Decision Support System for Public Transportation Selection

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Abstract. The purpose of this research is to give an advice related to the transportation inspection by using a decision support system. Literature study, observation, system design, and system testing were used as methods in this research. With this method, we can create a system that can support the decision of the rhamp check officer to determine the proper transportation to operate. The result of this research is obtaining the data about the criteria used as a reference in making decisions about the feasibility of vehicle operations. The creation of a decision support system is very important because it can provide an accurate picture of the condition of a vehicle based on the results of a check rhamp as a decision support for choosing road-worthy transportation. From this problem the author want to create a system that name is "Decision Support System Public Transport Feasibility"

1. Introduction
Transportation is an important thing in life. All aspects are depended on the transportation sector because economic activities and transportation have a close relationship where both can influence each other [1]. This means that transportation can be an indicator of whether a country is developed or not. Indonesia is a country with the fourth largest population in the world; it means mobility for daily activities requiring an adequate of public transportation. Therefore, the management of public transportation facilities is needed to ensure that existing public transportation facilities are safe to use. Management of road transportation becomes important in order to reduce the risk of accidents due to inadequate public transportation.

At this present day, information technology has changed everything to use the internet [2]. Decision support systems are used as a tool for decision makers to expand the capabilities of decision makers, but not to replace the judgment of decision makers [3]. The support system is a decision of a computer-based information system combining models and data to provide support to decision makers in solving problems [4]. Decision Support System is designed with an emphasis on aspects of flexibility and high adaptability [5]. The stages of the decision-making process consist of several steps, namely:

a. Design
This step is the process of finding, developing, and analyzing alternatives that can be done. This step includes the process of analyzing the problem and testing the feasibility of the solution.

b. Choice
The selection process is carried out among various alternative. The election results are then implemented in the decision making process.

c. An implementation. The actual step is of 3 stages which are the implementation of the decisions taken [6].

Difficulties in carrying out vehicle inspections are often due to the large number of vehicles and a number of other problems such as limited time and manpower making the inspection process not optimal and comprehensive. This way, information on the inspection of road transport will be vulnerable.
Therefore, we need a system that can help improve effectiveness and efficiency in carrying out these tasks [7]. The purpose of this research is to give an advice related to the transportation inspection by using a decision support system. Literature study, observation, system design, and system testing were used as methods in this research. With this method, we can create a system that can support the decision of the rhamp check officer to determine the proper transportation to operate.

2. Methods

This method used in this study is Multipple Attribute Decision Making (MADM). This method requires the decision maker to determine the weight for each attribute. The total score for an alternative is achieved by summing the whole multiplication result between the rating which can be compared to cross attribute weights and each attribute. The Rating of each attribute has passed the previous normalization process. The SAW method is known as the weighted summation term. The basic concept of the SAW method is finding the weighted summation of the performance rating on each alternative to all attributes. The SAW method requires the process of normalizing the decision Matrix (X) to a scale that can be compared with all existing alternate ratings. The Formula to do normalization is as follows:

\[
\frac{x_{ij}}{\max_i x_{ij}} \quad \text{and} \quad \frac{x_{ij}}{\min_j x_{ij}}
\]

rij is the normalized performance rating of Ai alternatives on attributes Cj; i =1,2,...,m and j=1,2,...,n.

Description:
rij = normalized Performance rating values
xij = attribute value to each criterion
max xij = largest value of each criterion
min xij = smallest value of each criterion

The preference value for each alternative (Vi) is given as:

\[
V_i = \sum_{j=1}^{n} w_{ij} \cdot r_{ij}
\]

Description:
Vi = rank for each alternative
wj = weight value of each criterion
rij = normalized Performance rating value

A greater value of Vi indicates that Ai alternatives are more selected.

3. Results and Discussion

Any vehicle that will operate in the terminal will be through the inspection procedures to determine the extent of the eligibility conditions. The officer in the field will conduct a physical examination of the transport vehicle and fill the inspection results through mobile application. With this mobile application, it aims to facilitate the process of exchanging data between officers in the field with officers who perform the assessment of transport vehicles. That way, the process of exchanging data can run quickly. Besides, the data that has been logged by the inspection officers will enter the storage. Then, the data will be processed using the algorithm Simple Addative Weighting (SAW) [8]. The assessment process through several procedures that have been specified as a parameter in the formation of alternative and information about the transport vehicle is eligible to operate and the transport vehicle that is not viable operating [9]. This information can certainly be a support decision whether the vehicle is viable to operate or not worth operating [10].
The following design system support decision of vehicle valuation of eligible operations to be built (see Figure 1).

Figure 1. Login menu in Mobile apps

Figure 1 above is the Login form menu, which used by officers to fill the vehicle inspection results. Each field officer has access to login and use the system (see Figure 2).

Figure 2. Vehicle Data Form Display

Figure 2 is a form to fill the general data of the vehicle to be conducted inspection. This general data is to fill in the data of the transportation number; inspection location, the number, and the route of the transport destination (see Figure 3).
Figure 3 is a form to fill the inspection results based on administration elements. Administration element is one of the important elements in the assessment process. Checks on the administration elements include checking of vehicle letters as well as periodic test times and driver license suitability for drivers (see Figure 4).

Figure 4. Main technical Element Form display
Figure 4 is a form to fill the inspection results based on the main technical elements. The main technical element is one of the important elements in the assessment process. Checks on key technical elements include checking for technical-technical vehicle such as lighting system, Dreaman system, tire condition, condition of vehicle body, and completeness of emergency response equipment (see Figure 5).

![Supporting Elements Form Display](image)

**Figure 5. Supporting element Form display**

Figure 5 is a form to fill the inspection results based on supporting elements. Technical element supporting is the verification of spare parts that exist on the main technical (see Figure 6).
Figure 6 displays a menu containing critical data. Data criteria are parameters to be used as reference or value of comparison in the assessment process of the inspection transport vehicles (see Figure 7).
Figure 7 is a view of the assessment process. The assessment process aims to create an alternative by calculating the algorithm based on vehicle data or alternative that has been checked by comparing it to the weight of each criteria (see Figure 8).
Figure 8 shows an alternate list view of the vehicle. It is operational viable and not worth the operation that has been filtered through the previous assessment process. This data aims to provide an overview of some of the transportation vehicles quickly and can be used by the officers as supporting the decision to determine the vehicle that is viable and not viable operationally.

4. Conclusion
With the decision support system of the transport determinable of this road, every officer in the field only need to fill data from the vehicle through the mobile application and send it to the server data processing in the terminal for the establishment of Alternatip Decent road transport. With the information generated from the system, it will be easy to decide on an alternative transportation viable path based on the procedural that has been determined. Hopefully, this system can facilitate the process of data exchange and reduce the error or inspection officers fault in the field.

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