Public knowledge in changes of fossil fuel become biofuel on the transportation sector

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Abstract. The government of Indonesia through vision energy 25/25 saves energy by saving fossil fuels. One sector that consume the largest fossil fuel is transportation. Through the vision, this sector has a great opportunity to make savings by converting fossil fuels into biofuels as stipulated in the mandatory B20 policy. The success of the implementation of the policies depends on providing socialization to the public. Therefore, the objective of this study is to collect the information about the level of knowledge of the community in receiving information about the use of biofuels in the transportation sector. This is a quantitative study using a questionnaire in data collection, finding that people's understanding of biofuels, including the perception and information of biofuels, still needs to be improved. The results of the study can be used to assist in the planning, implementation and evaluation of policies made by the government in the use of biofuels in the transportation sector in Indonesia. The implications of this study are as a material consideration for increasing the dissemination of information to the public about biofuels, so that the use of biofuels can increase.

1. Introduction
Carbon dioxide contributes up to 65% of greenhouse gas, which facilitates the occurrence of global warming [1]. It causes major problems such as depletion of the ozone layer, the acid rain effects, smoke haze and destruction of human health [2], which makes it a public issue to be resolved quickly.

Indonesia is the twelfth largest CO2 emitter in the world, which is primarily due to the incessant burning of solid, liquid and gas fossil fuels. Annually, the world banks report on carbon dioxide emissions reaches 464 million tons, [3] which is generated from transportation. This sector contributes to about 50% of the oil consumed and produces about 25% of CO2 emitted globally [4]. Its production continues to increase, posing serious environmental problems, hence, efforts are been made to reduce it within the next few decades.

The high consumption of fossil fuels does not match its availability because they cannot be renewed. Some countries have adopted policies to minimize its use in an attempt to overcome this problem. For instance, countries in the European Union (EU) have appropriated more shares to renewable fuels in the transportation system [5] because they possess great underutilized potentials. Studies have shown that they have great prospects as replacements to fossil fuels among other renewable energy sources.
Furthermore, renewable fuels contain no less than 80% organic materials [7], hence they are also capable of reducing CO₂ emissions in the transportation sector [6], which ensures better air quality [8].

The feasibility of this substitute makes it a valued solution to local economy problems, environmental climate change and fuel security. Countries that have used biofuels are Germany and France, where bioethanol has been used as an industrial biofuel since the beginning of 1894 [9]. In 1925, Brazil became the second largest producer in the world, totaling up to 23% of energy for transportation [10].

The Indonesian government affirms to create policies to enhance the effective mixing and use of biofuels. This is carried out through the vision of 25/25 energy, in an attempt to save fossil fuels and further increase the use of renewable energy. They have also made effort to establish a B20 mandatory program policy, where 20% of biofuel from palm oil is mixed into the pure diesel fuel. This was initiated in the Ministry of Energy and Mineral Resources No. 25 of 2013, which further experienced numerous changes until it was reaffirmed through the Presidential Regulation No.66 of 2018 and Ministry of Energy and Mineral Resources No. 41 of 2018, whose concept is to expand the use of a mixture of biodiesel-type fuel with diesel fuel fossil fuels by 20% (B20), valid from 1 September 2018. [11]

The process of implementing this policy has not been finalized because it requires the community - both as a subject and an object - to implement it. Its success is dependent on the how sensitized the public is, regarding the consumption pattern of these fuel in the transportation sector which is currently still dominated by fossil fuels.

The purpose of this study therefore was to obtain information on how knowledgeable the community is on the use of biofuels as a substitute to fossil fuels in the transportation sector and also to investigate the potential for the sustainable implementation of biofuel policies. Several studies have been conducted whose results could assist to identify new ways to measure the energy policy in relation to the receipt of biofuels for the transportation [12].

2. Theoretical discussions

The public opinion on biofuel gives a strong indication on the effectiveness of government policies, which is rarely conducted in other countries because it is considered to be quite complicated [12]. This research provides an insight on the potential sustainability of biofuel and also, information on what can motivate the public adapt to this change. Furthermore, the results could help the government find new ways to estimate public acceptance of biofuels.

Finland conducted a similar research, which indicated that the public have little knowledge of the potentials of biofuels in transportation. Furthermore, this study analyzed how consumer utilize fuel, which indicated that most respondents have the environmental awareness and are willing to choose the renewable fuels in the future. However, the consumption of biofuels in that country is still quite low because a significant percentage (60%) of respondent’s lack information, hence need further education before purchasing it [12].

A similar research has also been conducted in America, which explored public attitude towards biofuels and government policy options. This study attested that they were knowledgeable about biofuel technology but they further lacked information on its policies. Most generally supported biofuels because it is affordable and environmentally friendly, however, the public did not support the fixed subsidy and cap-and-trade policies because it is related to justice [13].

Other research carried out in Poland tested the public opinion on the application of biofuel technology in the aviation sector considering passenger safety. It was observed that public understanding of this technology, including its security is still limited and needs to be strengthened by designing a special education and awareness campaigns [14].

3. Methodology

The design of this study is a survey research, which involved the use of questionnaire and interview for collecting primary and supporting data respectively. The questions used were developed based on a number of themes that emerged from the theoretical discussions which were later adapted to suit the context in Indonesia.
The data collection method involved 50 respondents from the general public who participated in the survey (60% women and 40% men). The respondents were randomly selected from different age groups (Figure 1). The questionnaires were designed with close ended questions and administered directly, utilizing the 5-points Likert scale to analyze the data. It included questions to test the public knowledge on biofuel, B20 government policies, the obligation to use biofuels as alternatives that are better than fossils and also its use in the transportation sector. This was used to assess public perception and also to disseminate information regarding the use of biofuels.

The collected data then was analyzed using descriptive statistics in the form of non-parametric tests, including Kolmogorov-Smirnov and Kruskal-Wallis test to further determine the differences and build the correlations in public opinion [14].

Figure 1. Background information.

4. Results and discussion

4.1. The level of public knowledge

Based on Figure 2, it was observed that the public had generally obtained information about biofuels as 42% of them had sufficient knowledge by understanding the types and raw materials. They however lack in-depth insight on the use and benefits because it is not basically utilized.

In addition, most of them lack understanding of the government policies (on the B20 mandatory program) as a high percentage of them did not know that it is currently been utilized. This research also showed that more than 60% of respondents have never heard about this policy as they were enlightened for the first time during the interview process. This was further due to the lack of widespread information dissemination. These results are similar to that conducted in America, where public attitudes towards biofuels and government policy options were explored [13]. It was found that they had sufficient knowledge about biofuel technology, but information about biofuel policy was lacking.
An enhanced perception of the advantage of this substitution is a good indicator of public understanding, hence, fostering the potential for prompt public acceptance. They believe that the use of biofuels is a better alternative to fossil fuels as it was observed that 80% (M = 4.06) of respondents agreed on this. The advantage here is that the public believes biofuels are renewable fuels, however, there is need to improve the understanding of other advantages such as environmental friendliness and low CO₂ emissions. This will further reduce the use of fossil fuel. The results of this study are not much different from the research conducted in Finland [12], it was found that public awareness of the environment and concern for renewable fuels. this will have a good impact in the future that the public will welcome and accept the use of environmentally friendly renewable fuels for their transportation.

However, from this study, it was found that the public knowledge regarding the use of biofuels in the transportation sector was still very low (M = 2.22). It was found that more than 80% of respondents were not aware. They believe that the fuel used especially on buses and trains is diesel fuel, though the current use of fuel as a mixture of 20% biofuel with diesel is known as biodiesel.

4.2. Analysis of knowledge based on background information

Gender and age were variables in this study, which was analyzed with descriptive statistics, using a non-parameter test that did not pay attention to data distribution and data normality. The Kolmogorov-Smirnov Test and the Kruskal Wallis Test are used to find out the differences and correlations on these variables.

| Table 1. Analysis of knowledge-based gender. |
|--------------------------------------------|
| **Test Statistics**<sup>a</sup> | Knowledge |
| Most Extreme Differences | Absolute | 0.400 |
|                          | Positive | 0.400 |
|                          | Negative | 0.000 |
| Kolmogorov-Smirnov Z     | 1.386 |
| Asymp. Sig. (2-tailed)   | 0.043 |
|<sup>a</sup> Grouping Variable: GENDER

| Table 2. Analysis of knowledge-based age. |
|------------------------------------------|
| **Test Statistics**<sup>ab</sup> | Knowledge |
| Chi-Square                              | 1.652 |
| df                                      | 3     |
| Asymp. Sig.                             | 0.648 |
| a. Kruskal Wallis Test                  |       |
| b. Grouping Variable: Age               |       |

It was observed that gender with the Kolmogorov-Smirnov Test had a fairly low value of α = 0.043, which could be seen in table 1. that the value is still below a significant value (α ≥ 0.05). Therefore, it could be concluded that there are significant differences in the level of public knowledge regarding the use of biofuels in the transportation sector using gender as the comparison. It was however, observed that men are more knowledge of it than women.
5. Conclusion
The level of public understanding of biofuels as a whole is still low, which includes the perception and publicly learned information about biofuels in the transportation sector. Most people believe that the fuel used is derived from fossils, however, the information on mixing biofuel with diesel for bus and train was not yet understood.

Furthermore, the results of this study indicated that a person's gender affects the level of public knowledge as the information on changes in the utility of fuel is predominantly understood by men compared to women. However, it is different when observed from the age perspective. Based on a statistical analysis, a person's age does not affect their level of knowledge regarding this topic as it was observed that, at all age a person has a significantly similar perception, in which they do not possess enough information about the use of biofuel which they received.

Therefore, there is need for extensive information dissemination by the government, academies and all stakeholders. Public education on this topic creates belief and general acceptance of biofuels, hence, they care more for the environment and have a better understand of national energy security. In addition, it can also be deduced that the potential sustainability of utilizing biofuel in Indonesia will be quickly accepted by the public.

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