frontiers | Frontiers in Built Environment

TYPE Original Research
PUBLISHED 04 January 2023
DOI 10.3389/fbuil.2022.1038563

OPEN ACCESS

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SPECIALTY SECTION
This article was submitted to Transportation and Transit Systems, a section of the journal Frontiers in Built Environment

RECEIVED 07 September 2022
ACCEPTED 08 November 2022
PUBLISHED 04 January 2023

CITATION
Ismail R, Sitinjak C, Tahir Z, Che Rose RA, Mat Yazid MR, Harun Z and Suparjo Noordin NA (2023), A model analysis on the knowledge, attitude, and readiness of ELVs policy among Malaysians: A cross-sectional study. *Front. Built Environ.* 8:1038563. doi: 10.3389/fbuil.2022.1038563

A model analysis on the knowledge, attitude, and readiness of ELVs policy among Malaysians: A cross-sectional study

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The issue of end-of-life vehicles (ELV) in Malaysia has recently received serious attention from the government. The Malaysian government has launched various programs to reduce the number of ELVs that have not been adequately managed. Initiatives like offering rewards to those who want to turn up their damaged vehicles are similar to An effort to trade in their old automobiles. However, it was unsuccessful due to a lack of cooperation from Malaysians. This study examines the sociological aspects of community acceptance of ELV legislation in Malaysia. This study assesses community knowledge, attitudes, and readiness to implement ELV management in Malaysia. Six hundred thirty people participated in a cross-sectional survey performed across Malaysian states (Pulau Pinang, Kelantan, Johor, Melaka, Selangor, and Kuala Lumpur). A collection of questions was distributed face-to-face after satisfying the steps of validity and reliability tests. Then descriptive and multiple regression tests were run to determine correlations between variables. We use the structural equation model to determine the model in this research. The study's findings revealed that people's knowledge, attitudes, and readiness toward ELV policies were significantly influenced by their length of stay, level of education, and vehicle ownership (overall R2 = 0.663, VIF = 1,612, p = 0.000). It was also discovered that knowledge and attitude together could determine community readiness in implementing ELV policies in Malaysia. The findings of this study demonstrate how important it is for the government to consider the populace's knowledge and attitudes before implementing the ELV policy in Malaysia.

KEYWORDS

attitude, end of life (ELV), knowledge, readiness, survey

1 Introduction

According to Nielsen's study on vehicles, Malaysia has the highest number of vehicle owners in Southeast Asia. This means most Malaysians have private vehicles, including cars and motorcycles. Among them, the motorcycle is the most preferable. This is because the motorcycle is more convenient (price-wise and use-wise) than the car. However, the number of cars is also high compared to the neighboring countries (Mohamad-Ali et al., 2019; Akram Khan et al., 2021).

The demand for vehicles in Malaysia continues to grow. Since 1985, when Proton was established as the first automotive company in Malaysia, the number of vehicles has increased significantly. According to the Malaysian Automotive Association (MAA), in 2017, local automotive companies met domestic demand. In 2020, around 6.7 million vehicles were registered, and more than 90% were local vehicles (Mohamad-Ali et al., 2017; Raja Mamat et al., 2018; Wong, Al-Obaidi, and Mahyuddin, 2018). The high demand for the automotive industry has promised economic growth. To support and assist the domestic automotive players, including the domestic car project in Malaysia, the government creates initiatives by providing financial and non-financial incentives (Azmi & Tokai, 2017; Mohamad-Ali et al., 2018). As well as the high number of new vehicles, the end-of-life vehicles will be increased. The increasing number of end-of-life vehicles creates problems due to improper waste management, which is harmful to the environment (Mohamad-Ali et al., 2017; Othman et al., 2021; Solah et al., 2021). Besides, the use of end-of-life vehicles is not recommended for safety reasons, therefore reducing the number of end-of-life vehicles (Mohamad-Ali et al., 2019; Akram Khan et al., 2021).

The application of end-of-life vehicle policy (ELV) has been regarded as a promising solution to reduce the negative impact of a high number of end-of-life vehicles (Deveci et al., 2022; Jacobs et al., 2022; Merkisz-Guranowska & Wrona, 2022; Rajaee et al., 2022; Vesovic et al., 2022). ELV concepts are suitable for reducing, reusing, recycling, recovering, remanufacturing, and redesigning, which leads to a sustainable environment. Besides, proper ELV planning may stabilize the automotive ecosystem. Furthermore, the ELV system manages the roadworthiness of old and new vehicles to retirement (Jin et al., 2022; Yadav et al., 2022).

The European Union (EU) introduced the ELV Policy in September 2000 (Merkisz-Guranowska & Wrona, 2022). Asia, Japan, Korea, and Taiwan have implemented ELV policies to control the number of end-of-life vehicles off the road (Korica, Cirman, and Žgajnar Gotvajn, 2022; Swain, Park, and Lee, 2022; Zhang et al., 2022). Nevertheless, it is unfortunate that the End-of-Life Vehicles approach was not yet implemented when the number of vehicles increased from time to time, so the automotive ecosystem is unhealthy in Malaysia (Figure 1) (Othman et al., 2021). Rather than applying the ELV process, the unused vehicles (old and broken vehicles) and unrepaired vehicles (due to financial issues) were left as is or were just parked in the street.

Malaysia itself, in 2009, tried to apply the ELV policy but later withdrew due to uproar and fierce rejection by the public (Mohamad-Ali et al., 2019; Akram Khan et al., 2021; Othman et al., 2021). Additionally, the government conducted the vehicle scrappage subsidy program, but it was merely under the economic stimulus, not a permanent ELV structure (Jang et al., 2022; Modi and Mihai, 2022). It was recently discovered that the rejection is because of the application of ELV without proper research and has too many loose ends. In this case, Malaysian people have unique behavior. They always think new policies will create public excitement and negative perceptions (Harun et al., 2021). It always happens because the lack of understanding and socialization creates negative perceptions. Thus, the success of ELV policies can be determined by public perception (Yusop, Wahab, and Saibani, 2012).

The positive social perception of ELV policy can be enhanced by delivering knowledge and socializing more about ELV policy (Go et al., 2016). Once public perception has become more positive, it is possible to gain readiness. However, research related to readiness is still limited because the focus is more on the automotive industry and engineering side than on the social aspect of ELV management policy (Mamat, Saman, and Sharif, 2014; Wahab & co. 2014). Therefore, in this study, we explore the social factors, especially knowledge and attitudes, that are considered to increase the community's readiness to implement new regulations. It is necessary to know the level of social knowledge, attitude, and readiness (all automotive stakeholders) to achieve the ELV purposes (Mamat, Saman, and Sharif, 2015).

2 Literature review

2.1 ELV policy in Malaysia

The Malaysian government is now trying to make the right regulations on ELV to address the challenges of vehicle growth in Malaysia (Yusop, Wahab, and Saibani, 2012; Go et al., 2016; Jawi et al., 2016a). Currently, the Ministry of International Trade and Industry (MITI) noted that 2.7 million passenger vehicles aged 10 years and over are on the road. This number is very worrying because it will greatly impact the environment, as well as the safety of vehicle users on the road (Kassim et al., 2020).

Although Malaysia has several vehicle companies (Proton, Perodua, Nasa, & Modenas), there are no clear rules about ELV. Until 2020, the National Automotive Policy (NAP) had not released specific regulations regarding ELV. In addition, NAP in 2020 focused on the National Roadmap for Automotive Aftermarket (NRAA) for recycling used vehicles to make

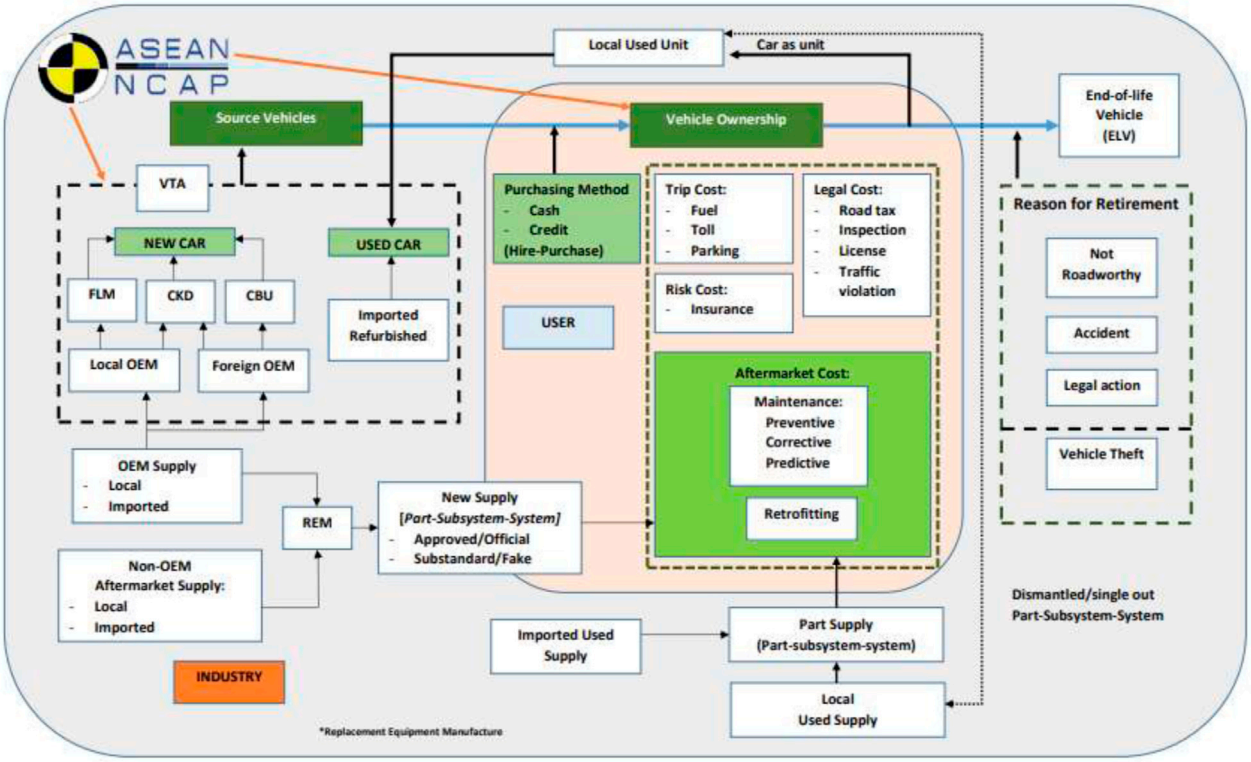

FIGURE 1
Shows the automotive ecosystem (Jawi et al., 2016b).

Malaysia the center of recycling in Southeast Asia (Mohamad-Ali et al., 2017; Harun et al., 2021; Othman et al., 2021).

Malaysia has 5,000 small companies that focus on reusing end-of-life vehicles. They work under affiliations such as Malaysia Car Recyclers Association (MAARA) and without a standard working practice (Mohamad-Ali et al., 2018; Raja Mamat et al., 2018). The business was operated comparable to standard car workshops; thus, appropriate regulatory control must be implemented to improve and control the current practice of recycling ELV. In practice, they usually take old vehicles from developed countries in Europe and Asia to be dismantled and retrieve the items that can still be used. At the same time, the unused parts are sent to the smelter for recycling. However, some things like engine oil and air conditioning as chlorofluorocarbons (CFCs) are not handled properly due to a lack of tools, data, and capabilities, then discarded without any treatment (Go et al., 2010a; 2010b; Mamat et al., 2014).

Lack of standards in ELV, e.g., vehicle life, parts, dismantling process, etc., becomes the biggest challenge in promoting ELV. In addition, the lack of technology and attention to ELV recyclers are challenges in implementing ELV in Malaysia. Malaysia is now gradually progressing to move forward with its technique and establish an appropriate End of Live Vehicles framework in Malaysia (see Figure 2). It focuses on developing an environmentally friendly automotive ecosystem. The Malaysian Automotive Institute (MAI) has finally issued an End of Life Recycling Process that refers to ELV recycling. It is expected to encourage manufacturers to do 4R (Reduce, Reuse, Recycle, and Remanufacture).

Instead of regulation, the government of Malaysia focused on the initiative scheme as an alternative solution for ELV (Go et al., 2016; Mohamed, Saman, and Sharif, 2017; Raja Mamat et al., 2018). This scheme was created to increase society's awareness of the environment. This scheme aims to decrease the number of old vehicles by exchanging them for new environmentally friendly and safe ones. In 2009, the first attempt, a cash voucher was given for exchanging the old for a new vehicle, but it was limited only to Proton and Perodua. However, this scheme failed due to being unaccepted by the community (Yusop, Wahab, and Saibani, 2012; Mamat, Saman, and Sharif, 2014).

Then, in 2018, the government planned to release "cash-for-clunkers."This program offered a discount to those willing to get a new vehicle in exchange for their old one. However, this program was improper. Since this program was not well prepared, it was impossible to proceed. Therefore, preparing a more applicable program (Go et al., 2010b, Wahab, 2014, Rahman, et al., 2010; Mohamad-Ali et al., 2017; Harun et al., 2021; Othman et al., 2021).

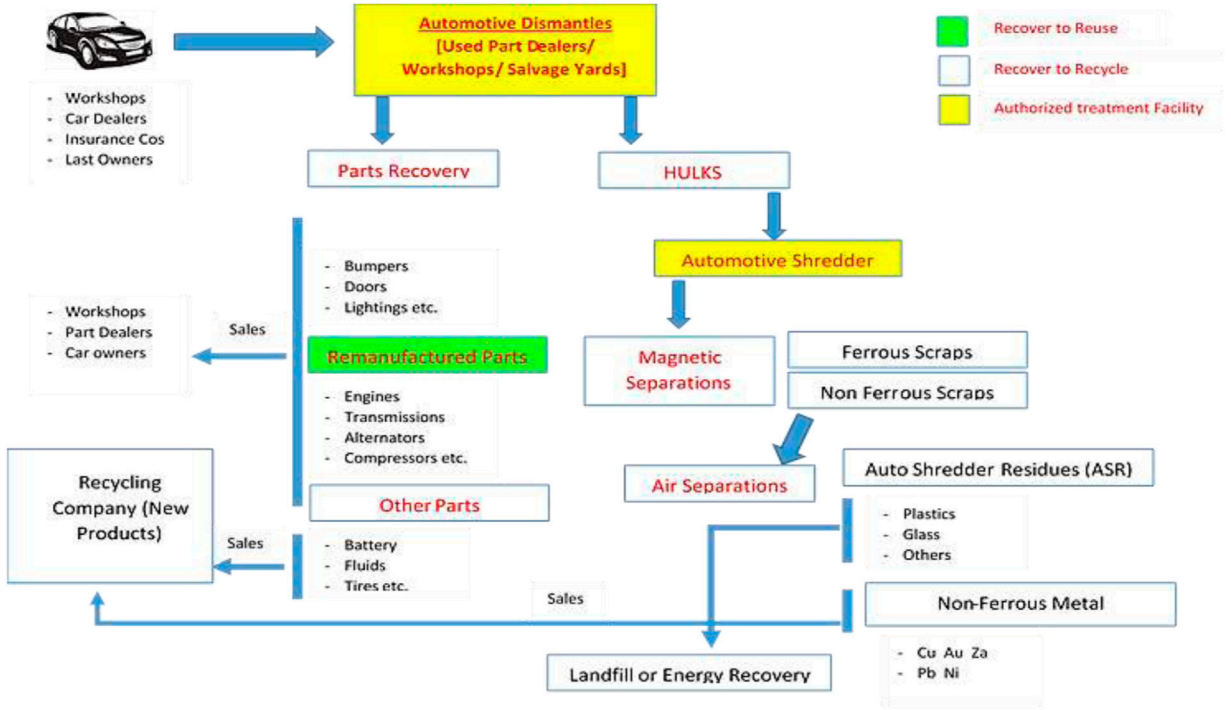

FIGURE 2
End of live vehicles recycling process (Jawi et al., 2016b).

2.2 Individual characteristic impact on social readiness

Individual characteristics are one of the aspects that can influence acceptance (Venkatesh et al., 2012). Age, gender, income, car ownership, race, and other factors can help or hinder the implementation of legislation. Several studies have found that women are more likely to support environmental legislation. Acceptance is also influenced by education, social status, and duration of stay. According to Bonjesson et al. (2016), education and income in admissions have a strongly associated level of admissions, those with higher education have strong support for regulating the use of public transportation to reduce pollution and congestion on urban roadways. Sfendonis et al. (2017), investigated public opinions toward emission-free zones in Volos, Greece, and discovered that communities that had previously resided in the area were less supportive.

2.3 The impact of knowledge and readiness

Many studies state that the role of communication or familiarity has a very large role to play in increasing the acceptance of individuals regarding new policies related to vehicles or modes of transportation (Mamat, 2014; Wahab, 2014; Mamat, 2015). However, this concept of communication and civility is very broad and focuses on the individual's perception of the policy and not the knowledge of the policy itself (Chan, 2018; N. et al., 2018; Kallas and Parts, 2021). Until now, there has still been little research that directly reveals the relationship between knowledge and an individual's readiness to accept new policies. In their research, Sitinjak et al. (2022a) tried to measure the relationship between subjective knowledge and policy. In their research, they found that a low level of knowledge largely determines the level of acceptability. Sitinjak et al. (2022b) qualitatively attribute public readiness in implementing the rules of emission-free zones in Canada. In their research, they concluded that knowledge is the main component capable of changing the attitude of individuals to comply with rules relating to the environment.

Knowledge is a valuable resource that can influence risk judgment. Knowledge variables are beneficial in explaining acceptance and can functionally contribute to better acceptance by enhancing it (Park, & Kim, 2018). In general, the greater the understanding of the risk, the lower the individual-level risk perception. Dumetz et al. (2017), have shown the objective degree of information has a positive effect on the economic perception and adoption of a new policy. Simic (2019), on the other hand, confirmed that the greater public awareness of the dangers of ELV, the greater the negative impact.

However, in the context of policies regarding environmental sustainability and public health, the relationship between knowledge and individual readiness has been intensively measured. Several studies have shown a strong link between knowledge and readiness. According to Sitinjak et al. (2022c), individuals with environmental understanding tend to assist in adopting ELV management in Indonesia. In their study, (Sitinjak et al., 2022a) also noted that a person's level of awareness of the benefits of one policy can influence their perspective on a new government program.

It is interesting to observe that knowledge plays a significant part in deciding a person's acceptance. Previous academics attempted to connect environmental education to increased personal knowledge and responsibility in environmental protection. Many environmental health studies employ knowledge as a predictor of a person's attitude toward environmental norms. Although research on the degree of knowledge has been widely applied, there is still very little research in the case of ELV management. Therefore, in their research, (Sitinjak et al., 2022b), advise examining the relationship between knowledge and public acceptability more fully.

2.4 Attitude and readiness of ELV management

(Sitinjak et al., 2022b) and Sobri et al., 2021) discovered three major elements in determining people's readiness to accept and implement new regulations, particularly those linked to transportation. The first factor is the characteristics of the policy itself, in which the regulation system, the boundaries, time, income allocation, and the quality of the regulation decide whether the community follows the rules. The second factor is psychological, with the psychological factor in question being the community's attitude toward the rules. Previous research on acceptance has discovered that psychological factors such as what is felt or expected, fairness, awareness, and feelings about congestion and air pollution will cause one group to favor or reject the policies enacted. The final element is socio-demographic characteristics, which include age, gender, education, duration of stay, employment, and vehicle ownership, all of which affect a person's level of readiness. Several studies have consistently demonstrated that people who own private vehicles have a low level of approval for ELV rules.

Previous studies (e.g., Sitinjak et al., 2022b) highlight that people's beliefs about the usefulness of the regulations to be applied influence attitudes towards acceptance of regulations.Whereas the attitude towards the regulation is considered as the affective response of the individual as a whole to comply with the regulation, which represents the emotional experience of the individual associated with one or the imposed (Sobri et al., 2021). In this study, attitudes towards ELV management represent the affective response of society as a whole to comply with the ELV regulations to be implemented. In TAM (Davis et al., 1989), individual attitudes towards the use of technology (Teo, 2010 2012; Jan and Contreras, 2011) are significantly predicted by the perception of the usefulness and ease of use of technology, which in turn is hypothesized to influence their behavioral intentions to use the technology and actual use.

Previous research has supported the premise that perception of the environment is an important component of beliefs. Communities that report stronger motivation, involvement, and tenacity in supporting the achievement of such regulations report greater comfort and availability in the process of adopting such regulations (Sitinjak et al., 2022b).

In this study, we attempted to incorporate a knowledge component into the community acceptance model to understand and compare the link between the two factors (knowledge and attitudes) in influencing people's acceptance of ELV policies.

3 Methods

3.1 Study subjects

The study was conducted in many Malaysian locations (Pulau Pinang, Kelantan, Johor, Melaka, Selangor, and Kuala Lumpur). The survey included 630 people over the age of 18 who had a driver's license. Samples are collected offline by directly giving a set of questionnaires to responders who meet the criteria. This sample criterion is based on the assumption that 18-year-olds are sufficiently mature in opinion and thought to provide subjective responses regarding the ELV issue in Malaysia.

3.2 Study design

Using a cross-sectional technique, the survey was done in Pulau Pinang, Kelantan, Johor, Melaka, Selangor, and Kuala Lumpur. The research uses a set of questions directly administered to a random sample of respondents. This method is used to obtain informative data and save time, given that samples were collected from multiple locations.

3.3 Participant

Adults over 18 with a driver's license were the focus of cross-sectional research employing survey methods; 630 respondents (328 men and 3,002 women) participated in this study, performed between March 9 and 17 July 2022 (see Table 1). Approaches for cluster sampling were utilized to gather participants. Questions about knowledge, attitude, and readiness to adopt ELV policies are posed to each chosen respondent. The distribution of detailed scores was continued when all questions had been answered.

TABLE 1 Demographic characteristics of the participants (*n* = 630).

Demographic factors	Classification	Frequency	Percentages
AGE	18–20 Years	198	31.4
	21–30 Years	3	0.5
	31–40 Years	147	23.3
	41–50 Years	154	24.4
	51–60 Years	102	16.2
	61 Years and above	26	4.1
	Total	630	100.0
GENDER	Male	328	52.1
	Female	302	47.9
	Total	630	100.0
RACE	Malay	554	87.9
	Chinese	49	7.8
	Indian	22	3.5
	Others	5	0.8
	Total	630	100.0
Working Status	Government	211	33.5
	Private	153	24.3
	Semi government	29	4.6
	Self-employed	109	17.3
	Student	80	12.7
	Unemployed	48	7.6
	Total	630	100.0
Income	RM2.500 below	304	48.3
	RM2.501—RM3.170	89	14.1
	RM 3.171—RM 3.970	53	8.4
	RM 3.971—RM 4.850	38	6.0
	RM 4.851—RM 5.880	65	10.3
	RM 5.881—RM 7.100	47	7.5
	RM 7.101—RM 8.700	19	3.0
	RM 8.701—RM 10.970	6	1.0
	RM 10.971—RM 15.040	6	1.0
	RM 15.041 and more	3	0.5
	Total	630	100.0
Education	Primary school	26	4.1
	Secondary school	195	31.0
	Diploma	108	17.1
	Bachelor's and above	301	47.8
	Total	630	100.0

3.4 Data collection

The questionnaire was specially allocated to eight researchers. Individuals willing to give a serious answer were chosen for this study. Respondents were given an explanation of the purpose of this study before being selected to fill out the questionnaire. The set of questions utilized formed itself and was constructed based on the proper dimensions and past research. A

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TABLE 2 Shows the relationship between demographic factors and respondents' knowledge (n = 630).

Demographic Factors	Classification	Knowledge Category			% Knowledge Category			P-Value
		Low	Medium	High	% Low	% Medium	% High	
Age	18–20 Years	14	147	37	7	74	19	0.000
	21–30 Years	0	2	1	0	67	33	
	31–40 Years	20	109	18	14	74	12	
	41–50 Years	21	116	17	14	75	11	
	51–60 Years	22	71	9	22	70	9	
	61 Years and above	10	12	4	38	46	15	
Gender	Male	52	223	53	16	68	16	0.028
	Female	35	234	33	12	77	11	
Race	Malay	68	405	81	12	73	15	0.000
	Chinese	15	32	2	31	65	4	
	Indian	4	18	0	18	82	0	
	Others	0	2	3	0	40	60	
Working Status	Government	20	162	29	9	77	14	0.000
	Private	19	119	15	12	78	10	
	Semi government	8	18	3	28	62	10	
	Self-employed	19	76	14	17	70	13	
	Student	6	53	21	8	66	26	
	Unemployed	15	29	4	31	60	8	
Income	RM2.500 below	46	218	40	15	72	13	o.004
	RM2.501—RM3.170	17	60	12	19	67	13	
	RM 3.171—RM 3.970	10	41	2	19	77	4	
	RM 3.971—RM 4.850	3	28	7	8	74	18	
	RM 4.851—RM 5.880	4	51	10	6	78	15	
	RM 5.881—RM 7.100	4	36	7	9	77	15	
	RM 7.101—RM 8.700	2	12	5	11	63	26	
	RM 8.701—RM 10.970	1	5	0	17	83	0	
	RM 10.971—RM 15.040	0	6	0	0	100	0	
	RM 15.041 and more	0	0	3	0	0	100	
Period of Stay	5 years below	14	104	24	10	73	17	0.073
	6–10 years	8	77	12	8	79	12	
	11–15 years	10	57	13	13	71	16	
	16–20 years	17	43	8	25	63	12	
	More than 20 years	38	176	29	16	72	12	
Education	Primary school	12	13	1	46	50	4	0.000
	Secondary school	41	134	20	21	69	10	
	Diploma	14	85	9	13	79	8	
	Bachelor's and above	20	225	56	7	75	19	
ELV Vehicle Ownership	Yes	64	226	48	19	67	14	0.000
	No	23	231	38	8	79	13	

total of 100 respondents were selected for the pilot study, and the findings were utilized to calculate the validity and reliability of the questions. The survey's sixty questions are organized into four sections. The first section consists of questions designed to learn about respondents' demographics, such as gender, occupation, income, residency status, etc.

The second section of a series of questions assessed respondents' knowledge of ELV management and ELV itself. The third segment has questions to elicit individual attitudes toward ELV management/policy. At the same time, the last section contains questions designed to elicit individual readiness for ELV application.

4 Result

4.1 Demographic characteristic

This survey received responses from 630 people. The largest age range of respondents was 41–50 (24.4%), and the majority of respondents in this study were men (52.1%). In terms of race, the majority of respondents (87.9%) were Malays, the majority of respondents had the status of royal employees (33.5%), the majority of respondents (48.3%) had an income of less than RM2500, and the majority of respondents who took part in this survey had a bachelor's degree or higher (47.8%).

4.2 Level of knowledge

The cross-tabulation test was conducted in this study to test the relationship between demographic factors and knowledge levels regarding ELV policies. Table 2 shows the results of the cross-tabulation test between demographic factors and knowledge, as well as the influence value between factors. Researchers generate high, medium, and low categories for each cross-tabulation outcome between demographic characteristics and knowledge to make the data easier to interpret (Low = X < M - 1SD; Medium = M—1SD ≤ X–M + 1SD; High = M + 1SD ≤ X).

According to the test results, most respondents scored in the middle. According to the findings, respondents have medium knowledge of ELV regulations in almost every demographic. According to the findings, the factor period of stay had an insignificant influence with a *p*-value of 0.073 (>0.05), indicating that a person's length of stay in one area is not correlated with the person's knowledge of ELV regulations.

The results of the analysis also directly provide knowledge that age can be a predictor that can influence a person's knowledge related to age (*p*-value 0.000), followed by race (*p*-value 0.000), working status (*p*-value 0.000), an education level (*p*-value 0.000), ELV ownership (*p*-value 0.000), income (*p*-value 0.004), and gender, which has a *p*-value of 0.028.

4.3 Level of attitude

Table 3 displays the research results of a cross-tabulation analysis of demographic factors and respondents' attitudes toward ELV regulations. This analysis was conducted to determine respondents' attitudes toward the ELV policy they wish to implement in Malaysia and to identify the most significant factors influencing people's attitudes. Researchers also generate high, medium, and low categories for each cross-tabulation outcome between demographic characteristics and attitude to make the data easier to interpret (Low = X < M–1SD; Medium = M—1SD ≤ X–M + 1SD; High = M + 1SD ≤ X).

The study's findings revealed that people's attitudes toward ELV policies remained moderate, with no high level of attitude in any of the demographic factors measured. According to the findings of the cross-tabulation analysis, three demographic factors had no significant relationship with community attitudes. Gender (*p*-value 0.451), income (*p*-value 0.076), and length of stay (*p*-value 0.066) are all unrelated to a person's attitude.

4.4 Level of readiness

Table 4 shows respondents' overall readiness to implement ELV policies. Table 4 demonstrates that each demographic factor classification has a medium level of readiness. For this part researchers also make classification high, medium, and low categories for each cross-tabulation outcome between demographic characteristics and readiness to make the data easier to interpret (Low = X < M - 1SD; Medium = M—1SD ≤ X–M + 1SD; High = M + 1SD ≤ X). This result shows that respondents' readiness to implement ELV policies is still low.

The analysis results in Table 4 also showed that sex differences did not significantly influence the community's readiness to imply ELV regulations (*p*-value 0.837). The length of stay was also found to have no significant impact on public readiness regarding the rules for expired vehicles (*p*-value 0.156).

According to Table 4, many demographic factors can significantly influence the community's readiness to accept ELV policies in Malaysia. The *p*-value value of 0.000 indicates that factors of age, race and working status have the greatest influence in shaping readiness. The level of education also significantly influences the expectation of readiness (*p*-value 0.001). The ELV ownership factor can also significantly influence the level of community readiness for this policy. Finally, it was discovered that income significantly affects the level of community readiness (*p*-value 0.018).

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TABLE 3 Shows the relationship between demographic factors and respondents' attitude.

Demographic Factors	Classification	Knowledge Category			% Knowledge Category			P-Value
		Low	Medium	High	% Low	% Medium	% High	
Age	18–20 Years	13	145	40	7	73	20	0.002
	21–30 Years	1	1	1	33	33	33	
	31–40 Years	17	113	17	12	77	12	
	41–50 Years	15	124	15	10	81	10	
	51–60 Years	21	70	11	21	69	11	
	61 Years and above	5	20	1	19	77	4	
Gender	Male	37	252	39	11	77	12	0.451
	Female	35	221	46	12	73	15	
Race	Malay	57	419	78	10	76	14	0.000
	Chinese	10	36	3	20	73	6	
	Indian	5	17	0	23	77	0	
	Others	0	1	4	0	20	80	
Working Status	Government	21	165	25	10	78	12	0.000
	Private	14	123	16	9	80	10	
	Semi government	3	22	4	10	76	14	
	Self-employed	16	85	8	15	78	7	
	Student	9	42	29	11	53	36	
	Unemployed	9	36	3	19	75	6	
Income	RM2.500 below	37	221	46	12	73	15	0.076
	RM2.501—RM3.170	9	75	5	10	84	6	
	RM 3.171—RM 3.970	10	40	3	19	75	6	
	RM 3.971—RM 4.850	3	27	8	8	71	21	
	RM 4.851—RM 5.880	4	48	13	6	74	20	
	RM 5.881—RM 7.100	6	37	4	13	79	9	
	RM 7.101—RM 8.700	2	14	3	11	74	16	
	RM 8.701—RM 10.970	0	5	1	0	83	17	
	RM 10.971—RM 15.040	1	5	0	17	83	0	
	RM 15.041 and more	0	1	2	0	33	67	
Period of Stay	5 years below	9	111	22	6	78	15	0.066
	6–10 years	5	79	13	5	81	13	
	11–15 years	8	62	10	10	78	13	
	16–20 years	11	49	8	16	72	12	
	More than 20 years	39	172	32	16	71	13	
Education	Primary school	7	17	2	27	65	8	0.000
	Secondary school	28	155	12	14	79	6	
	Diploma	16	82	10	15	76	9	
	Bachelor's and above	21	219	61	7	73	20	
ELV Vehicle Ownership	Yes	52	248	38	15	73	11	0.002
	No	20	225	47	7	77	16	

According to the study's findings, several demographic factors significantly influenced people's attitudes toward ELV, policies. Age (p-value 0.002), race (p-value 0.000), working status (p-value 0.000), educational status (p-value 0.000), and ELV, ownership were discovered to be significant (p-value 0.000).

10.3389/fbuil.2022.1038563

TABLE 4 Shows the relationship between demographic factors and respondents' readiness.

Demographic Factors	Classification	Knowledge Category			Knowledge Category			P-Value
		Low	Medium	High	% Low	% Medium	% High	
Age	18–20 Years	16	126	56	8	64	28	0.000
	21–30 Years	1	2	0	33	67	0	
	31–40 Years	22	104	21	15	71	14	
	41–50 Years	26	113	15	17	73	10	
	51–60 Years	20	69	13	20	68	13	
	61 Years and above	6	18	2	23	69	8	
Gender	Male	45	228	55	14	70	17	0.837
	Female	46	204	52	15	68	17	
Race	Malay	73	381	100	13	69	18	0.000
	Chinese	8	37	4	16	76	8	
	Indian	9	13	0	41	59	0	
	Others	1	1	3	20	20	60	
Working Status	Government	29	158	24	14	75	11	0.000
	Private	20	106	27	13	69	18	
	Semi government	6	21	2	21	72	7	
	Self-employed	16	77	16	15	71	15	
	Student	10	39	31	13	49	39	
	Unemployed	10	31	7	21	65	15	
Income	RM2.500 below	45	191	68	15	63	22	0.018
	RM2.501—RM3.170	18	62	9	20	70	10	
	RM 3.171—RM 3.970	9	41	3	17	77	6	
	RM 3.971—RM 4.850	3	25	10	8	66	26	
	RM 4.851—RM 5.880	3	55	7	5	85	11	
	RM 5.881—RM 7.100	8	34	5	17	72	11	
	RM 7.101—RM 8.700	4	12	3	21	63	16	
	RM 8.701—RM 10.970	0	5	1	0	83	17	
	RM 10.971—RM 15.040	1	5	0	17	83	0	
	RM 15.041 and more	0	2	1	0	67	33	
Period of Stay	5 years below	17	93	32	12	65	23	0.156
	6–10 years	12	72	13	12	74	13	
	11–15 years	9	62	9	11	78	11	
	16–20 years	14	46	8	21	68	12	
	More than 20 years	39	159	45	16	65	19	
Education	Primary school	9	13	4	35	50	15	0.001
	Secondary school	37	133	25	19	68	13	
	Diploma	17	76	15	16	70	14	
	Bachelor's and above	28	210	63	9	70	21	
ELV Vehicle Ownership	Yes	60	213	65	18	63	19	0.004
	No	31	219	42	11	75	14	

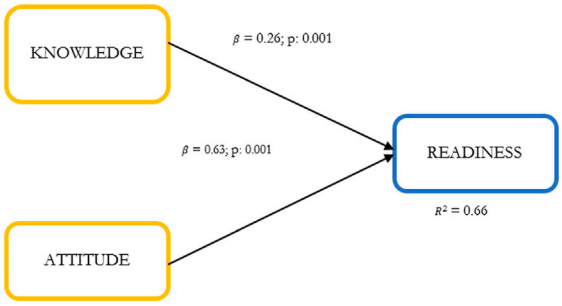

FIGURE 3
Final model with the standardized regression coefficient.

4.5 Factors that shape community readiness

We identified several independent variables for regression analysis to test the relationship between variables derived directly from the community's readiness to accept the ELV regulations proposed in this study. Figure 3 depicts the proposed path diagram, and shows the direct standard effect and the *p*-value of the tested variables (knowledge, attitude, and readiness).

The findings show that knowledge positively and significantly influences the community ($\beta = 0.26$; p: 0.001). Second, the analysis revealed that attitude has a positive and significant influence and is the strongest predictor of readiness ($\beta = 0.63$; p: 0.001). Overall, the proposed regression model performs well (Adj.R2 = 0.663, APC = 0.443, AVIF = 1.612, $p = 0.000$).

5 Discussion

We tested the influence of various variables on the readiness of Malaysian communities to implement ELV regulations. We used the survey data to determine the level of knowledge, attitude, and preparedness at the individual level. This is the first study to examine the social factors that comprise community readiness and the first study to examine the demographic factors that affect the predictor factors of proposed acceptance (knowledge, attitude, and readiness). This paper also contributes directly to the literature on the public acceptance of ELV policies slated for implementation in Malaysia. Assuming that social factors influence public readiness to implement ELV policies, we also directly develop a comprehensive model for predicting public responses to ELV policies.

First, we reported the respondents' knowledge, attitudes, and readiness levels in this study, as well as information about factors that significantly influenced knowledge, attitudes, and readiness. Age, race, working status, education level, ELV ownership, income, and gender were found to have a significant influence on individual knowledge in the first analysis of demographic factors related to knowledge. This research is consistent with previous research (Sitinjak et al., 2022a; Sitinjak et al., 2022b; Sitinjak et al., 2022c), which stated that the more mature a person has, the better knowledge they find from experience or education, formally or informally, so that they can influence a person's knowledge of a government policy. Furthermore, research by Al Sarrah, Ajmal, and Mertzanis (2020), discovered that an increasing level of work directly affects an individual's income and can affect a person's level of knowledge.

Education level, in addition to age, employment status, and income, has a significant influence on ELV-related knowledge; many studies have found a positive relationship between a person's educational level and knowledge level (Arning & Ziefle, 2007; Wang, 2009; Wang and kim 2018; Siyam, 2019). The higher a person's level of education, the more knowledge they have gained during their education, and the more mature their level of idiosyncratic thinking become (Vaghee et al., 2017). This paper also discovered that ELV ownership positively impacts ELV knowledge. Many scientists have found that people who own vehicles have a good understanding of the effects of these vehicles on the environment and a better understanding of how to maintain and treat end-of-life vehicles (Ukonze et al., 2020; Yang et al., 2022). Age was also found to have a significant influence on respondents' knowledge of ELV-related knowledge, which is consistent with previous studies in which gender was found to be a determining factor in a person's high and low knowledge of government regulations (Shallcross et al., 2013; Vaghee et al., 2017; Yang & Shih, 2020; Jain & Jain, 2022). One very interesting finding in the results of this study is: that gender is a predictor that significantly affects a person's knowledge. This is a new and interesting finding because there have previously been no studies linking race to knowledge about policy.

This study demonstrates that information significantly impacts a person's willingness to accept a new rule. Knowledge This is the foundation for comprehending the significance of government regulations. Knowledge creates value-in-subject and value-in-context (Ohn Mar et al., 2019). Indeed, finding a government that recognizes the potential of expanding people's knowledge is quite unusual, particularly to boost their approval of a newly developed rule. This knowledge can assist the government in achieving public acceptance of the new rules that will be imposed if it is readily available.

Based on these data, it was shown that knowledge is a significant predictor of a person's willingness to accept a new regulation. Formal and informal education on environmental concerns can promote environmental protection, but it has not been implemented comprehensively in Malaysia. This is the case in developing countries such as Malaysia, where it is found that education has a significant influence on a person's knowledge. In addition to age, education, gender, race, employment status, and income, ELV management knowledge is also significantly influenced by objective and subjective knowledge. The distinctive finding of this study is that the length of stay did

not affect ELV management knowledge. This differs slightly from prior research, which demonstrated that the longer an individual resides in a region, the greater their pro-environmental behavior. This is very likely to occur because Malaysia is one of the developing nations that still lacks ELV infrastructure and promotions related to ELV management. This can make people less likely to learn about the bad effects of ELV, which makes them even less likely to agree with this regulation.

The second part of the study discovered that demographic factors such as age, race, employment status, educational level, and ELV ownership significantly impacted attitude. These findings support previous research that found age, employment status, educational level, and ELV ownership to be factors capable of predicting individual attitudes toward environmental policies (Schmidt et al., 2018; Guan et al., 2019; Zhao et al., 2019; Rahimi, et al., 2020; Pavlíček et al., 2021; Pratama and Firmansyah, 2021). Individuals of a mature age think more maturely than young people. In contrast, more mature individuals will see one rule from various perspectives, influencing a person's attitude when finding a new policy. In her research, Sitinjak et al., 2022a discovered that a person's employment status has a positive and significant role in vehicle policies; the lower their employment level, the more individuals tend to reject regulations related to vehicle smelting because they consider it harmful. Vehicle ownership was also a predictor of significantly influencing individuals' attitudes toward accepting or rejecting vehicle-related policies. Most people will store and collect their vehicles because they are thought to have memories and have become collectible items for some people, so people who own old vehicles are more likely to oppose ELV rules (Guan et al., 2019; Rahimi, Azimi, and Jin, 2020).

This study gives in-depth information and understanding regarding the significance of a person's attitude toward the proposed regulations. Due to the impact of the legislation on the community, especially in sustaining environmental sustainability, the attitude substantially determines the intent to act under public demands. In order to increase individual readiness in responding to the rules imposed by the government, it is necessary to cultivate a positive attitude toward a policy related to environmental equality. Such an attitude directly supports the community's sense of environmental responsibility and ensures the success of government initiatives implemented in the social sphere of society.

Research has revealed that the relationship between pro-environment beliefs and behavior is not statistically significant (Vicente-Molina et al., 2013). The data also indicate that a person's attitude significantly impacts their willingness to accept new regulations. This is not surprising given that empirical research indicates that attitudes are excellent indicators of an individual's self-acceptance of new laws (Sitinjak et al., 2022b). In reality, how the attitude gives an internal impetus to adopt regulations may manifest the individual's feeling of environmental responsibility.

The third section discovered that age, race, employment status, and level of education are all factors that influence an individual's readiness to implement ELV policies. (Sitinjak et al., 2022a). discovered in their research that a person's level of readiness is largely determined by demographic factors such as age, occupation, education, and ethnicity. Age is thought to be a factor that can influence acceptance, according to a study conducted by Shallcross et al. (2013), which discovered that age is the key factor in a person's acceptance of new technologies. The older a person is, the more difficult it is for him to accept change, and when a person reaches the age of 25–40 years, the individual is more receptive to new rules that are thought to provide benefits for them. Aside from age, it was discovered that employment status has a significant impact. Where a person's employment level will determine income, someone with a high level of work tends to be more prepared to accept policies related to their vehicle because they have the idea that a vehicle is not an investment object that can be stored for all time. This is supported by several previous studies that found that the lower a person's work, the greater their reliance on vehicles (Wu et al., 2020; He et al., 2021; Tongwane & Moeletsi, 2021). In this study, it was also discovered that race is a significant, influential factor; the social environment influences the tendency of people to accept and reject new rules; in the community itself, people of various races tend to gather in their race, which greatly affects their acceptance and readiness to accept the policies that the government will implement.

Furthermore, this study confirms previous research, which found a positive and significant relationship between knowledge and attitude toward readiness using bivariate analysis. Knowledge and attitude combine to form factors that can predict how prepared a community is to implement or accept ELV policies (Yusop, Wahab, and Saibani, 2012; Al Sarrah, Ajmal, and Mertzanis, 2020; Sitinjak et al., 2022a; Sitinjak et al., 2022b). The results of this test are consistent with the theory of planned behavior, which states that internal factors of the individual determine factors that increase a person's readiness to accept regulations. The internal factors in this study are represented by knowledge and attitude variables, which have a simultaneous influence of $R2 = 0.66$, or it can be said that the community's readiness to accept ELV policies is determined by the knowledge and attitude factor of 66%. Other variables root the rest until it reaches 100%.

According to the findings of the analysis, attitude is a factor that significantly impacts community readiness. According to previous research, attitude is a reaction that can predict whether an individual rejects or wants to accept one rule. Our data also shows that knowledge plays a significant role, as the most recent research consistently links acceptance to a person's level of knowledge about the benefits and the consequences of implementing the regulation.

Interestingly, most respondents have middle-level knowledge and attitudes, implying that the Malaysian people cannot support this ELV policy.

According to the findings of this study, knowledge and attitudes have a crucial influence in shaping social preparedness to adopt ELV legislation. Malaysia's government should begin developing relevant campaigns. ELV management to improve public awareness of ELV management. Increasing public awareness will affect green behavior patterns, making it easier for the government to enforce ELV rules. Furthermore, the study's findings suggest that attitudes play a crucial impact in acceptance. The public's reaction to ELV policy is determined not only by knowledge but also by attitude. Increasing the community's positive attitude through comprehensive government initiatives will positively impact society.

This is the first study conducted in Malaysia to look for social factors that build community readiness for government-planned ELV policies. The study's findings have provided policymakers with a comprehensive picture of the community's readiness for ELV policy. There is still no full knowledge, and public attitudes toward ELV policies are the main issues the government must address before ELV policies can be successfully implemented. Furthermore, the findings of this study provide extensive knowledge to vehicle owners regarding end-of-life vehicle treatment and directly provide knowledge to the automotive industry to assist the government in implementing Malaysia's ELV policy. The study's findings can also have various implications for policymakers and all automotive stakeholders.

6 Conclusion

ELV management is an integral part of the cycle of the automotive industry, which, according to the EU, is perfect if a country has successfully implemented the policy from the vehicle manufacturing process to the 4R process of the vehicle (Reduce, Reuse, Recycle, Replace). However, implementing 4R for vehicles is the most difficult task for developing nations. In Malaysia, a nation that produces its vehicles (Proton and Perodua), policies related to 4R for vehicles are still being implemented. The lack of public awareness regarding ELV management and the majority of the public's indifference towards ELV have impeded the implementation of ELV regulations in Malaysia.

In this study, we identified several demographic variables that significantly impacted the three admission predictors we proposed. In addition, we identified a pattern of community readiness in which knowledge and attitude were found to increase community participation in implementing ELV policies. In general, it can be stated that implementing the ELV policy in Malaysia will be facilitated by the level of community knowledge and attitude.

In this study, we also acknowledge numerous flaws that we must address. First, because the majority of respondents in this study were Malay, the results of this study cannot be directly generalized, given that Malaysia is made up of various races (Chinese, Indian, Malay, etc.). Second, the variables in this study are limited to three, whereas additional variables can be added to form a model that predicts a person's acceptance of a new policy. Most respondents have an income of less than RM2,500, which explains their attitudes and readiness to be at the middle level, referring to previous studies of individuals with a low-income possibility or neutral considerations of the rules. Then, we did not consider the scale of public acceptance completed in other countries, and we only used data from surveys in this study. In contrast, data from interviews can be used to supplement the results obtained from surveys.

For future research, we recommend a larger sample size and focusing on the number of respondents, not just the Malay race but also other races who live in Malaysia. Furthermore, pay attention to the income sector; it would be preferable if you obtained a diverse sample of respondents with varying incomes. We also strongly advise using the mix-method in future research to obtain more detailed and in-depth results. Finally, the addition of variables forming public acceptance is strongly advised to obtain better and more generalized results.

In this paper, we attempt to present an overview of the factors of public acceptance that explain the public acceptance of ELV regulations. This finding adds to our understanding of community readiness for the ELV policy that the Malaysian government wishes to implement. This policy is being proposed to provide solutions for vehicles that will be banned, ELVs that are not being managed properly, and the problem of congestion in Malaysia as the number of vehicles increases. According to the survey results, knowledge and attitudes directly increase public acceptance of the new policy, as well as demographic factors that significantly impact the community's level of knowledge, attitudes, and readiness.

Data availability statement

The data analyzed in this study is subject to the following licenses/restrictions: please directly contact the corresponding author. Requests to access these datasets should be directed to CS, p112562@siswa.ukm.edu.my.

Author contributions

RI performed literature collections, and RI, CS, and NS performed CS Data processing and handling. CS, and RI wrote the manuscript, and RC, MM, and ZT conducted RI

Project planning. All authors have read and agreed to the published version of the manuscript.

Funding

This research was funded by Trans-disciplinary Research Grant Scheme (TRGS) TRGS/1/2020/UKM/02/1/2.

Acknowledgments

We appreciate the financial support for this research provided by Trans-disciplinary Research Grant Scheme (TRGS) TRGS/1/2020/UKM/02/1/2, and the authors would like to thank the reviewers for their help.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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