertibles are also popular choices depending on individual preferences.

For this research, the primary objective is to determine the key factors that significantly influence the car's values. This research was crucial because understanding such factors can provide beneficial insights for stakeholders. Recognising which factors affect resale value helps consumers to make informed choices about buying and maintaining cars, potentially increasing their return on investment. Multiple Linear Regression is appropriate for analysing the multiple variables that impact car resale values, including types of car, age, condition, mileage, and other factors. Past research has employed comparable methodologies to explore these factors, but often adopted a broader scope, encompassing multiple brands or regions [3–5]. This study seeks to fill this gap by concentrating specifically on Perodua, Malaysia's car brand, aiming to offer targeted and practical insights that are directly applicable to the Malaysian automotive market.

Factors of Resale Value

Transmission types

Car transmission is among the most crucial elements of a car where they are responsible for transferring engine power to the wheels [6]. Car's transmission comes in two types of designs which are manual and automatic. The driver for manual transmission utilizes the clutch pedal and a gear stick that are either on the floor between the front seats or on the center console. Meanwhile, the electronic control unit or ECU in the automatic gearbox changes the gear ratio by using sensors to track the speed and engine revolutions per minute [7]. The clutch and manual transmission's typical functions are carried out automatically, permitting controlled slippage between the car's engine and transmission [8]. In urban driving conditions, automatic transmissions are generally more popular due to their convenience, which could influence their resale value compared to manual transmissions [9].

Age of car

Every car is subject to depreciation, but it has the greatest impact during the initial years of ownership, with the first year experiencing the steepest decline in value [10]. Depreciation is defined as the difference between the price of the car at the time of purchase and its current market value. For purchasers, awareness of depreciation can aid in accurately estimating long-term ownership costs and simplify negotiation processes [10]. The age of car is a significant factor influencing resale value [4]. As cars age, they may be perceived as less desirable due to absence of the latest features and safety technologies, resulting in lower resale values compared to newer models equipped with updated advancements.

Mileage

Mileage is defined as the total distance that a car has traveled since it was manufactured. Typically, it is measured in kilometres or miles. The maintenance requirements are significantly impacted by the car mileage [11]. In general, higher mileage made car parts more prone to damage and the frequently used parts like the engine, suspension, and braking system are more likely to experience wear and tear and lead to damage as the mileage increases [11]. The relationship between mileage and resale value is well-established, with lower mileage often associated with higher resale values [12]. A study also agreed that lower mileage will cost higher than a car with a high mileage, specifically on automatic transmission [3]. Hence, as mileage increases, cars need more frequent maintenance which will lead to lower resale value.

Engine capacity

A study indicated that engine capacity is a significant factor that affects a car's price [13]. A well-maintained car is one with a larger engine capacity, as it has the capability for higher speeds and better acceleration. Due to their superior performance characteristics, vehicles with larger engine capacity command higher resale values, which appeal to individuals who are seeking a more exhilarating driving experience. The resale value of the car will increase when the engine capacity is increased [14].

Body types

The body type of a car refers to the structure and design of a car’s exterior shell. It is an essential actor since it reflects a variety of aspects like functionality, market demand, and style. The common and popular body types in Malaysia are sedans because of their spaciousness, comfort, and affordability. An example of a Malaysian car with a sedan body type is Proton S70. In addition, SUV is also one of the body types such as Perodua Ativa [15]. It gained popularity among Malaysians due to its spacious interiors, higher ground clearance, and perceived safety features. Other body types included in Malaysia are Multi-purpose, MPV and hatchback. The most expensive body types of cars are sedans and SUVs [3].

Methodology

The population of the study was all Perodua-used cars listed on the Carro website and a sample consist of 156 used cars advertised on the Carro website from July 2024 until October 2024 was taken. The secondary data was obtained from https://carro.co/my/en using the self-key in data technique. The variables used for this study are the transmission types, the age of the car, the mileage, the car’s engine capacity, and the body types as shown in Table 1.

Table 1: Description of Variables

Variables	Scale of Measurement	Data Value
Resale Value (price in RM)	Ratio	
Transmission types	Nominal	0 = Automatic 1 = Manual
Mileage (km)	Ratio	
Engine Capacity	Ordinal	0 =>1300cc 1=1000cc – 1300cc
Age of car (month)	Ratio	
Body types	Nominal	0 = Hatchback 1 = Sedan 2 = SUV 3 = MPV

Constructing Dummy for Categorical Variables

Dummy variables are independent variables which take the value of either 0 or 1. In quantitative analysis, such as Multiple Linear Regression, a dummy variable is a numeric stand-in for qualitative variables or a logical proposition. Practically, it is simplest to understand the regression results when the dummy variable is limited to 0 and 1 [16].

For example, in this study, variable body types have four levels which were Sedan, SUV, MPV, and Hatchback. Its level of body type was recorded into three dummy variables with one type treated as the reference category. The reference category was hatchback since it had the highest category level in the dataset. The references for each categorical variable are shown in Table 2.

Table 2: Description of Dummy Variables

Variables	Reference Category	Value	Names of dummy
Transmission types	Automatic	0 = Otherwise 1 = Manual	Transmission group
Engine capacity	>1300cc	0 = Otherwise 1 = 1000cc-1300cc	Engine group
Body types	Hatchback	0 = Otherwise 1 = Sedan	Sedan
Body types	Hatchback	0 = Otherwise 1 = SUV	SUV
Body types	Hatchback	0 = Otherwise 1 = MPV	MPV

Data Analysis

Multiple linear regression was used to determine the significant factors that influenced the resale value of cars. In this subsection, procedures of Multiple Linear Regression (MLR) were discussed. The purpose is to determine if two or more independent variables (X1, X2, ..., X7) have a significant effect on the dependent variable (Y) [4]. The Multiple linear regression equation is given in equation 1.

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_7 X_7 + \varepsilon \quad (1)$$

Where;

Y = resale value (RM)

β_0, β_1, β_2, β_3, β_4, β_5, β_6, and β_7 are the regression parameters or regression coefficients.

X_1 : Transmission types

X_2 : Mileage (km)

X_3 : Engine capacity

X_4 : Age of car (month)

X_5 : Body types (Sedan)

X_6 : Body types (SUV)

X_7 : Body types (MPV)

ε : random error

If the p-value of an independent variable is less than the significance level of 0.05, the variable is considered significant to the model, indicating that the factors are affecting the resale value of cars in Malaysia. During the model development process, the data were thoroughly examined, and the assumptions underlying the regression were validated, such as linearity between dependent and independent variables, normality of error terms, homoscedasticity, multicollinearity and autocorrelation, and outliers.

Results and Discussion

This research was conducted to identify the most significant factors affecting the resale value of cars in Malaysia. Multiple Linear Regression (MLR) was employed to fulfill the objective. All the assumptions of Multiple Linear Regression were met. ANOVA (Analysis of Variance) is used to assess the influence of one or more independent variables on a continuous dependent variable. The hypothesis test determines the statistical significance of the model. In Table 3, the p-value is 0.000, which is less than the significance level of 0.05, indicating that the model is statistically significant.

The coefficient of determination R^2 quantifies the proportion of variability in the dependent variable (Y) that is explained by the model. According to the value of R^2 presented in Table 3, 97.2% of the total variation in resale value (price in RM) can be explained by the independent variables, including transmission types, mileage, engine capacity, car age (in months), and body

types. The remaining 2.8% is attributed to other factors not included in the model. The model is a good fit for the data, as it captures most of the patterns and relationships in the dataset.

Table 3: Results of ANOVA and R-Squared

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	15440000000	7	2206417646	734.346	0.000
Residual	444681283.8	148	3004603.269		
Total	15890000000	155			
R-Squared (R^2)					0.972

Estimated Model

The model for multiple linear regression is as follows:

$$Y = 59468.351 - 12353.136X_1 - 0.025X_2 - 11315.296X_3 - 177.148X_4 + 6169.695X_5 + 22224.934X_6 + 9921.884X_7 \quad (2)$$

Where;

X_1 : Transmission types
X_2 : Mileage (km)
X_3 : Engine capacity
X_4 : Age of car (month)
X_5 : Body types (Sedan)
X_6 : Body types (SUV)
X_7 : Body types (MPV)

Testing of Model Parameters

After confirming the model's validity, the significance of each parameter was assessed. If the p-value of an independent variable is less than the significance level of 0.05, the variable is considered significant to the model. Table 4 shows that all independent variables are significant, as their p-values are all less than 0.05.

Table 4: Coefficient results

Model	Unstandardized coefficient	t	Sig.	Null Hypotheses
(Constant)	59468.351	110.387	0.000	
Transmission types	-12353.136	-14.999	0.000	H_0 rejected
Mileage (km)	-0.025	-3.395	0.001	H_0 rejected

Engine capacity	-11315.296	-16.402	0.000	H_0 rejected
Age of car (month)	-177.148	-18.559	0.000	H_0 rejected
Body types (Sedan)	6,169.695	8.376	0.000	H_0 rejected
Body types (SUV)	22224.934	26.827	0.000	H_0 rejected
Body types (MPV)	9921.884	28.860	0.000	H_0 rejected

The significant relationship between transmission types and resale value aligns with previous research by [17], which indicated that the price of manual cars is lower than automatic cars. Moreover, there is significant relationship between engine capacity and its resale value, highlighted that the cars with a bigger engines will cost more than the small engine capacity [18]. From this study, age of car (month) concluded to be the significant factor affecting cars resale value in Malaysia, supported by a study by [4]. In addition, there is significant relationship between mileage and resale value , which highlight that lower mileage typically corresponds to higher resale value [12], aligns with this study that showed mileage is one of the significant factors of car resale value. Furthermore, a car's resale value influenced by its body type is consistent with [19] study, where larger vehicles, such as MPVs and SUVs, generally have higher resale values compared to smaller cars like sedans and hatchbacks.

Acknowledgments

The authors would like to thank Universiti Teknologi MARA Cawangan Negeri Sembilan, Kampus Seremban for the facilities involved in making this research a success.

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