

SOCIAL FACTOR TO DETERMINE SOCIAL ACCEPTANCE TOWARD ELV MANAGEMENT

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Abstract: Indonesia, as a country with a highly developed automotive sector, is ranked 2nd under Thailand in the number of 4-wheeled vehicle production. However, the high number of automotive industries in Indonesia has directly threatened the high number of vehicles classified as end-of-life vehicles (ELV). Until now, Indonesia has been unable to address the ELV problem adequately; all efforts have been made to reduce the number of vehicles that are not suitable for use in Indonesia, such as the implementation of periodic emission tests, euro 2 and euro 4. Still, this regulation has not received a positive response from the public. This study attempts to test the previously designed acceptance model, in which external and internal factors from within the individual are considered. The findings of this study provide an overview of the social acceptance model for new policies, indicating that the government must consider each factor before developing and implementing new regulations.

Keywords: ELV Management, Social Acceptance, Social Influence, Public Trust

1. INTRODUCTION

Indonesia is one of the developing countries in Southeast Asia with an excellent automotive sector. Indonesia currently ranks second in the number of four-wheeled vehicles produced (OICA (Organisation Internationale des Constructeurs & D'Automobiles), n.d.). Even the Indonesian Ministry of Industry encourages the automotive sector to grow and develop in Indonesia (Sitinjak et al., 2022a). However,



there is one major threat that occurs along with the growth of the automotive sector in Indonesia, namely the increase in vehicles that abound on Indonesia's roads (Karagöz et al., 2021; Simic & Dimitrijevic, 2012; Cieśła, 2024). ELV is a difficult household waste to manage due to its complex structure and toxic chemicals (see Table 1) (Karagoz et al., 2022; Sitinjak et al., 2022a).

Table 1. ELV hazardous components

Hazardous Waste Components	Characteristic
Waste liquid gas storage tank	Reactive (R), Flammability (F)
Unsaved airbag	Reactive (R)
Waste battery	Toxicity (T), Corrosivity (C)
Waste gas purification catalysts	Toxicity (T)
Waste oil	Flammability (F)
Waste brake fluid, antifreeze, riot agent	Toxicity (T)
Waste air conditioning refrigerant	Toxicity (T)

There are no ELV rules in Indonesia, so many vehicles that should have reached the end of their lives are still used in Indonesia (Sitinjak, Ismail, Tahir, et al., 2022). This causes high air pollution on the streets of the capital city because vehicles classified as ELV emit 10 times more dangerous gases. Not only that, but the high number of vehicle accidents in Indonesia is also dominated by vehicles that are no longer suitable for use.

Vehicle recycling and waste management are disorganized in Indonesia (Sitinjak et al., 2022). The informal sector manages old vehicles without legal/environmental/ethical standards. Non-scientific informal sector process execution reduces material recovery. This polluted water, air, and soil and created dangerous working conditions (Akolkar et al., 2015; Sitinjak et al., 2022). Vehicle owners risk harm or trouble because open-market vehicles may be used illegally. Good ELV management is crucial for Indonesia's sustainable development. Changing social practices, perceptions, and mindsets affect sustainable development. In developing countries, basic needs take priority over old vehicles (Kuzior et al., 2023). Education and socialization are keys to better ELV management in Indonesia.

Few studies on psychosocial factors in waste management implementation were found in our review (Zhang & Batterman, 2013). A systematic psychosocial examination is critical; knowledge and attitude play important roles in both intention and waste management behavior; waste management knowledge and methods do not significantly affect either intention or actual people's behavior (Ittiravivongs, 2012; Wang et al., 2021). Individual acceptance depends on institutional trust (Huijts et al., 2012; Jagers et al., 2017; Kuzior et al., 2023). ELV programs focus on education and infrastructure. Before making policy, governments should consider social, organizational, and individual factors.

This study aims to determine the extent to which social factors can influence an individual's acceptance of ELV policies by adapting the previous theory of acceptance by focusing on the internal and external aspects of the individual in accepting a new rule.

1.1. Current Situation of ELV Recycling Practice

Despite its common association with recycling, ELV encompasses recycling, recovery, and reuse. ELV recycling's motivation, criteria, and overarching concept have evolved over time due to several factors (Bhari et al., 2021; Reuter et al., 2006). It wasn't until the 1960s and 1970s that the electric arc furnace was developed, and since then, the auto shell has been used as an input scrap at a much higher rate. Over time, high-quality steel production necessitated using nonferrous metal-free scrap from automobiles. For this reason, magnetic separation was required to separate ferrous metals from non-ferrous metals. Aluminum extracted from ELV was also significantly more efficient to process than aluminum extracted from its ores (Tshifularo and Patnaik, 2021; Wang et al., 2021).

Economic and technological factors as well as social and environmental concerns now push for ELV recycling. So, the auto industry must make a pivot toward eco-friendly garbage collection methods (Hiratsuka et al., 2014; Lin et al., 2018).

The material used in vehicle construction and the design concept of the elements' assembly are both factors in the feasibility of ELV recycling. Over time, vehicles have undergone a compositional shift, resulting in a greater prevalence of lightweight components like aluminum and polymeric constituents. A total of 82% of the weight of a typical European car in 1965 was made up of metals other than iron and steel (2% aluminum) and 2% plastics, as noted by Kurogi et al. (Kurogi et al., 2021). Midway through the 1980s, it was estimated that 8–10% of the total weight was composed of plastics, while 74.5–75% comprised ferrous and non-ferrous metals (with 4.5–5% aluminum). Utilizing lighter materials (aluminum and plastics) improved gas mileage and decreased vehicle weight. The release of gases into the air. It has been estimated that fuel savings of about 0.7 liters per 100 can be achieved by reducing the vehicle's weight by 100 kilograms. Adding more convenience and safety features to vehicles requires more weight, so using lighter materials is preferable (Arnold et al., 2021; Karagoz et al., 2020a; Yi & Lee, 2021). Automobile dismantling is a primary area of focus for many collecting and dismantling businesses, with the removal of usable parts and other components being their primary objectives (engines, batteries, oils and fuels, and airbags) (Chen et al., 2010; Karagoz et al., 2020a, 2020b; Ruffino et al., 2021; Vermeulen et al., 2011). The work of these businesses is crucial to the goal of reducing ELV waste. However, the dismantlers are typically smaller businesses only interested in the parts of ELVs that can be reused, recycled, or sold. Most attempts at ELV decontamination are faulty. A rise in ELV garbage volume and toxicity. When an ELV is dismantled, the remaining pieces, or "hulks," are sent to shredding companies (Cheng et al., 2012; Cossu and Lai, 2013; Hedayati and Subic, 2011; Kurogi et al., 2021; Wang et al., 2021).

Shredding the hulks and then physically and mechanically sorting the resulting debris is what it takes to get at the ferrous and non-ferrous metals. Twenty-five percent to thirty-five percent of the ELV weight comprises the residue from the shredding process, called automobile shredder residues (ASR). Figure 1 shows its typical make-up (Hiratsuka et al., 2014; Kim et al., 2004; Lin et al., 2018; Santini et al., 2011; Simic and Dimitrijevic, 2012; Tshifularo and Patnaik, 2021).

The ASR is a major problem for ELV recycling in the European Union and beyond. About 2 million tones of ASR are produced annually in EU countries (Bhari et al., 2021; Karagoz et al., 2022). As a matter of fact, it only accounts for a tiny fraction of the EU's overall garbage. However, the ASR is so poisonous that it is considered hazardous waste in many

nations. Considering that the ASR is composed of more than 70% combustible matter, it has been suggested that it could be used as a source of energy (see Figure 1).

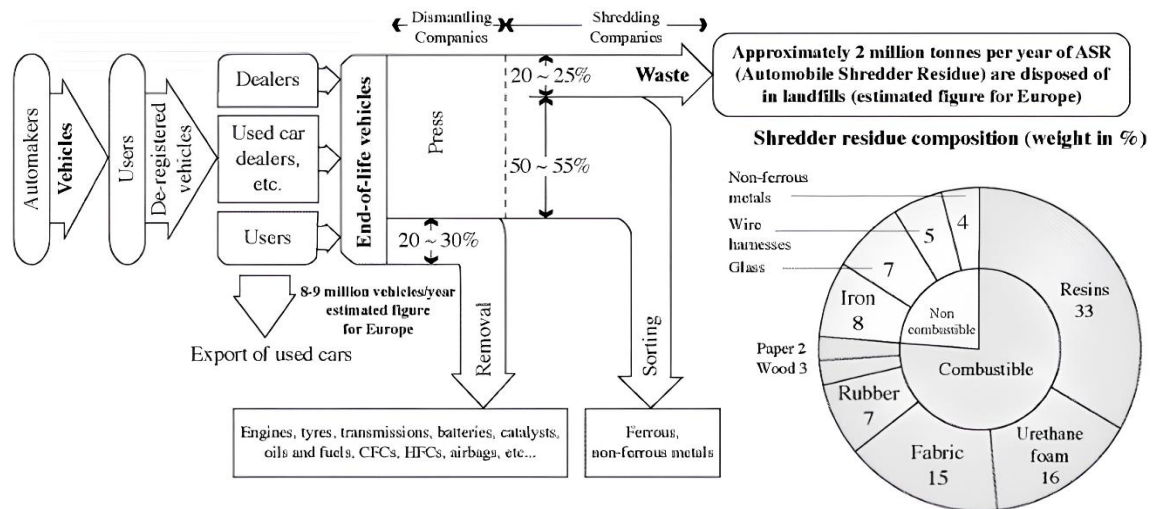


Fig. 1. Disposal Route for End-of-Life Vehicles

1.2. Factors that influences social acceptance

Several studies have examined the public acceptance of waste-reduction policies. This study included a public opinion survey on ELV management and examined its individual and contextual determinants. After categorizing the factors that influence transportation policy and environmental regulations, we review some studies in this section, as shown in Figure 2. Gender, age, education level, income, and car ownership influence ELV policy approval. According to research, women support transportation regulations less than men (Lee et al., 2006; Park et al., 2020; Weisberg et al., 2021). Educational and socioeconomic status affect acceptance. Education and income affected acceptability, with those with the most education and income supporting a congestion strategy. Lower-income and young people support low-emission zones less, according to Schade and Schlag (Schade and Schlag, 2003) found that only socioeconomic status affects people's rule acceptance. Acceptance can be lost when a person's attitude is based on their old car or their environment. According to Brännström, Kumar and Alén (Brännström et al., 2018), burdensome regulations are often rejected. He found a strong link between Edinburgh congestion charge discharges and vehicle owners. Sitinjak et al. (Sitinjak, Ismail, Bantu, Fajar and Samuel, 2022a) found a similar result, stating that respondents who own a car are more likely to oppose ELV policy than those who do not because they believe they will not be harmed by the policy's implementation, whereas those who do not own a car may see benefits. Policy knowledge is important for acceptance beyond sociodemographic factors. Ajzen et al. (Ajzen, 1991), found that expertise influences study acceptance. Other research examines acceptance and knowledge. According to Skoumpopoulou et al. (Skoumpopoulou et al., 2018), educating the community will change their perceptions of the regulations, allowing them to change their behaviors and follow the new norms. Individual acceptance is also influenced by social impact. Social influence is a rule's social context-influenced conviction. Social influence affects people's behavior, says Mensah (Mensah, 2019). Social influence is the ability of people to change their behavior through social interaction, according to Moussaïd et al. (Moussaïd et al., 2013). Social influence and new policy acceptance are linked, say Beldad and Hegner

(Beldad and Hegner, 2018). Yukalang, Clarke, and Ross (Yukalang et al., 2017) found that Thailand's lack of social influence hinders waste management. Institutional trust is important for policy tool acceptance. Faith in the political institutions responsible for policy action influences opinions in complex and contentious matters. Institutional trust affects public acceptance of government programs (Thomas et al., 2015). There have been few attempts to study the importance of other emotions, such as interest, fear, fury, or hope, in policy acceptability in this environment. Emotional and value-related factors often influence policy opinions more than the plan's projected impacts (Jagers et al., 2017). Specific and general emotions and feelings must be considered in policy acceptability.

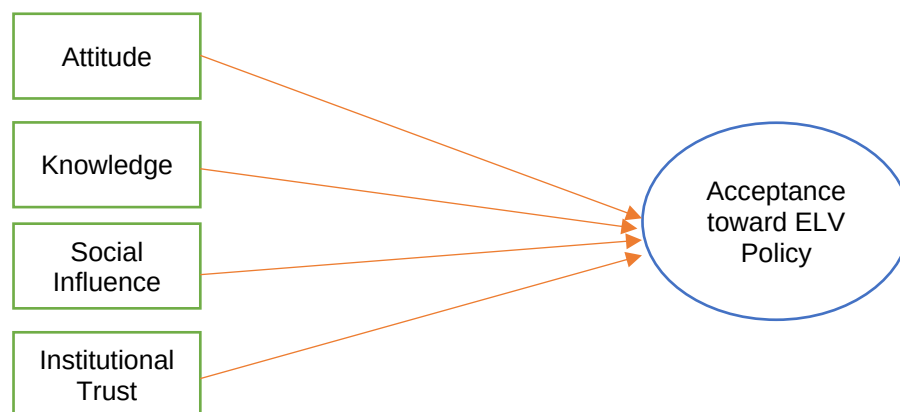


Fig. 2. Conceptual framework for ELV policy acceptance

2. MATERIALS AND METHODS

2.1. Study subjects

The investigation was carried out by means of questionnaires distributed and completed on the internet by residents of Jakarta, Tangerang, Bogor, Depok, and Bekasi (JABODETABEK). All of the respondents who were considered for this study were at least 18 years old and had previous work experience.

2.2. Study design

The present investigation is a cross-sectional survey that was carried out in Jakarta between the months of January and February 2022. In the study, self-administered questionnaires were distributed to respondents who had been chosen at random.

2.3. Participants

Studies using cross-sectional designs, such as surveys, have been carried out on adult participants. This research was carried out between November 2021 and February 2022, and it involved 243 residents of JABODETABEK who took part in the study and filled out the questionnaire. The selection of participants is carried out using a straightforward method of random sampling. The participants' knowledge, attitude, social influence, institutional trust, and acceptance of ELV are investigated here. After that, each and every questionnaire that has been filled out is scored in great detail. In this particular survey, the vast majority of participants were male (68%) and ranged in age from 51 to 60 years (35%). A bachelor's degree is held by the vast majority of them (91.3%). 93.5 percent of those who participated in the survey owned a private vehicle (either a motorcycle or a car).

Table 2. Sample Characteristic

Male (%)	68.3
Female (%)	31.7
18-20 Years	3.3
21-30 Years	17.3
31-40 Years	24.3
41-50 Years	11.1
51-60 Years	35
>61 Years	9.1
Educational Level (% University Degree)	91.3
Motors/Cars Ownership	93.5

2.4. Questionnaire

Questionnaires are made based on reviews of past research and interviews with multiple respondents in order to answer a set of questions. We ask participants questions about how they see problems, what they think about institutions, and their previous values and attitudes, such as whether they want to implement ELV policies or how they feel about protecting the environment. One page of information about ELV management is given to each participant. At the end of the questionnaire, questions and measurement items related to attitudes, knowledge, social influence, trust in government, and ELV-related admissions are shown in Table 3. This table gives an overall evaluation of ELV-related admissions.

Table 3. Questionnaire

Variable	Survey Question	Response Categories
Attitude	I will support all ideas relating to old/damaged vehicles, as well as imposing payment of processing fees if any	1 (totally disagree) to 5 (totally agree)
Knowledge	I know the benefits of implementing the ELV policy	1 (totally disagree) to 5 (totally agree)
Social influence	The social environment determines my attitude to accepting or rejecting new rules	1 (totally disagree) to 5 (totally agree)
Institutional trust	overall, local governments are capable and professional institutions to make policy	1 (totally disagree) to 5 (totally agree)
Acceptance	I want to implement the ELV policy	1 (totally disagree) to 5 (totally agree)

Before the question device was used, the Cronbach alpha test was used to ensure the questionnaire was fixed. Based on the test results with 100 people, the alpha efficiency value for the question device was 0.897. This means that this set of questions can be used.

2.5. Analysis

In this analysis, SPSS 26 is used to look at how often proposed variables happen and how they relate to each other.

3. RESULTS

3.1. Descriptive Analysis

In Table 4, you can see how much management ELV each survey respondent got. Most people who answered (49.38%) said that ELV management shouldn't be used in Indonesia. Another 21.39% weren't sure, and 29.21% said that ELV management should be used.

Table 4. Respondent response regarding ELV policy

Category	Total	Percentage
Unacceptable	120	49.38%
Neither acceptable nor unacceptable/undecided	52	21.40%
acceptable	71	29.22%
Total	243	100.00%

3.2. Regression Results

Several independent variables were chosen for track analysis to test factors that were directly or indirectly linked to the acceptance of elv management in this study. Table 5 shows the direct standard effects of the chosen explanatory variables (attitude, knowledge, social influence, and institutional trust) on acceptance. Figure 3 shows a diagram of the proposed path.

First, the model's results show that ethics, knowledge, social influence, and belief in the institution have a big direct effect on how people accept something. The strongest predictor of acceptance (effect 0.387) was a social influence, followed by institutional trust (direct effect 0.379) and knowledge (direct influence 0.288). Acceptance is affected by the attitude in a small but important way (direct effect 0.190).

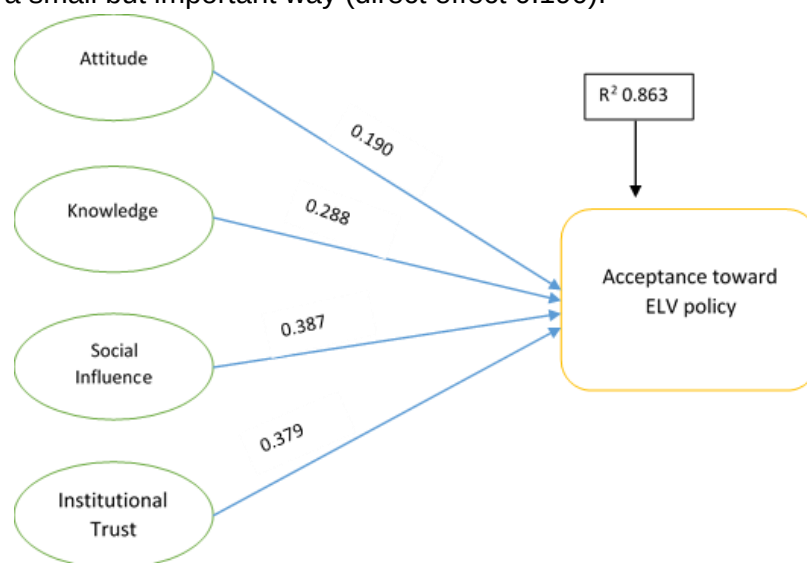


Fig. 3. Final path model with standardized regression coefficients

4. DISCUSSION AND CONCLUSION

In this study, it was found that the majority of respondents refused to accept the ELV management policy, this could be due to various factors such as knowledge, community attitudes towards the environment, social support, and lack of public trust in the government. The findings of this study support several previous studies that stated that social influence is the main factor shaping an individual's readiness to accept and perpetuate environmental policies. It was also discovered that trust in institutions is a factor that has a major influence on the formation of a person's acceptance, and this research confirms a previous study where trust in stakeholders was said to be a predictor who makes a significant contribution (González-Melado and Di Pietro, 2021; Ulewicz et al., 2023; Hou et al., 2019; Nulhusna et al., 2017; Sitinjak, Ismail, Tahir, et al., 2022; Zannakis et al., 2015). According to the findings of this study, attitudes and knowledge play a significant role in a person's acceptance. Earlier researchers considered attitude to be the initial predictor of whether individuals are willing to accept policies, whereas knowledge is considered a monetary factor driving a person to accept regulations. According to Sitinjak et al. (Sitinjak et al., 2022b), the importance of increasing knowledge about regulations can significantly increase people's desire to implement regulations. This is due to the fact that the public is aware of the benefits of the regulation, both from a health and economic standpoint. The findings of this study also show that before the government issues new regulations, the order must pay attention to the acceptance factors mentioned above; these factors must be improved before the regulations can be implemented in social life. Increasing public trust through the results of real work, as well as providing campaigns about the benefits of one regulation, can have a direct impact on increasing public trust and public knowledge. Furthermore, providing campaigns on a consistent basis can increase public support, so that every community is willing to support the implementation of these policies and indirectly form a positive attitude of the community toward one regulation.

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