



## DECISION SUPPORT SYSTEM FOR VEHICLE ROADWORTHY IN SOUTH TANGERANG CITY

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### ABSTRACT

In addition to preventing environmental pollution caused by exhaust emissions, creating a safe vehicle is the main objective of the process of testing vehicles. Testing vehicles in the process requires time efficiency and accurate service output to decide whether the vehicle is roadworthy or not. In this study, the application of the Analytic Hierarchy Process (AHP) method is considered more appropriate in solving existing problems by weighting the criteria of technical testing and administrative testing, where there are four criterias are used such as the identity of the owner / authorized, application letter, type test registration certificate and vehicle license. The results of this study are web-based applications that regulate the hierarchy starting from the beginning of the registration process, testing, ratification of service outputs and various kinds of reporting so that the supervisor as the main person responsible for ensuring the safety of the tested vehicle can be faster, more precise and comprehensive in making the decision.

**Keyword:** vehicle inspection, roadworthy, decision support system, analytical hierarchy process.

### INTRODUCTION

Today the development of technology and legislation in public services in a government agency is increasingly advanced. Among them circular from the director-general of land transportation number AJ/502/33/9 / DRJD concerning UPUBKP Accreditation and Application of Electronic Test Pass point two, which reads Province / District / City UPUPKB which does not have an accreditation stipulation from the director-general of land transportation and has not yet applied the Evidence of Electronic Pass Test until with a deadline of December 31, 2019 [1]. In accordance with circular number SE.1 / AJ.502 / DRJD / 2019 concerning changes in the use of evidence of passing the periodic test of motorized vehicles in the form of test books, test marks, and side signs of motorized vehicles to test cards and test marks then [2].

The UPUBKB is prohibited from conducting periodic testing of motorized vehicles so that its services are transferred to the nearest UPUPKB that has obtained accreditation and applies evidence of passing an electronic test [3]. Testing a motorized vehicle in principle is a process that must be passed by a mandatory vehicle test so that it can legally operate on the road [4]. The road operating requirements, in this case, are the minimum conditions for a motorized vehicle that must be achieved following the applicable laws and regulations [5]. The scope of a vehicle that is justified whether or not it is called a mandatory test vehicle (KBWU) with classification according to law number 22 of 2009 concerning transportation and road traffic includes freight cars, bus cars, public passenger cars, trailer trains, and patch trucks. Each KBWU unit is obliged to test its vehicles periodically in the motor vehicle testing service unit every six months if at the time of testing it is declared

ineligible and the KBWU unit is not permitted to operate on the road and various other sanctions [6, 7].

Based on the above, the agencies related to vehicle testing are required to make a system to support roadworthy decisions by applicable laws and regulations [8, 9]. Before implementing BLUe, the motorized vehicle testing unit must have been accredited at least to get an assessment B [10]. The accreditation component itself is contained in the regulation of the director-general of land transportation number SK. 1471 / AJ / DRJD / 2017[11]. The existing condition in the South Tangerang motor vehicle testing service unit still uses the conventional system even though it has received an accreditation assessment B from the directorate general of land transportation as a formal recognition and as a condition for implementing the BLUe system [12, 13].

Existing circumstances that are still conventional or semi-computerized cause various obstacles including is Testing registration process that is still not organized causing problems in service output, Community Difficulties in getting information and evaluating services, the testing process is uncertain when the completion time (relatively long), Administration, archiving and reporting procedures are still not following the principles of the front office and back-office services [14, 15, 16]. There are many cases of document forgery and the supervisor cannot comprehensively monitor the decision on whether or not the vehicle being tested is feasible [17]. Procurement of service paper which is costly, when there is monitoring from the Board of Trustees constrained data storage, an employee buildup occurs, motor vehicle testing is not permitted to operate [18].

Actually, it is not so difficult to develop this decision-making system (DSS) because some of the assessment thresholds have been read on the test



equipment used to check the technical components of vehicles whose thresholds have been set in standard rules, only with too many vehicles being tested every day [19]. There are also many items tested and inspected so that this item must make decisions quickly, accurately, and efficiently to minimize human error from the results of the decision both from a technical and administrative point of view [20].

## MATERIAL AND METHODS

### Review and Data Source

The data needed in this study is sourced from the main data and supporting data, the main data is the data that is on the master card and the database which is managed in the form of excel. While supporting data are data sourced from literature reviews both from previous research or data from stakeholders relating to motor vehicle testing services [21].

### Research Time and Location

This research was conducted at the South Tangerang motor vehicle testing service office and the surrounding vehicle testing service offices such as Tangerang City, Bogor Regency, and DKI Jakarta to add to the researcher's literature. The research time is on service operational working hours, with about two months.

To design and manipulate existing data on the master card in this study using MySQL because it is seen as being more able to simplify, secure, more easily, and flexibly use. In this data manipulation, standardized formulas using SQL that have been determined according to the Minister of Transportation regulations include the formula of brake efficiency and the speedometer inequality formula.

### Population and Research Sampling

To test this study the authors took samples from several vehicles that were first tested in the motor vehicle testing service unit in the southern city of Tangerang, with the hope that fresh data makes higher accuracy. In engineering this data sampling the author uses the AHP method with stages - stages according to the method that was first developed by Thomas el Saaty in the 1970s [22]. There are 4 axioms contained in the AHP model among other Reciprocal Comparison, Homogeneity, Independence and Expectation. Of the four axioms in this system tend to adopt the theory of independence and expectation in which the system shows a direct dependency by the components above according to the testing sequence and if all elements of the criteria are not met then it is considered incomplete and must start testing from the beginning.

The purpose of establishing the system among others is to provide the effectiveness of the supervisor's accuracy in making decisions as to whether or not the

vehicle being tested is feasible. Simplifying the supervisor in identifying problems that exist in the technical and administrative service space, Assist the Head of Office in terms of service evaluation and related policy-making and evaluation, as report data required vertical and horizontal agencies.

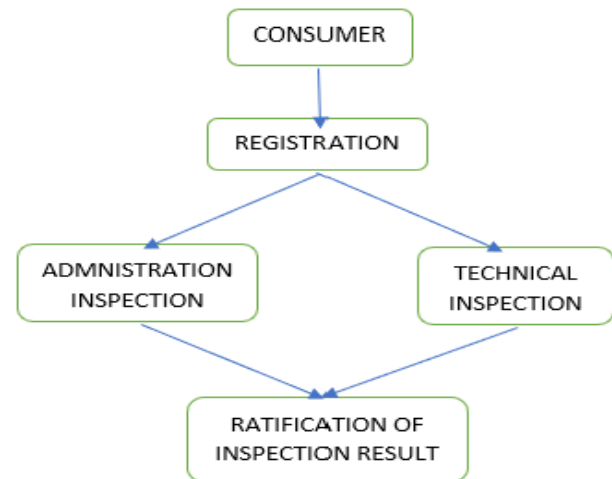


Figure-1. Flow test for motor vehicles.

In the design of decision-making systems using the AHP method, several principles must be understood including making the System Hierarchy [23]. In categorizing the criteria, some laws and regulations become the reference for processing the threshold using a table that is at the minimum threshold of motorized vehicles following the Minister of Transportation's decision number 63 of 1993. For those not listed in the table, the criteria for passing and not passing are guided by technical requirements for testing motor vehicles including other arrangements, equipment, equipment, car body, coupling, use, attachment, and administrative requirements as seen in Table-1. Based on Figure-1, the weighting criteria only refer to technical testing, so a scale assessment table is needed to find out which vehicles tested meet the technical requirements and roadworthiness thresholds or not.

Table-1. Passing criteria in the test administration.

No	Criteria	Verification
1	Identity of the owner / authorized	Complete or Not Complete
2	Application letter	Complete or Not Complete
3	Type test registration certificate	Complete or Not Complete
4	Vehicle License	Complete or Not Complete

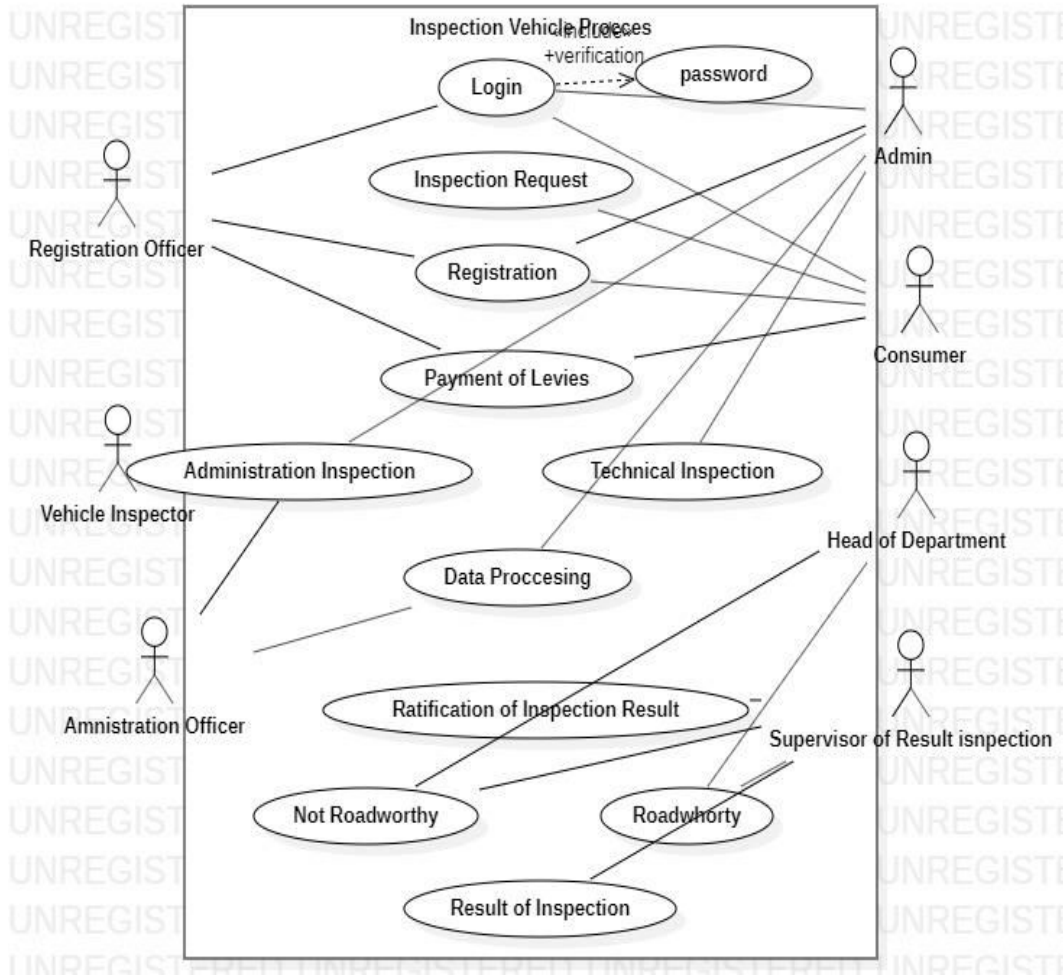


Figure-2. Use case diagram of motor vehicle testing services.

**Evaluating Criteria**

Table-2. Criteria for Roadworthiness thresholds for technical tests.

No	Criteria	Threshold
1	Brake system	50 %
2	speedometer	-10 % s/d + 15 %
3	Side Slip	5 %
4	Emission / co hc	50 %
5	Horn	83 db s/d 118 db
6	Glass Darkness	30 %
7	Tire groove depth	1 mm
8	Headlight of Intensity	12.000 cd
9	Equipment and Supplies	Fulfilling conditions and functions
10	Others Component	Fulfilling conditions and functions

Table-2 is the list of 10 roadworthiness criteria for vehicle technical test. For Based on the threshold in Table-2 above there is also the main brake efficiency and deviation formula and the speedometer to be input into the system so that when testing the brake and speedometer the test results can be read directly in equations (1), (2) and (3).

$$\sum B = \frac{\sum sb1 + \sum sb2}{\sum BK} \times 100\% \tag{1}$$

$$\sum Bn = \frac{\sum sbb + \sum sbs}{\sum sbb} \times 100\% \tag{2}$$

$$\sum Sb = \frac{\mu r - 40}{40} \times 100\% \tag{3}$$

With  $\sum B$  in equation (1) is the number of main brake efficiencies,  $\sum Bn$  in equation (2) is number of brake deviations,  $\sum sb1$  is the amount of brake efficiency on axis 1,  $\sum sb2$  is the amount of brake efficiency on axis 2,  $\sum BK$  is the total weight of the vehicle,  $\sum Sbb$  is the largest number of main brake efficiencies,  $\sum Sbs$  is the smallest number of main brake efficiencies,  $\sum Sd$  is the number of



speedometer measurements,  $\mu$  is an assessment of the vehicle, 40 is the average value

## RESULTS AND DISCUSSIONS

### System Analysis

From a review of the operational standard procedures set by the head of the transportation department, the application in the field still has weaknesses, making it difficult to accelerate services according to the Standard Operator procedure (SOP). The system will be made into groups according to stages AHP theory is then continued by calculating the value of the results of technical and administrative testing. The determination of the standard value of each technical sub-criteria has been determined with the threshold of the roadworthiness in the applicable laws and regulations and the fulfillment of technical requirements following the testing technique of motor vehicles in the threshold tab.

Besides that, the numbering of the vehicle test number when the vehicle is first tested, the numbering of the test number has been determined from the Guidance agency following the origin of the province, origin of the city, and the type of vehicle conducting the test. The test number here becomes very important because it becomes an identity like a birth certificate of a motorized vehicle. The test must be tested from the first time the vehicle is

tested until the vehicle is transferred to other areas. Therefore, in this system, the test number will not be issued before the tested vehicle is declared to have passed the test or roadworthy to avoid double test numbers or other errors.

The Test Number that can be raised can be a reference as to how much vehicle growth, so it becomes a percentage that is used as material to submit budget requirements for the following year. It has a function as the vehicle's identity, test number as well as material for initial stage identification. If the test number that is stamped in the vehicle chassis does not match the one in the motorized vehicle test data system, certainly, the vehicle is not the vehicle that submitted the vehicle test. As a change of identification before the vehicle entered the technical test, which was previously swiped using friction paper such as at Samsat developed into a photo upload test number.

The use case diagram above explains what activities are outlined in the process of determining roadworthiness and how many actors are involved. Each actor can be divided into several employees according to the position and workload analysis. Each actor is also limited in what can be done, while if there is an error when operating Admin will be a modifier or improvement of data.

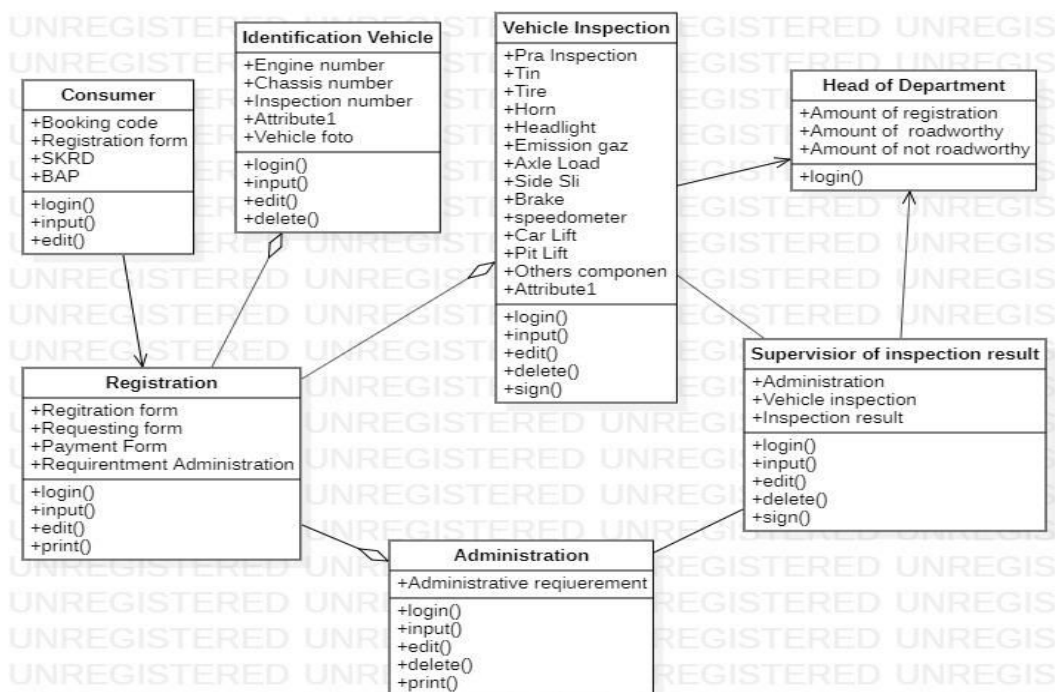


Figure-3. Class diagram of a motor vehicle testing system.

Clustering is needed to divide the activities according to the main tasks and functions according to the authority of each actor so that the optimal service in the process. In sub grouping. The part will make employee efficiency comparable later with the efficiency of the

budget to pay these employees, especially honorary employees who accumulate. So that the budget that was previously spent on payroll can be diverted for the development of motor vehicle testing innovations or other capital expenditures related to operational needs that have





not been accommodated such as refreshing new test equipment, adding test equipment, and improving public facilities.



**Figure-4.** Display the application login and main Menu.

### Proposed System

In principle, the proposed system accommodates evidence of passing the electronic test that is integrated with the ministry of transportation.

### CONCLUSIONS

The weighting and hierarchy of criteria by the AHP method can make more details of the items examined. However, the need for ongoing review and control adjusts the development of applicable laws and regulations. Completeness of supporting equipment must be a priority so the system can run without hampering the pace of service. This system is also in the framework of operational needs to apply the system to avoid the closure of services, whereas of 2021 no longer use the kir book (test book)

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