Jurnal Teknik dan Keselamatan Transportasi

ISSN: 2622-0105 (print) | 2716-1196 (online)
http://jurnal.poltekbangmakassar.ac.id/

The Effect of Pickup Truck Age on Roadworthiness Test Pass Rates at the Bantul Regency Vehicle Inspection Unit

Wahyu Budi Kurniawan[1*], Nanang Okta Widiandaru[2], Rifano[3], Gunawan[4], Anton Budiharjo[5]
[1,2,3,4,5] Politeknik Keselamatan Transportasi Jalan

***Correspondence:**
wahyukuriawan7878@gmail.com

ABSTRACT

Motor vehicles play a vital role in supporting community activities. As vehicles age, the performance of their engines and other technical components may decline, potentially affecting driving safety. Therefore, the government conducts routine vehicle inspections to ensure that vehicles meet technical and roadworthiness requirements. This study aims to analyze the effect of vehicle age on roadworthiness test results, identify testing parameters that frequently cause vehicles to fail the test, and analyze the factors leading to vehicles passing or failing the test. The study employs three approaches: binary logistic regression analysis to examine the effect of vehicle age on test status, quantitative descriptive statistical analysis to determine the distribution of passing and failing test results through data tables and graphs, and a qualitative descriptive analysis approach to identify other factors causing vehicles to pass or fail the test through field observations and interviews at the UPTD PKB of Bantul Regency from February to April 2026. The sample consisted of 92 vehicles, determined using the Slovin formula with a 10% margin of error from the population of pickup trucks required to undergo testing, which totaled 1,188 during that period of February–April 2026. The research results indicate a significant influence between vehicle age and passing the roadworthiness test. Among vehicles less than 10 years old, 40 passed the test and 6 failed. Conversely, among vehicles over 10 years old, 42 failed the test and only 4 passed. These results indicate that vehicle age affects roadworthiness test pass rates, although other factors also play a role, such as vehicle maintenance, type and load of cargo, road conditions, driving style, examiner factors, and vehicle usage intensity. It is hoped that this study can provide insight into the relationship between vehicle age and roadworthiness levels, thereby increasing public awareness of the importance of maintaining vehicle condition. According to the research data, the highest failure rate was found in the brake tester at 52.18% due to high vehicle usage intensity.

Article info

Received: 04-06-2026
Final Revision: 13-06-2026
Accepted: 27-06-2026
Available online: 30-06-2026

Keywords:

Motor vehicle roadworthiness test, pickup, roadworthiness, vehicle age.

Reccomended Citation:

APA Style

INTRODUCTION

According to Government Regulation No. 55 of 2012, Article 1, a vehicle is a means of road transport comprising motorized and non-motorized vehicles. A motorized vehicle is defined as a vehicle propelled by mechanical equipment in the form of an engine, excluding vehicles that run on rails. With technological advancements, vehicles continue to undergo updates in terms of both features and environmental aspects. In Indonesia, the number of motor vehicles continues to rise due to population growth and the public's increasing need for mobility. Motor vehicles, whether for passengers or goods, have become the primary mode of transportation supporting daily activities (Kawengian et al., 2017). The increase in the number of vehicles operating on public roads poses serious challenges to the safety and security of road users. Additionally, many older vehicles or those with outdated production years remain in operation, leading to safety concerns and environmental pollution due to exhaust emissions. This situation underscores the importance of vehicle testing to ensure they remain roadworthy (Machmud, 2021). One effort to provide a sense of safety and comfort while reducing traffic accidents is through motor vehicle testing. Motor vehicle inspection is a series of checks performed on a vehicle to determine whether it is roadworthy or not, and it also includes the vehicle registration document (Saputra et al., 2021). In order to obtain an operating permit, a vehicle must undergo a series of tests, one of which is a periodic inspection (Novianto et al., 2022). Research conducted by Luis Miguel indicates that accidents caused by vehicle component failures account for 3% to 19% of all accidents, making vehicle inspections critically necessary (Miguel et al., 2021).

According to Law No. 22 of 2009, periodic vehicle inspections are tests conducted at regular intervals to ensure that vehicles meet technical and roadworthiness requirements. The first periodic inspection must be conducted no later than one year after the issuance of the first vehicle registration certificate, followed by inspections every six months (Bahri et al., 2025) the vehicle will receive a BLU-E certificate upon passing the inspection (Ratnasari et al., 2024). Roadworthiness inspections evaluate several technical aspects of vehicles, including braking performance, emissions, lighting, steering alignment, speedometer accuracy, horn sound, and window transparency in accordance with Indonesian regulations (Okresowych & Zakresie, 2018). Testing aims to prevent accidents caused by technical component failures while ensuring that operating vehicles do not endanger other road users (Siti & Mukhamad Faizin, 2023). Additionally, studies indicate that older vehicles pose a higher safety risk to passengers compared to newer ones (Torok, 2020). Older vehicles also contribute to pollution levels because they are generally less efficient at burning fuel, resulting in high soot emissions that can be harmful to health—including causing respiratory problems, damage to blood vessels, and complications during pregnancy (Rahmawati et al., 2024).

One factor believed to influence roadworthiness test results is vehicle age. Older vehicles generally experience a decline in component performance due to wear, rust, or material fatigue, making them more likely to fail periodic inspections (Syaputri et al., 2024). However, vehicle age is not always the primary factor, as vehicle condition is also influenced by the frequency of maintenance and the vehicle's mileage (Mikulić et al., 2020). However, older vehicles are more likely to fail the test (Hudec, 2021). A study by Domagoj Mikulic, Zeljko Boskovic, and Luka Zovak titled "Effect of Driving Style and Vehicle Maintenance on Vehicle Roadworthiness" shows that while age and high mileage do increase the risk of vehicle damage, driving style also plays a significant role. Aggressive driving styles, such as high RPM usage, sudden braking, and hard acceleration, can accelerate component wear even if the vehicle is maintained regularly. Conversely, vehicles that are driven well and carefully tend to remain roadworthy even if they have the same age and mileage.

Previous studies have shown that a vehicle's age affects its roadworthiness, exhaust emissions, and safety levels but this can be addressed by setting a threshold (Donowati & Kholmi, 2024). Previous studies have shown that vehicle age, maintenance practices, driving style, and mileage influence vehicle roadworthiness and inspection outcomes. Vehicle age has been associated with higher exhaust emissions (Machmud, 2021), while maintenance and driving style play important roles in reducing mechanical failures (Mikulić et al., 2020). Older vehicles also tend to experience more technical defects (Olesen et al., 2024). In addition, (Suastari, 2021) emphasized the importance of reliable and high-quality periodic vehicle inspection services to ensure compliance with technical and roadworthiness requirements, while (Novia Putri Romadhoni, 2023) reported that limited public awareness remains a challenge for periodic vehicle inspection in Indonesia. These findings indicate that roadworthiness is influenced by multiple factors; however, studies simultaneously examining vehicle age, inspection parameter failure distribution, and other contributing factors in Indonesian pickup trucks remain limited. Therefore, this study aims to address this research gap. In addition, mileage also affects a vehicle's roadworthiness, as vehicles with high mileage are more likely to experience mechanical problems, particularly regarding vehicle emissions (Davison et al., 2022). The difference between this study and previous research lies in the effort to identify other factors that influence passing rates in periodic inspections besides vehicle age, as well as to analyze the distribution of failures in roadworthiness tests.

Based on the above description, this study was conducted to determine the effect of pickup truck age on passing the roadworthiness test at the UPTD PKB in Bantul Regency. The study focused on pickup trucks used for freight transport that were subject to mandatory testing during the period of February – April 2026. Vehicle age was classified into two categories: less than 10 years and more than 10 years, with the sample size determined using the Slovin formula. This study aims to determine the effect of vehicle age classification on roadworthiness test results, to identify the distribution of passing and failing vehicles based on age, and to identify other factors that cause pickup trucks to pass or fail roadworthiness tests. This study is expected to provide a deeper understanding of the relationship between a vehicle's age and its roadworthiness, raise public awareness of the importance of using safe and roadworthy vehicles, and reduce accidents; moreover, no fees are currently being collected, even though this has led to a decrease in local government revenue (Hariyati et al., 2025). A vehicle is considered suitable when it meets the thresholds for brake testers, emission analyzers, headlight testers, side-slip testers, speedometer testers, sound level meters, and tint meters. All inspection parameters followed the technical standards specified in Government Regulation No. 55 of 2012 and Minister of Environment Regulation No. 8 of 2023. Therefore, regulations have been enacted requiring the public to have their vehicles inspected, as vehicle condition is one of the leading causes of traffic accidents (Ayu et al., 2024).

METHOD

Research Location and Time

The study was conducted at the Bantul Regency Regional Technical Implementation Unit for Motor Vehicle Testing (UPTD PKB), located at Jl. Parangtritis No. KM 5.5, Tarudan, Bangunharjo, Sewon District, Bantul Regency, Special Region of Yogyakarta 55188. Data collection took place from February to April 2026, with pickup trucks as the research subjects. The data analyzed consisted of 46 pickup trucks less than 10 years old and 46 pickup trucks more than 10 years old, obtained from motor vehicle roadworthiness inspections using the following test parameters: gas analyzer, smoke tester, tint meter, side slip, sound level meter, headlight tester, brake tester, and speedometer tester. The data obtained were then processed and analyzed using SPSS software with the binary logistic regression method to determine the effect of pickup truck age on roadworthiness and to examine the distribution of pass and fail results for the roadworthiness test.

Population and Sample

The population consists of all elements in the study; in this case, it comprises pickup trucks subject to mandatory testing (KBWU) at the Bantul Regency Regional Technical Implementation Unit for Motor Vehicle Testing (UPTD PKB), totaling 1,188 vehicles. A sample was then drawn from this population; the sample itself is a subset of the population that serves as the data source used in the study and is considered representative of the entire existing population. Sampling was conducted using purposive sampling, a technique in which samples are selected based on specific criteria aligned with the research objectives. Additionally, the author determined the sample size using the Slovin formula because the population used in the study was a limited population, namely the number of pickup trucks subject to mandatory testing (KBWU) at the Bantul Regency Regional Technical Implementation Unit for Motor Vehicle Testing (UPTD PKB), with a margin of error (e) of 10% (Majdina et al., 2024), as follows:

$$n = \frac{N}{1 + N.e^2} \tag{1}$$

$n = Number\ of\ samples$

$N = Population\ size$

$e = Margin\ off\ error$

the results were as follows:

$$n = \frac{N}{1 + N.e^2}$$

$$n = \frac{1188}{1 + 1188x0{,}1^2}$$

$$n = 92{,}2$$

The 92 samples were divided into two balanced groups: 46 vehicles under 10 years old and 46 vehicles over 10 years old. This age classification is based on previous research, specifically a study conducted by Sindu Kisyono, which found that vehicles over 10 years old have an impact on road accident rates (Olesen et al., 2024). In this context, it implies that accidents occur not only due to driver negligence but also because of vehicles that are unfit for the road; therefore, measures are needed to mitigate this, such as imposing age limits on motor vehicles or ensuring roadworthiness based on test results and the policies of the Special Capital Region of Jakarta as stipulated in of the Republic of Indonesia No. 2 of 2024 on the Special Capital Region of Jakarta, as well as the regulations in the Special Capital Region of Jakarta Governor's Instruction No. 66 of 2019 on Air Quality Control specifically by tightening emission test requirements starting in 2019 and ensuring that vehicles over 10 years old are not operated in DKI Jakarta by 2025. This is further supported by Michelle's research, which states that such measures are highly appropriate (Michelle et al., 2020), noting that the maximum vehicle age in European Union countries is 2009, and that other nations such as Singapore and India also limit vehicle age to no more than 10 years (Syaputri et al., 2024).

Research Variables

The dependent variable (Y) is the factor that is influenced or changes due to the presence of an independent variable; it can be interpreted as the outcome variable, which in this study is the roadworthiness test result, denoted as 1 = Passed the test and 0 = Failed the test. The independent variable (X) is a factor that influences or causes changes in another variable; in this case, the independent variable X is the vehicle age category, denoted by 1 = Vehicle age < 10 years and 0 = Vehicle age > 10 years.

Data Collection Method

Data were collected through direct observation of periodic vehicle inspection results using standardized observation forms and through semi-structured interviews with Level 4 inspectors, Level 5 inspectors, and assistant inspectors at the Bantul Regency UPTD PKB. Observation data included the results of roadworthiness inspection parameters, while interview data were used to identify factors other than vehicle age that influenced roadworthiness test outcomes. All inspections were conducted using standard motor vehicle inspection equipment in accordance with applicable regulations.

Data Analysis Method

The data analysis in this study employs three approaches:

1. Binary Logistic Regression

   The binary logistic regression model is formulated as follows:

$$\pi(x) = \frac{\exp\,(\beta 0 + \beta 1x1 + \cdots + \beta pxp}{1 + \exp\,(\beta 0 + \beta 1x1 + \cdots + \beta pxp} \tag{2}$$

Source : Hosmer, D.W. and Lemeshow, S. 2000. Applied Logistic Regression, 2nded. New York: John Wiley & Sons, Inc.

Model testing was conducted in three stages:
(a) Model Fit Test (Hosmer and Lemeshow Test)
Hypotheses:

H0 = The model fits (There is no significant difference between the observed results and the model's predictions)
H1 = The model does not fit (There is a significant difference between the observed results and the model's predictions)
Test Statistic:

$$\hat{C} = \sum_{k=1}^{g} \frac{(0k - n_k\bar{\pi}_k)^2}{n_k\bar{\pi}_k(1-\bar{\pi}_k)}$$

(3)

Source : Hosmer, D.W. and Lemeshow, S. 2000. Applied Logistic Regression, 2nded. New York: John Wiley & Sons, Inc.

Critical Region:
Reject H_0 if $C > X^2$ (a,g-2) or the p-value is less than α (0.05)
(b) Simultaneous Hypothesis Test/Omnibus Test
Hypotheses:
H0: β1 = β2 = … = βp = 0
H1: At least one βj ≠ 0, for j = 1, 2, …, p
Test statistic:

$$G = -2\ln\frac{\left[\frac{n_1}{n}\right]^{n_1}\left[\frac{n_0}{n}\right]^{n_0}}{\sum_{i=1}^{n}[\pi_i]^y i[1-\pi_i]^{1-yi}} \; dengan\, n_0 = \sum\nolimits_{i=1}^{n}(1-yi)\,, n_1 = \sum\nolimits_{i=1}^{n} yi$$

(4)

Source : Hosmer, D.W. and Lemeshow, S. 2000. Applied Logistic Regression, 2nded. New York: John Wiley & Sons, Inc.

Critical region:
Reject H_0 if G (calculated chi-square value) > X^2 (a,df) (table chi-square value), where df is the number of independent variables in the model, or if the p-value is less than α (0.05).
(c) Partial Hypothesis Test/Wald Test
Hypotheses:
H0: β_j = 0, j = 1, 2, …, p
H1: β_j ≠ 0, j = 1, 2, …, p
Wald Test Statistic:

$$W_i^2 = \frac{\hat{\beta}_j^2}{SE(\hat{\beta}_j)^2}$$

(5)

Source : Hosmer, D.W. and Lemeshow, S. 2000. Applied Logistic Regression, 2nded. New York: John Wiley & Sons, Inc.

Critical region:
Reject H_0 if $Wt^2 > X^2_{a,df}$ (chi-square table) or p-value < α (0.05)

2. Quantitative Descriptive Statistical Analysis
Used to provide an overview of the data on motor vehicle roadworthiness test results, including the number of vehicles that passed and failed the test, as obtained from the research observation forms. According to Martono (2011). This analysis is conducted by calculating the frequency and percentage of roadworthiness test results for pickup trucks. Additionally, a mapping of the distribution of pass and fail results is conducted based on test parameters derived from the observation forms to examine

the distribution of these test outcomes, which also provides information regarding vehicle type and age. The results of this analysis are then presented in the form of frequency distribution tables and graphs to facilitate visual interpretation of the pass and fail rates for pickup trucks.

3. Qualitative Descriptive Analysis
This study systematically and factually examines the factors causing vehicles to fail inspections, based on interview sheets compiled from field data. Qualitative research is an approach aimed at understanding meaning within a subjective social context (Subhaktiyasa, 2024). The data used in this analysis consists of primary data from the results of technical inspections of vehicles that failed the test, as well as statements from both the inspectors and the drivers themselves, covering various aspects of the factors causing vehicles to fail the test. The findings will be described in narrative form, explaining the dominant factors that led to failure or passing of the roadworthiness test. The informants in this study were 2 Level 5 inspectors, 2 Level 4 inspectors, and 2 assistant inspectors, who were selected using purposive sampling based on their competence, experience, and understanding of motor vehicle inspections. The interviews were then conducted face-to-face using an interview guide that focused on questions regarding the factors causing vehicles to pass or fail the test. At least six factors contributing to test failure were identified: improper maintenance, type and load of cargo, road conditions, driving style, examiner-related factors, and usage intensity. The data was analyzed using data reduction, descriptive data presentation, and conclusion drawing. Information with similar answers or themes was grouped into the same category to avoid duplicate data.

RESULTS AND DISCUSSION

Research Data Description

The research data were obtained from direct observations of 92 pickup trucks at the Bantul Regency Vehicle Registration Office (UPTD PKB) during the period of February – April 2026. The sample was divided into two vehicle age categories: 46 vehicles under 10 years old and 46 vehicles over 10 years old. Based on the data collection results, the distribution of inspection pass status by pickup truck age classification is shown in Table 1 below.

Table 1. Pickup Vehicle Data Collection Results by Age Classification

Vehicle Age	Number Passed	Number Failed	Total	Passing Percentage
Age < 10 years	40	6	46	86,95%
Age > 10 years	4	42	46	8,69%
Total	44	48	92	47,82%

Source: Research Data, 2026

Based on Table 1, vehicles less than 10 years old showed a significantly higher pass rate (86.95%) compared to vehicles older than 10 years (8.69%). Overall, out of 92 vehicles tested, 44 (47.82%) passed the roadworthiness test. The significant disparity between these two age groups provides an initial indication that vehicle age influences roadworthiness test pass rates.

Binary Logistic Regression Analysis

The goodness-of-fit test (Hosmer and Lemeshow Test)

A model fit test was conducted to ensure that the binary logistic regression model fits the research data, as shown in Table 2. The hypotheses for the model fit test are as follows:

H_0: $\beta_1 = 0$ (the model fits with a p-value > 0.05)

H_1: $\beta_1 \neq 0$ (the model does not fit)

The results based on the research design, vehicle age was used as the independent variable, which was tested for its effect on the outcome of the roadworthiness test, which served as the dependent variable. This relationship was analyzed using SPSS with a binary logistic regression model because the variable is dichotomous—specifically, between passing the test and failing the test. The results of the Hosmer-Lemeshow Test showed a significance value of 0.696 > 0.05, so H_0 was accepted and H_1 was rejected, indicating that the model has a good fit. This means there is no significant difference between the predicted probabilities and the observed probabilities in the field, and the research model can be used for further in-depth analysis. Thus, the binary logistic regression model is capable of describing the relationship between the age of pickup trucks and passing the roadworthiness test, as well as identifying the data distribution and the distribution of test status.

Table 2. Hosmer and Lemeshow Test Results

Step	Chi-square	df	Sig.
1	5.566	8	0.696

Source: Output SPSS

Simultaneous Hypothesis Test (Omnibus Test)

An omnibus test was conducted to determine whether the independent variable (vehicle age) simultaneously influences the dependent variable (passing the roadworthiness test). The hypotheses tested are:

H_0: $\beta_1 = 0$ (vehicle age does not significantly influence passing the roadworthiness test)

H_1: $\beta_1 \neq 0$ (vehicle age significantly influences passing the roadworthiness test)

Table 3. Omnibus Tests of Model Coefficients Results

Test	Chi-square	df	Sig.
Step	65.186	2	0.000
Block	65.186	2	0.000
Model	65.186	2	0.000

Source: Output SPSS

Table 4. Chi-Square Distribution Table

DF	0,005	0,010	0,025	0,050	0,100	0,250
1	7,879	6,635	5,024	3,841	2,706	1,323
2	10,597	9,210	7,378	5,991	4,605	2,773
3	12,838	11,345	9,348	7,815	6,251	4,108
4	14,860	13,277	11,143	9,488	7,779	5,385
5	16,750	15,086	12,833	11,070	9,236	6,626
6	18,548	16,812	14,449	12,592	10,645	7,841
7	20,278	18,475	16,013	14,067	12,017	9,037
8	21,955	20,090	17,535	15,507	13,362	10,219
9	23,589	21,666	19,023	16,919	14,684	11,389
10	25,188	23,209	20,483	18,307	15,987	12,549
11	26,757	24,725	21,920	19,675	17,275	13,701
12	28,300	26,217	23,337	21,026	18,549	14,845
13	29,819	27,688	24,736	22,362	19,812	15,984
14	31,319	29,141	26,119	23,685	21,064	17,117
15	32,801	30,578	27,488	24,996	22,307	18,245
16	34,267	32,000	28,845	26,296	23,542	19,369
17	35,718	33,409	30,191	27,587	24,769	20,489

Source: www.statistikian.com

Based on Table 3, the results of the binary logistic regression analysis in the omnibus test show that the chi-square value is 65.186 with 2 degrees of freedom (df) and a significance level (Sig.) of 0.000. From these results, it can be concluded that the calculated chi-square value is greater than the critical chi-square value, as the calculated chi-square value is 65.186 and the critical chi-square value (X^2 at α, df) = (X^2 at 0.05, 2) is 5.991. Similarly, the significance value (Sig.) is 0.000, which is smaller than 0.05 ($p < 0.05$). Therefore, it can be concluded that the test results reject H0 and accept H1, meaning that the logistic regression model used statistically indicates that the independent variable vehicle age has a significant effect on the roadworthiness test pass status.

Partial Hypothesis Test (Wald Test)

Table 5. Variables in the Equation Results

Variabel	B	S.E.	Wald	df	Sig.	Exp(B)
Data_Kendaraan	0.020	0.025	0.612	1	0.434	1.020
Usia kendaraan(1)	5.226	1.486	12.365	1	0.000	186.021
Constant	-3.796	1.954	3.775	1	0.052	0.022

Note: Variable(s) entered on step 1: Data_Kendaraan, Usia kendaraan.
Source: Output SPSS

Based on Table 5, the results of the Wald test show a Wald value of 12.365 with df = 1, which is greater than the critical chi-square value of 3.841, and a significance level of 0.000, which is less than 0.05 (p-value < 0.05). The regression coefficient (B) of 5.226 indicates a positive effect, meaning that younger vehicles tend to have a higher probability of passing the roadworthiness test. This is reinforced by the Exp(B) value of 186.021, which indicates that newer vehicles have a significantly higher probability of passing the roadworthiness test compared to older vehicles. Therefore, H_0 is rejected and H_1 is accepted, meaning that vehicle age has a significant effect on the outcome of the roadworthiness test.

Effect of Vehicle Age on Roadworthiness Test Passing Results

Based on the results of the binary logistic regression analysis, which included three tests—the model fit test, the simultaneous hypothesis test (omnibus test), and the partial hypothesis test (Wald test)—it was found that H0 was rejected and H1 was accepted, meaning that the age of pickup trucks has a significant effect on the roadworthiness test results. This occurred because the model fit test revealed that the binary logistic regression model exhibited a good fit with the research data—or, in other words, the model fit was appropriate—meaning the binary logistic regression model is suitable for further analysis since there was no significant difference between the predicted probabilities and the observed probabilities in the field. Furthermore, in the simultaneous hypothesis test (omnibus test), the results showed that the calculated chi-square value was greater than the critical chi-square value, and the significance level (Sig.) was 0.000, which is less than 0.05 ($p < 0.05$). Therefore, it can be concluded that the test results reject H0 and accept H1, meaning that the logistic regression model used statistically demonstrates that the independent variable—vehicle age—has a significant effect on the roadworthiness test pass status.

Additionally, a partial test (Wald test) was conducted, yielding a Wald value of 12.365 with df = 1, which is greater than the table chi-square value (X^2 a,df) of 3.841, and the significance level (Sig.) is 0.000, which is less than 0.05 ($p < 0.05$). This means that the test results reject H0 and accept H1, indicating that vehicle age has a significant effect on passing the roadworthiness test. Thus, it is clear that the age of pickup trucks has a significant effect on passing the roadworthiness test. Thus, the results of this study reinforce previous findings that vehicle age affects the roadworthiness of motor vehicles; however, based on the author's field data from interviews, there are at least several additional factors influencing test results, namely inadequate maintenance, type and load of cargo, terrain traversed, driving style, examiner factors, and usage intensity, as well as vehicle mileage.

Distribution of Roadworthiness Test Passing and Failing Outcomes

A distribution analysis was conducted on all roadworthiness test parameters to determine which parameters were the most common causes of failure. The distribution data for passing and failing results are presented in Table 6 and Table 7.

Table 6. Distribution of Roadworthiness Test Passing Outcomes by Test Parameter and Vehicle Age Classification

No	Test Parameter	Number Passed		Success Percentage	
		Age < 10 years	Age > 10 years	Age < 10 years	Age > 10 years
1.	*Smoke tester*	14	10	100%	100%
2.	*Gas Analyzer*	31	32	96,87%	88,88%
3.	*Sound level meter tester*	46	40	100%	86,95%
4.	*Brake tester*	40	22	86,95%	47,82%

5.	*Headlight tester*	46	35	100%	76,08%
6.	*Side slip tester*	46	46	100%	100%
7.	*Speedometer tester*	46	45	100%	97,82%
8.	*Tint meter tester*	46	46	100%	100%

Source: Research Data, 2026

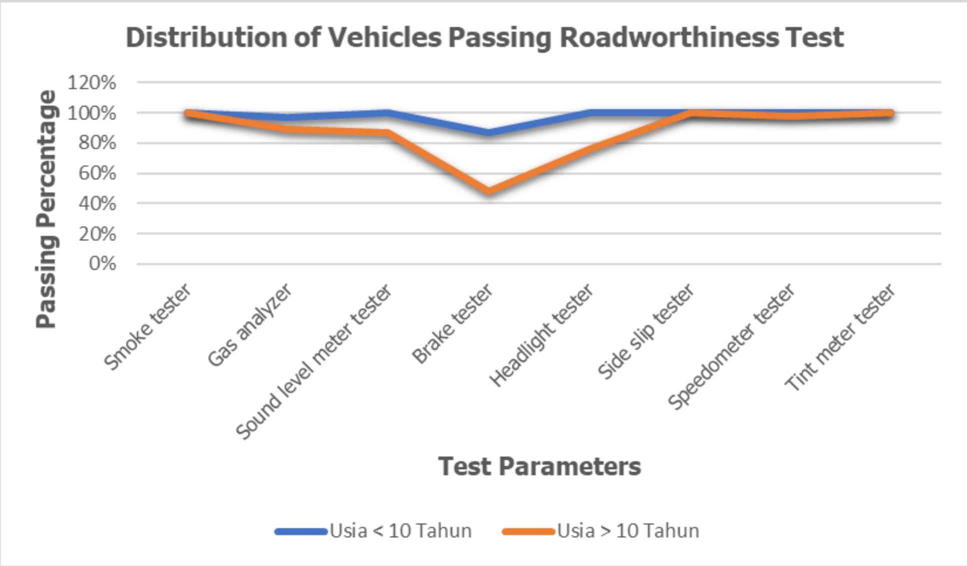

Figure 1. Distribution graph of vehicles passing the roadworthiness test

Based on the table and graph, it can be concluded that for vehicles under 10 years old, the pass rate for roadworthiness tests is nearly perfect, with all test parameters achieving a 100% pass rate except for the gas analyzer (96.87%) and the brake tester (86.95%). For vehicles over 10 years old, only three test parameters achieved a 100% pass rate: the smoke tester, the side slip tester, and the tint meter tester. The others have fairly high pass rates: the gas analyzer at 88.88%, the sound level meter tester at 86.95%, the speedometer tester at 97.82%, and the headlight tester at 76.08%. However, one test parameter stands out with a notably low pass rate: the brake tester at 47.82%. This indicates that the age of the vehicle plays a significant role in roadworthiness test pass rates, as evidenced by the data showing a significant difference between vehicles under 10 years old and those over 10 years old.

Table 7. Distribution of vehicles failing the roadworthiness test

No	Test Parameter	Number Failed		Failure Percentage	
		Age < 10 years	Age > 10 years	Age < 10 years	Age > 10 years
1.	*Smoke tester*	0	0	0%	0%
2.	*Gas Analyzer*	1	4	3,13%	11,12%
3.	*Sound level meter tester*	0	6	0%	13,05%
4.	*Brake tester*	6	24	13,05%	52,18%
5.	*Headlight tester*	0	11	0%	23,92%
6.	*Side slip tester*	0	0	0%	0%
7.	*Speedometer tester*	0	1	0%	2,18%
8.	*Tint meter tester*	0	0	0%	0%

Source: Research Data, 2026

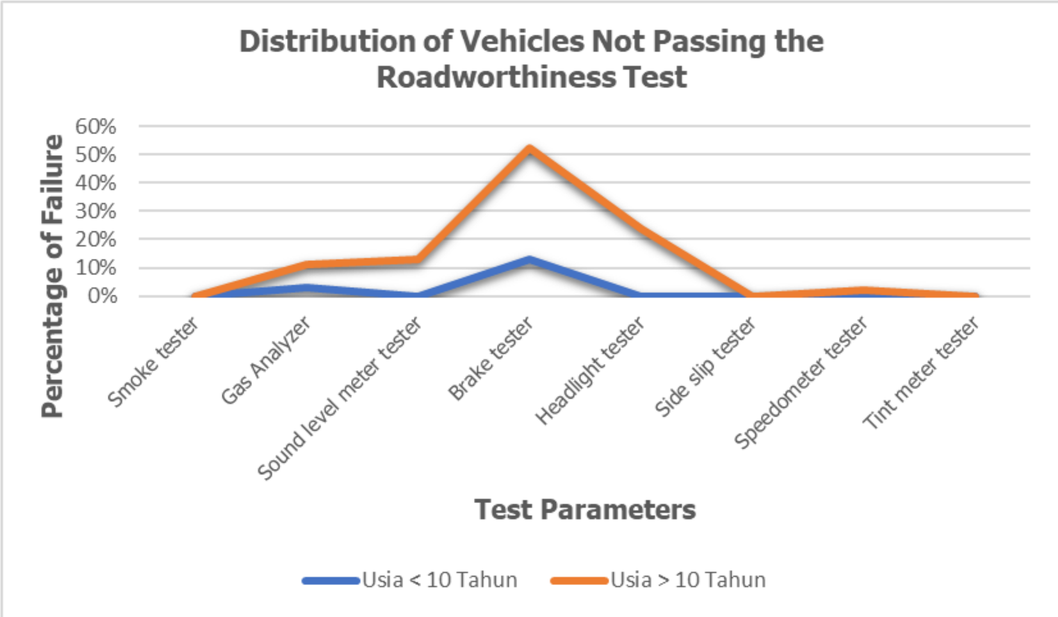

Figure 2. Distribution graph of vehicles failing the roadworthiness test

Based on the table and graph, it was concluded that for vehicles under 10 years old, only two test parameters failed the test: the gas analyzer at 3.13% and the brake tester at 13.05%. In contrast, for vehicles over 10 years old, nearly all parameters failed the test, as seen in the gas analyzer at 11.12%, the sound level meter tester at 13.05%, the headlight tester at 23.92%, and the speedometer tester at 2.18%. The parameter causing the most test failures was the brake tester at 52.18%. Additionally, aside from these test parameters, there were no test failures for the smoke tester, side slip tester, and tint meter tester.

Based on this data, it can be concluded that for vehicles under 10 years old, the test parameter causing the most failures in roadworthiness testing was the brake tester at 13.05% (6 pickup trucks); similarly, for vehicles over 10 years old, the test parameter causing the most failures was also the brake tester at 52.18% (24 pickup trucks).

Other Factors Influencing Roadworthiness Test Passing Outcomes

Although vehicle age was found to have a significant effect, there were anomalies in the data: 6 vehicles under 10 years old failed the test (13.05%) and 4 vehicles over 10 years old passed the test (8.69%). This indicates that other factors are also at play. Based on observations and interviews with Level 5 inspectors at the Bantul Regency UPTD PKB, there are at least six additional factors:

1. Inadequate maintenance
   Vehicle maintenance is a key factor affecting roadworthiness. Inadequate maintenance, such as irregular servicing or repairs at unlicensed workshops, may lead to undetected component damage, reducing the performance of braking, steering, electrical, and emission systems. Conversely, regular maintenance reduces the risk of component failure (Liston & Panggabean, 2025). This finding is consistent with interviews indicating that vehicles receiving routine maintenance are more likely to pass the roadworthiness test.
2. Type and load of cargo
   The type and load of cargo also influence vehicle roadworthiness. Heavy or overloaded cargo accelerates wear on the braking and suspension systems, while certain materials, such as sand, may damage brake components. These findings are consistent with (Gunawan & Fauzi, 2023) and were supported by interviews with inspectors, who reported that overloaded vehicles generally experience faster component deterioration.
3. Terrain traversed
   Road and environmental conditions affect vehicle durability. Vehicles operating in coastal areas are more susceptible to corrosion, while frequent use on rough or steep roads accelerates component wear.

These findings are supported by (Hendranata et al., 2025) and confirmed by inspectors' field observations.

4. Driving Style
   Driving style significantly influences vehicle condition. Aggressive driving, including sudden braking, rapid acceleration, and high engine speeds, accelerates component wear, whereas careful driving helps maintain vehicle roadworthiness (Mikulić et al., 2020). Inspectors also reported that vehicles driven carefully generally perform better during inspections.
5. Tester Factors
   Tester-related factors may influence inspection results through technical or operational errors (Nur et al., 2022) . Interviews revealed that operating the brake tester directly by inspectors has reduced errors previously caused by drivers' inaccurate braking timing, highlighting the importance of examiner competence and consistency.
6. Usage Intensity
   Vehicle usage intensity alone does not determine inspection outcomes. Frequently used vehicles may remain in better condition because their components continue to function regularly; however, this advantage depends on proper maintenance. Without adequate maintenance, intensive vehicle use accelerates component deterioration and increases the likelihood of failing the roadworthiness test.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of this study, vehicle age significantly affects the roadworthiness test pass rate of pickup trucks at the Bantul Regency UPTD PKB. Vehicles less than 10 years old were more likely to pass the inspection than those over 10 years old. The brake tester was the parameter that most frequently caused test failure in both age groups, indicating that braking performance requires particular attention during vehicle maintenance.

Vehicle owners, particularly those operating vehicles over 10 years old, are encouraged to perform regular maintenance, especially on the braking system, and to inspect their vehicles before testing. Regular maintenance helps ensure optimal engine performance (Rosianto et al., 2022), while maintaining a proper service history can reduce the risk of breakdowns and extend vehicle lifespan (Fauzi et al., 2025). The Bantul Regency UPTD PKB should strengthen public awareness of periodic vehicle inspections and continue improving inspection quality. Future studies are recommended to include additional variables, such as maintenance frequency, vehicle usage intensity, and mileage, while using larger samples, broader study areas, and different vehicle types to improve the comprehensiveness of the findings.

REFERENCES

Ayu, I., Kusuma, W., Pitriyantini, P. E., Bagus, I., & Dharma, W. (2024). *Analisis Yuridis terhadap Penegakan Hukum Pelanggaran Pengujian Kendaraan Bermotor yang Menyebabkan Kecelakaan Lalu Lintas*. *02*(01), 38–44. https://doi.org/10.58878

Bahri, I. M., Syafril, R., Publik, A., Padang, U. N., & Vehicle, M. (2025). *EFEKTIFITAS MODEL BLU-e PADA PENGUJIAN PERANGKAT KENDARAAN BERMOTOR DI DINAS PERHUBUNGAN KABUPATEN*. *2*, 75–98.

Davison, J., Rose, R. A., Farren, N. J., Wagner, R. L., Wilde, S. E., Wareham, J. V, & Carslaw, D. C. (2022). Atmospheric Environment : X Gasoline and diesel passenger car emissions deterioration using on-road emission measurements and measured mileage. *Atmospheric Environment: X*, *14*(February), 100162. https://doi.org/10.1016/j.aeaoa.2022.100162

Donowati, M. P., & Kholmi, M. (2024). *Analisis Peningkatan Kualitas Udara di Terminal : Strategi Mengurangi Emisi Gas Buang dari Armada Bus*. *4*, 8773–8783.

Fauzi, N. A., Sampurno, Y. G., & Wahyudi, K. S. (2025). *Journal of Vocational Applied Research Development of a Centralized Vehicle Maintenance Information System*. *2*(2), 135–141. https://doi.org/10.37934/jvars.XX.X.XX

Gunawan, T. R., & Fauzi, M. (2023). *ANALISIS PENGARUH KENDARAAN OVER DIMENSI DAN*. 112–117.

Hariyati, Nur, M., & Rahmat, M. R. (2025). *Penurunan pendapatan daerah*. *11*(2), 611–622.

Hendranata, D., Arwati, I. G. A., & Darmono, B. (2025). *Tinjauan Pengaruh Iklim Pantai Terhadap Laju Korosi Kerangka Kendaraan Dengan Variasi Perlakuan*. *4*(2), 5766–5774.

Hudec, J. (2021). ScienceDirect ScienceDirect Examination of the results of the vehicles technical inspections in Examination of the results of the vehicles technical inspections in relation to the average age of vehicles in selected EU states relation to the average age of vehicles in selected EU states. *Transportation Research Procedia*, *55*(2019), 2–9. https://doi.org/10.1016/j.trpro.2021.07.063

Kawengian, & dkk. (2017). Model Pemilihan Moda Transportasi Angkutan Dalam Provinsi. *Jurnal Sipil Statik*, *5*(3), 133–142.

Liston, S., & Panggabean, H. (2025). *PERAWATAN SERVICE BERKALA 10 . 000 KM DI MOBIL AVANZA*. *15*, 1–8.

Machmud, S. (2021). Analisis Pengaruh Tahun Perakitan Terhadap Emisi Gas Buang Kendaraan Bermotor. *Jurnal Mesin Nusantara*, *4*(1), 21–29. https://doi.org/10.29407/jmn.v4i1.16038

Majdina, N. I., Pratikno, B., & Tripena, A. (2024). Penentuan Ukuran Sampel Menggunakan Rumus Bernoulli Dan Slovin: Konsep Dan Aplikasinya. *Jurnal Ilmiah Matematika Dan Pendidikan Matematika*, *16*(1), 73. https://doi.org/10.20884/1.jmp.2024.16.1.11230

Michelle, E., Jusuf, M., & Julian, J. (2020). *Efektifitas pelaksanaan pergub 66 dki*. *66*.

Miguel, L., Lardelli-claret, P., Garc, L., Rivera-izquierdo, M., Jim, E., & Mart, V. (2021). *Effect of Periodic Vehicle Inspection on Road Crashes and Injuries : A Systematic Review*. https://doi.org/10.3390/ijerph18126476

Mikulić, I., Bošković, I., & Zovak, G. (2020). Effects of driving style and vehicle maintenance on vehicle roadworthiness. *Promet - Traffic and Transportation*, *32*(5), 667–677. https://doi.org/10.7307/ptt.v32i5.3443

Novia Putri Romadhoni. (2023). Kurangnya Kesadaran Masyarakat Untuk Uji Kendaraan Bermotor : Penyebab dan Akibat. *Journal of Student Research*, *2*(1), 59–68. https://doi.org/10.55606/jsr.v2i1.2483

Novianto, R. A., Fahmadi, A. E., & Tosi, V. El. (2022). *Kajian Penerapan Pemeriksaan Persyaratan Teknis Pada Unit Pelaksana Uji Berkala Kendaraan Bermotor Sesuai Buku Pedoman Pengujian Kendaraan Bermotor Jilid II B Dan II D*. *9*(1), 11–20. https://doi.org/10.46447/ktj.v9i1.415

Nur, M., Nilwana, A., Hatibu, I., & Barisan. (2022). *Kinerja pegawai dalam layanan pengujian kendaraan bermotor di kabupaten sidenreng rappang 1)*. *10*, 86–92.

Okresowych, K. R., & Zakresie, S. W. (2018). *DIRECTIONS FOR THE DEVELOPMENT OF PERIODIC TECHNICAL INSPECTION FOR MOTOR VEHICLES SAFETY SYSTEMS*. *80*(2), 37–51. http://dx.doi.org/10.14669/AM.V0L80.ART3

Olesen, A. V., Lahrmann, H., Jensen, L. V., & Øhlenschlæger, R. (2024). The effect of periodic vehicle inspection on road traffic crash risk. *Traffic Safety Research*, *6*, 1–10. https://doi.org/10.55329/lrva5301

Rahmawati, V., Hayat, A. L., & Salam, A. (2024). *Analisis dampak pencemaran udara terhadap kesehatan masyarakat di perkotaan*. *2*, 17–24.

Ratnasari, T., Salbiah, E., & Hermawan, D. (2024). Analisis Kualitas Pelayanan Pengujian Kendaraan Angkutan Barang dengan Sistem Bukti Lulus Uji Elektronik. *Karimah Tauhid*, *3*(9), 10725–11039. https://doi.org/10.30997/karimahtauhid.v3i9.15231

Rosianto, M. P., Rarindo, H., Rizza, M. A., & Wahyudi, B. (2022). *METODE RCM UNTUKPENJADWALAN PERAWATAN PADA KENDARAAN*.

Saputra, D., Arbain, T., & Riduansyah Syafari, M. (2021). Kualitas Pelayanan Uji Berkala Kendaraan Bermotor. *Jurnal Pemikiran Dan Penelitian Administrasi Politik Dan Administrasi Binsnis*, *5*(1), 30–48. https://doi.org/10.35722/pubbis.v5i1.282

Siti, S., & Mukhamad Faizin. (2023). Evaluasi Pelaksanaan Pengujian Berkala Kendaraan Bermotor Menggunakan Metode Topsis di Unit Pengelola Pengujian Kendaraan Bermotor Pulogadung DKI Jakarta. *Logistik*, *16*(01), 23–41. https://doi.org/10.21009/logistik.v16i01.34180

Suastari, N. M. (2021). Pelaksanaan Uji Kelaikan Kendaraan Bermotor Dalam Rangka Pencapaian Standar Pelayanan Minimal Di Kabupaten Buleleng. *Jurnal Hukum*, *9*(1), 99–118.

Subhaktiyasa, P. G. (2024). *Menentukan Populasi dan Sampel : Pendekatan Metodologi Penelitian Kuantitatif dan Kualitatif*. *9*, 2721–2731.

Syaputri, M. D., Dewi, R., & Sari, P. (2024). *Urgensi Pengaturan Pembatasan Usia Kendaraan Pribadi dalam Menjaga Kualitas Udara di Surabaya*. 573–586.

Torok, A. (2020). *A NOVEL APPROACH IN EVALUATING THE IMPACT OF VEHICLE AGE ON ROAD SAFETY*.