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Public Community Knowledge on Reuse of End-of-Life Vehicles: A Case Study in an Automotive Industrial City in Malaysia

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Abstract: The automotive industry is facing a number of serious challenges related to the environmental impact of automotives throughout their entire life cycle. Recent initiatives on recovery of end of life vehicle component had a new impact not only to the automotive industry, but also the public at large. In Malaysia, despite a higher awareness on end of life recovery among the industry, it is uncertain as to whether the public are aware of the new phenomenon that has been successfully implemented in many developed countries including Europe and Japan. The aim of this study is to ascertain the level of knowledge of the public community with regard to end of life vehicle recovery. The study was conducted through field study based surveys on a public community of 400 respondents residing in Shah Alam, an industrial area in the state of Selangor in Malaysia. Out of the nine questions given to respondents, a total of seven questions attained answers in the range of 'agree' and 'strongly agree' giving a total percentage of 80.83%. While two questions attained answers in the range of 'strongly disagree' to 'not sure', giving a total percentage of 19.17%. The results of this study indicates that the knowledge of ELV need to be enhanced if end of life vehicle reuse is to be implemented to support a sustainable automotive development in the country. Several suggestions have been put forward in this paper to ensure a succesful implementation of ELV recovery in Malaysia.

Key words: Reuse, automotive components, end-of-life vehicle, public knowledge

INTRODUCTION

End of Life Vehicle (ELV) recovery that includes recycling, reuse or remanufacturing is an initiative by the automotive industry in order to respond to the global sustainable development. Before the automotive recovery process was introduced, vehicles that have reached their end of life will be disposed off at disposal sites or landfill areas. However, when the disposal process has been so rapid, solid waste increased dramatically leading to a shortage of the disposal sites. According to Go *et al.* (2010), the automotive industry in Malaysia has grown tremendously since the establishment of Proton in 1985, followed by Perodua in 1993 as a part of the National Car Project. The introduction of the National Car Project has given a boost to the development of components and parts manufacturing in Malaysia. Despite fluctuation in production of automotives, vehicle production in Malaysia tends to increase as reflected by the rapid increase in domestic sales.

The total vehicle production in 2007 was 441,678 units as compared to 360,105 units in 2000. From January to September 2009, the total number of units produced was 356,490 as in "Table 1". As such, the automotive industry faces a number of serious challenges in vehicle disposal due to its impact on the environment throughout their entire life cycle.

Table 1: Production of vehicles in Malaysia in the year 2000-2009

Year	Passenger vehicle	Commercial vehicles	4×4 vehicles	Total vehicle
2000	295,318	37,552	27,235	360,105
2001	355,863	40,916	31,922	428,701
2002	380,050	44,045	32,727	456,822
2003	327,450	65,554	33,642	426,646
2004	364,852	75,384	31,739	471,975
2005	422,225	95,662	45,623	563,510
2006	377,952	96,545	28,551	503,048
2007	403,245	38,433	-	441,678
2008	484,512	46,298	-	530,810
YTD Sept. 2009	325,644	30,846	-	356,490

Automotive solid waste such as engine blocks and carburetors are commonly reused in many developed countries. The process of reuse of ELV involved inspection and testing to assure quality and durability of reused parts. Parker (2007) noted that a generic term covering all operations where an end-of-life product is put

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back into service, essentially in the same form, with or without repair or remediation. The following terms are also related to the conventional view of reuse: (1) Direct re-use: Placing back into the retail chain returned goods that have no discernable fault. (2) Redeployment: Use of a product in the same application, with no assumptions about fitness for purpose or warrant. (3) Repurposing: Use of product wholly or partly in another application.

There are various benefits in performing the process of reuse of which can generate sustainable environment, conservation of energy and reduction in the use of new materials.

Currently, ELV activities are actively carried out in developed countries such as Europe, USA, UK and Japan. The ELV initiatives had a new impact not only to the automotive industry, but also the public at large. As an automotive producing country, Malaysia is also committed in realising its ELV initiative however, it is still at the initiation phase. Researches related to recycling in Malaysia has been reported in the past, however aspects of recovery such as reuse of automotive components has not been reported. Omar *et al.* (2009) conducted a study on households' attitudes toward recycling of solid waste in Malaysia. Results from the study showed that household participation in recycling waste relies on the level of awareness and understanding on recycling. Ahmad and Ali (2012) investigated the environmental knowledge and practices among Malaysians. Findings from the study indicated that respondents' basic or general environmental knowledge was high, while knowledge on specific environmetal issues were low. Ahmad *et al.* (2012) conducted a study on the perception and participation of the Malaysian youth with regard to environmental citizenship. The study has shown that the Malaysian youth are aware of the environmental problems faced by the world and though their technical understanding can be improved, the general understanding of the state of the earth and what can be done to preserve it is satisfactory.

Generally, when an initiative such as ELV concept is still at its infancy, the level of knowledge of the local community has to be ascertained and the necessary measures need to be undertaken in order to ensure a successful implementation. Therefore, this study is aimed at determining the level of public knowledge on ELV reuse which is at the highest level of product recovery.

Since ELV reuse is still at its infancy, it is expected that the study will not only identify the level of knowledge but also to propose actions that can be considered by the relevant authorities in ensuring a smooth and effective implementation of ELV reuse in Malaysia.

MATERIALS AND METHODS

The study was conducted through field study based surveys on a public community of 400 respondents residing in Shah Alam, an industrial area in the state of Selangor in Malaysia. First of all, the location of the automotive industrial city was determined with various considerations including the population rate as well as the optimal sampling rate. Upon completion of the questionnaires construction, a pilot study on 10 respondents were conducted, comprising students, staff and lecturers from the Faculty of Engineering and Built Environment at National University of Malaysia. Results from the pilot study were analyzed to ascertain the validity of each survey question using Cronbach Alpha reliability in the Statistical Package for Social Sciences (SPSS)©. Field studies were then carried out and the results were analyzed using SPSS© frequency.

Selection of the area of study: There are altogether six automotive cities in Malaysia, namely Gurun, Bertam Seberang Perai, Pekan, Tanjung Malim, Shah Alam and Rawang (Department of the Prime Minister, 2005). The basis for selecting an automotive industrial city as the location of study is that the public in such cities are more exposed to automotives and therefore they would have a clearer perspective on ELV issues. Due to financial and time limitations, the study was focused on only one of the automotive cities. The selection of the automotive city was carried by firstly obtaining the total population of each automotive city. Table 2 provides a listing on the automotive industrial cities in Malaysia and their total population by Department of Statistics Malaysia (2010).

The data shown in Table 2 indicates that the automotive industrial city of Shah Alam has the highest population among all automotive industrial cities in Malaysia in 2010 with a capacity of 157,210 people. Therefore, the automotive industrial city of Shah Alam was chosen as the location of study and the public community residing in Shah Alam as respondents.

Optimum sample rate: The Department of Statistics Malaysia (2010) states that the population in Shah Alam

Table 2: Automotive industrial cities in Malaysia

Automotive industrial city	Population (2010)
Gurun, Kedah	7667
Bertam Seberang Perai, Pulau Pinang	559
Pekan, Pahang	3460
Tanjung Malim, Perak	3319
Shah Alam, Selangor	157,210
Rawang, Selangor	30,711

in 2010 stood at 157,210. In order to determine the optimal sample size, the equation by Yamane (1967) was used, as shown below:

$$n = \frac{N}{1+N(e)2}$$

where, n is the sample rate, N is the population and e is the significant rate (0.05).

Therefore, the optimum number of sample (respondents) needed to represent the population of Shah Alam is determine as follows:

$$n = \frac{157\ 210}{1+157\ 210\ (0.05)^2}$$

$$n = \frac{157\ 210}{394.03}$$

n = 398.98 @ 400 respondents

Thus, a total of 400 respondents are needed to represent the population of Shah Alam.

Questionnaire construction: The study was conducted using a field study based survey addressed to the public community residing in the Shah Alam area. The questionnaires were developed using closed form questions in order to facilitate the respondents in providing their answers. Since the respondents are those from the public community it is necessary for the questions to be answered within a short time period. Furthermore closed questions are easier to analyze.

There are two sections in the survey questionnaire namely part A and part B. Part A consists of questions related to the respondents' profile such as age, gender, race, employment sector, income status, duration of stay in Shah Alam and their highest level of education. Part B was developed to determine the respondent's level of knowledge on concepts such as solid waste recycling and ELV reuse.

Pilot study: A pilot study was conducted to test the validity of the questions in the survey questionnaire. It is necessary to ensure the questions are understood and can be answered by the respondents. The pilot study was conducted on 10 respondents from the university comprising students, staff and lecturers.

Results of the pilot study: Results of the pilot study were analyzed using the Statistical Package for Social Sciences (SPSS)© version 18. According to Plume (2003), SPSS is a modular data management and analysis application created and produced by SPSS, Inc., in Chicago, Illinois. Among its features are modules for statistical data analysis, including descriptive statistics such as plots, frequencies, charts and lists, as well as sophisticated inferential and multivariate statistical procedures like analysis of variance (ANOVA), factor analysis, cluster analysis and categorical data analysis. SPSS is designed generally for the storage and manipulation of alpha-numeric data and spesifically for, but not limited to, use with social science data. SPSS allows users to input, store, manipulate and analyze alpha-numeric data.

The validity of the questions was tested using the techniques of the Cronbach's alpha in which the minimum level required is 0.7. If the value is less than 0.7, the questions must be modified or dropped. Otherwise, respondent may not understand or cast doubts on the question causing them to miss the question or mark more than one answer. If a question has an Cronbach's alpha level of 0.7, the question does not need to be modified as it is clear and understood by the respondents. Cronbach's alpha is regarded as measure of the interrelatedness of item scores constituting one instrument or test (Cortina, 1993). Theoretically, alpha is 0 when there is no correlation among scores and alpha is 1 when there is perfect correlation. Since the values of the coefficient alpha (Miller, 1995) are determined by the interrelatedness of item scores it is said to be "… the most widely used method for evaluating internal consistency…" (Polit and Beck, 2008).

Based on Table 3, nine questions need were given to the respondents. Question number five was recorded as having the highest value with 0.792, while question number eight recorded the lowest value with 0.770. However, all questions attained a value of more than 0.7 which indicates that the questions need not be modified as it is clear and understood by the respondents.

Field study: The field survey was conducted in June 2012 and a total of 400 respondents from the public community

Table 3: Validity of survey questions using cronbach's alpha in SPSS

Questions	Cronbach's alpha
I know about the concept of solid waste recycling	0.791
Solid waste in Malaysia should be given due attention	0.779
I know about the concept of end of life vehicles (ELVs)	0.786
I know about the concept of reuse for end of life vehicles (ELVs)	0.783
Solid wastes such as car components can undergo end of life reuse process	0.792
End of life vehicles components that have been tested to assure quality and durability can be reused in a new car	0.771
The process of reuse can generate environmental sustainability	0.775
The process of reuse can conserve energy	0.770
The process of reuse can reduce material consumption	0.775

residing in Shah Alam were selected to answer the questionnaire. The random sampling technique was deployed for the field study since respondents (individuals) were identified based on their consent.

The questionnaires were distributed near to the focal point and meeting places in Shah Alam such as the SACC Mall and Plaza Alam Sentral as well as the Shah Alam Lake Garden. This is to ensure that researchers can have better access to the public community. Results of the field studies were analyzed using the frequency method in SPSS.

RESULTS

In this section, the results of the field studies are presented.

Part A: Respondents background: The overall analysis of respondents' background.is shown in Table 4.

Age: Respondents' ages were divided into five categories namely 15 to 25 years, 26 to 35 years, 36 to 55 years, 56 to 65 years and 66 years and above.

Based on Table 4, the highest percentage of respondents are those in the age group of 26-35 years with 39.8%, while respondents that ranked the second highest is the age group of 15-25 years with 34.3%. Respondents in the age group of 36-55 years was recorded at 23.5 and 2.5% were from the age group 56-65 years.

Gender: Gender is divided into two categories, namely male and female. From Table 4, it was found the male respondents recorded 53.5% while female respondents recorded 46.5%.

Race: The respondents' race consists of four categories such as the Malays, Chinese, Indians and others. From Table 4, the Malay respondents recorded the highest percentage with 80.3%, while the Chinese recorded the second highest with 10.8%, followed by Indians with 9.0%.

Job sector: The employment sector is divided into five categories, which are public sector, private sector, self-employed, students (not working) and retirees. Results from Table 4 shows that respondents from the private sector recorded the highest percentage with 49.3%, while the public sector is the second highest recorded as 25%. Students are recorded as 19%, followed by 5.0% self-employed and retirees by 1.8%.

Table 4: Results of the respondent's background

Respondent's background	Result (%)
Age (years)	
15-25	34.3
26-35	39.8
36-55	23.5
56-65	2.5
66 years and above	0.0
Gender	
Male	53.5
Female	46.5
Race	
Malay	80.3
Chinese	10.8
Indian	9.0
Others	0.0
Employment sector	
Government sector	25.0
Private sector	49.3
Self employed	5.0
Student/not working	19.0
Retirees	1.8
Income status	
Unemployed	19.0
RM 1500 and below (equivalent to USD 463 and below)	19.0
RM 1501-3000 (equivalent to USD 464 to 927)	31.5
RM 3001-4500 (equivalent to USD 928 to 1392)	17.8
RM 4501-6000 (equivalent to USD 1393 to 1856)	6.3
RM 6001 and above (equivalent to USD 1857 and above)	6.5
Duration of stay in Shah Alam	
Less than 1 year	47.5
1-5 years	35.3
6 years and above	17.3
Higher education	
Informal	0.0
Primary school	1.0
High school	29.3
Diploma and equivalent	33.8
Degree and equivalent	36.0

Income status: Income status is divided into six categories, starting with no income which means that they are still in the studying and unemployed. The second income category is between RM 1500 and below, representing the lowest-income respondents. Third, is the low-income category representing RM 1501 to RM 3000. Next, is the upper-middle income category that is between RM 3001 to RM 4500, while high income is RM 4501 to RM 6000 and the highest income is RM 6001 and above. From Table 4, it can be seen that the third category or low-income respondents recorded the highest percentage with 31.5%, while respondents with low income and no income recorded the second highest percentage with a similar value with 19%. Next highest was the third high-income respondent with 17.8%, followed by respondents in the highest income category by 6.5% and the latter is the highest income category recorded by 6.3%.

Duration of stay in shah alam: Duration of stay in Shah Alam is divided into three categories. The first category

is for less than one year. The second category is from 1-5 years and 6 years and above represents the longest duration of stay in Shah Alam. From Table 4, it can be shown that the category of 6 year and above recorded the highest with 47.5%, followed by the second category with 35.3% and the category for less than one year with 17.3%.

Education: Education is categorized as informal, primary school, high school, diploma and equivalent and the last is a degree and equivalent. From Table 3, it was found among respondents from a degree and equivalent recorded the highest percentage with 36%, while the second highest is from diploma and equivalent category with 33.8%. Respondents from the high school category is recorded as 29.3% while the category of primary school is recorded as 1.0%.

Part B: Respondents' knowledge level

I know about the concept of recycling of solid wastes: From this study, the respondents' knowledge on the concept of solid wastes recycling has been identified. "Figure 1" shows that 48.8% of respondents strongly agreed to the statement, while respondents that agreed was recorded in 44.3%. There is also 7% of respondents that are not sure about the concept of solid wastes recycling. Overall, 93.1% of respondents agree that they know about the concept of solid waste recycling Fig. 1.

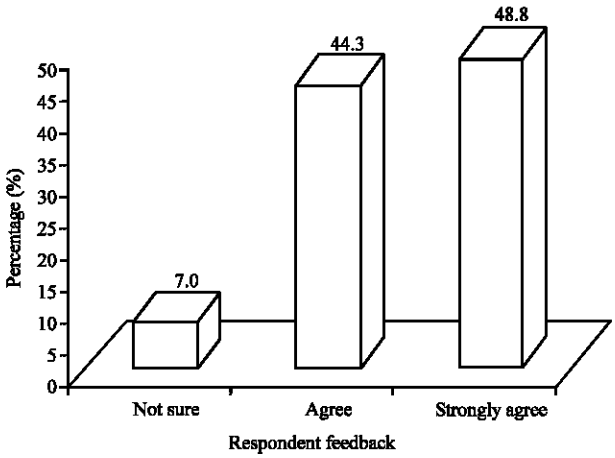

Fig. 1: Knowledge on the concept of recycling of solid wastes

Solid waste in Malaysia should be given due attention: From "Fig. 2", it is found that 69.8% of the respondents strongly agreed and 29.3% agreed to the statement. While one percent of respondents were not sure. In total 99.1% of respondents agreed that solid wastes in Malaysia should be given due attention.

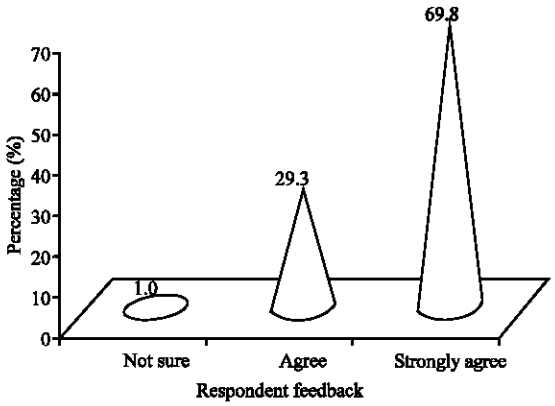

Fig. 2: Due attention for solid waste in Malaysia

I know about the concept of ELV: Next, the level of knowledge on the ELV concept was posed to the respondents. The results as shown in "Fig. 3" indicates that 39.8% of respondents were not sure. While the second highest response was 34.8% agree and the next is strongly agreed with 19.3%. There are also 5.8% respondents that disagree and 0.5% that strongly disagree. In total respondents that know about the concept of the end of life vehicles was recorded at 54.1%, while 46.1% say that they have less knowledge about the concept of the end of life vehicles.

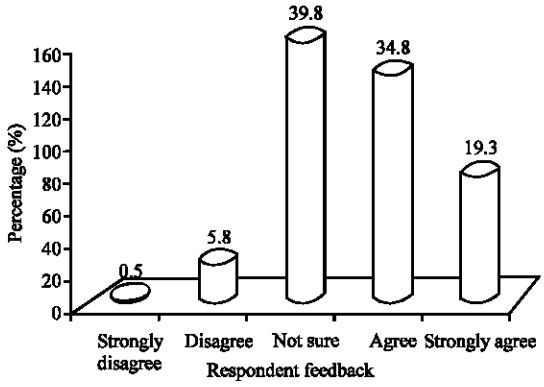

Fig. 3: Knowledge on the concept of ELV

I know about the concept of reuse for ELV: Questions regarding respondent's knowledge on the concept of reuse for ELV are also put forth to the respondent. Results as shown in "Fig. 4" reflects that not sure answers were recorded as the highest percentage with 38.8%, the second highest answer is agree with 37% and strongly agree with 19.5%. A total of 4.3% responded to disagree and 0.5% responded to strongly disagree. Overall, it can be considered that 56.5% of the

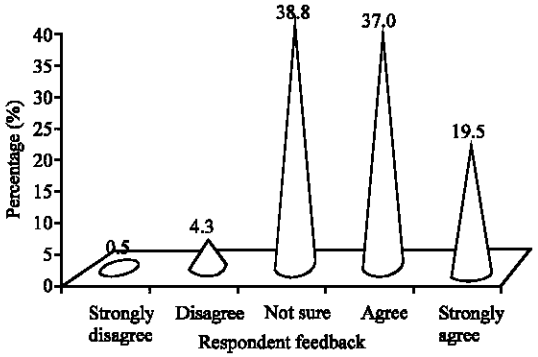

Fig. 4: Knowledge on the concept of reuse for ELV

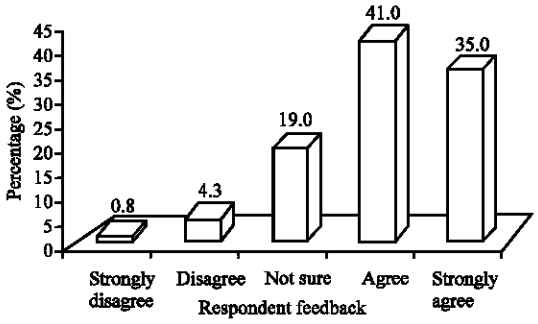

Fig. 5: Reusing of solid waste at their end of life

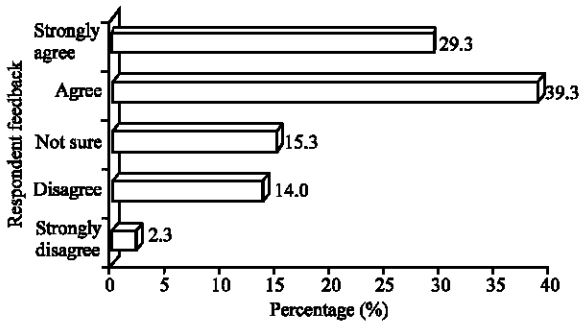

Fig. 6: Reuse of car components that have been tested

respondents have a good knowledge on ELV reuse, while 43.6% of respondents have no knowledge regarding ELV reuse.

Solid waste such as car components can be reused at their end of life: With regard to the question on solid waste such as car components can be reused at their end of life, "Fig. 5" shows that the answers agree has the highest percentage at 41% and the next is strongly agree at 35%. While not sure answers are 19,4.3% responded to disagree and strongly disagree with 0.8%. The number of respondents that agreed with this question is 76% while not agree is at 24.1%. Overall, respondents agreed that solid waste such as car components can be recovered at the end of their useful life.

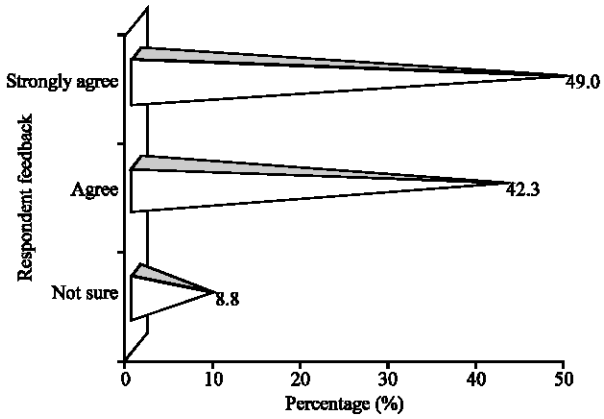

Fig. 7: Environmental sustainability through reuse

End of life car components that have been tested to assure quality and durability can be reused in a new car: In this section, the answers agree recorded the highest percentage with 39.3 and 29.3% responded to strongly agree as in "Fig. 6". While the not sure answers recorded the third highest percentage with 15.3%, 14% responded to disagree and strongly disagree with 2.3%. The number of respondents that agreed is much higher at 68.6%, while not agree at 31.6%. In total, respondents agreed that ELV components which have been tested to assure their quality and durability can be reused in a new car. An earlier study by Amelia *et al.* (2009) has shown that customers low perception of the quality of reused products is one of the inhibiting factors of end-of-life recovery implementation. It is therefore necessary for customers to know the actual requirements for a reused product before it can be used in a new application. The process of reuse can generate environmental sustainability.

As shown in "Fig. 7", the answers strongly agree recorded the highest percentage with 49 and 42.3% responded as agreed while not sure responses were recorded as 8.8%. The total number of respondents that agreed to this statement is 91.3%, while the not sure answers are recorded as 8.8%. In total, respondents agreed that the process of reuse can generate environmental sustainability. The process of reuse can conserve energy.

As shown in "Fig. 8", respondents that strongly agreed are recorded as the highest percentage with 55.8% and agreed as the second highest with 38.3%. While the not sure answers are recorded as 6%. The number of

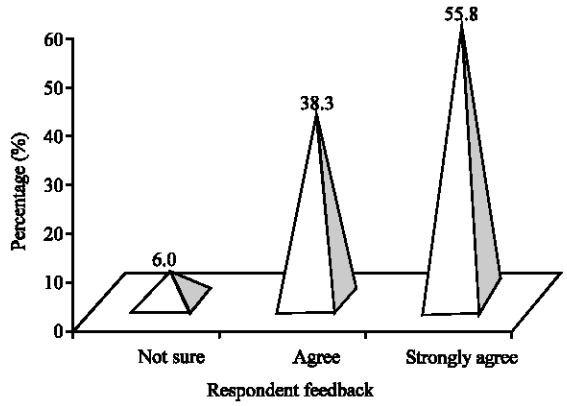

Fig. 8: Conservation of energy through reuse

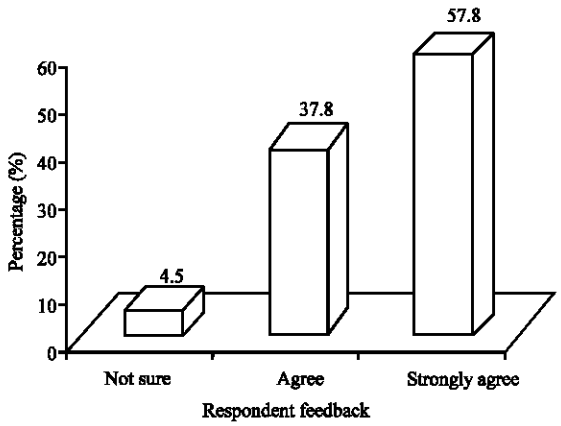

Fig. 9: Reduction of material consumption through reuse

respondents that agreed with this question is 94%, while not sure is 6%. Therefore, a majority of the respondents agreed that the process of reuse can lead to energy conservation.

Process of reuse can reduce material consumption: The last question is on whether a reuse process can reduce material consumption. As shown in "Fig. 9", the answer strongly agree was recorded as the highest responses with 57.8% and agreed was recorded as the second highest response with 37.8%. While the not sure answer was recorded as 4.5%. The number of respondents that agreed is 95.6%. Therefore a majority of the respondents agreed that material consumption can be reduced through the process of reuse.

DISCUSSION

This study is aimed at identifying the level of public knowledge on reuse of end of life vehicle. Results from the analysis indicate that a high percentage of respondents agreed to the concept of recycling of solid waste and that solid waste in Malaysia should be given due attention. It was also agreed that solid waste such as car components can be reused after their quality and durability has been assured. This finding is in-line with the report by Amelia *et al.* (2009) which state that the public may not be confident of the quality of reused product. The public are also aware that the process of reuse can generate environmental sustainability, conservation of energy and reduction in material consumption. However, respondents that are uncertain of their knowledge on the concept of ELV reuse recorded the highest percentage.

The results show that the knowledge of the public community in Malaysia with regard to the concept of recycling and reuse of solid waste is at a reasonably good level. Earlier findings by Ahmad and Ali (2012) has also proven from their study that the Malaysians basic or general environmental knowledge was high, while knowledge on specific environmetal issues were low. However, the concept of ELV reuse is rather new to the respondents. In other words, the respondents have not attained a good level of knowledge related to the concept of ELV and the concept of ELV reuse. This may be due to respondents lack of exposure to the subject. It is therefore crucial for the community to be educated on issues related to end of life recovery including for vehicles.

In Netherland for examples, the Auto Recycling Netherland (ARN) was established by the Dutch automobile industry to collect all scrap cars and oversees their dismantling and recycling, without cost to the last owner. Financing for this system is achieved through a waste disposal fee payable as part of vehicle registration. ARN manages vehicle collection and recycling activities by entering into contracts with car dismantling companies and was responsible for recycling 90% of the 234,000 discarded end-of-life vehicles in the Netherlands in 2006 (USEPA, 2008).

Japan also introduced a 2002 ELV Recyling Law, which is based on a 'shared responsibility' principle. This requires consumers in Japan to pay a fee when they purchase a new car or, for cars sold before the enforcement of the law, at the time of mandated regular inspection. The fee is managed by a third party namely the Japan Automobile Recycling Promotion Center (JARC). An electronic manifest system is used to help ensure that ELV are properly recycled. The law also mandates the final disposition of CFCs/HFCs, shredder residue and airbags from vehicles. The Japan Automobile Manufacturers Association also established voluntary targets to reduce substance of concern in vehicles and achieve recycling goals (USEPA, 2008).

Based on the success of ELV programmes in Netherland and Japan, the Malaysian government and the automotive industry in particular, need to play an active role in providing knowledge resources to the community, such as developing awareness campaigns, workshops and seminars on the concept of the ELV reuse. Through awareness campaigns, workshops and seminars, the community will gain more exposure and in depth knowledge on environmental sustainability through ELV reuse.

Community education through print and electronic media is also necessary in highlighting the concept of the ELV to the community. Disclosure of the ELV concept using the print media such as magazines, newspapers and newsletters can also be an effective mechanism to educate the community since the community today has more interaction through the electronic media. Therefore, the government authorities and industry must complement each other in all their initiatives to educate the public in order to gain public support once ELV is implemented in Malaysia.

The government may also need to introduce ELV directives as practiced in countries such as Europe and Japan. In the European Union (EU) countries, the directive is seen as a pushing factor for the establishment of an environmentally conscious automotive industry (Amelia *et al*., 2009). For examples, The European Union's End of Life Vehicles (ELV) Directive (2000/53/EC) is to promote recycling and provide incentives for environmentally-friendly vehicle design represents an early application by the EU of Extended Producer Responsibility (EPR) principles for the sustainable life cycle management of products (USEPA, 2008).

In Japan, the Japanese End-of-life Vehicles (ELVs) Recycling Law came into force in January 2005. In Japan, 76 million vehicles are in use of which 3.5 million are treated as ELVs every year (Togawa, 2008). The Japanese End-of-life Vehicles Recycling Law sets the standard of recycling rate for Automobile Shredder Residue (ASR) to 30% by the year 2005-2009, 50% in 2010-2014 and 70% by the year 2015 (Ogushi and Kandlikar, 2005).

Therefore, this directives have been seen as an enabler to ELV initiatives in the respective countries. Thus, ELV disposal in landfill area can be reduced in view of ensuring a sustainable automotive development in the country.

In addition, the government and industry need to work together in providing a suitable infrastructure for the collection of ELV. The infrastructure must include a collection site for ELV as well as processing plants at every strategic locations in the country. With a good understanding and knowledge on ELV, the public can be engaged directly to the reuse initiative.

The next step to be taken by the government is to provide incentives to the public community who uses ELV components. Once the directives and infrastructure are in place, the government should introduce incentives to the participating public community. The provision of incentives will certainly motivate individuals to participate in ELV reuse.

CONCLUSION

The study has shown that the level of respondents' knowledge on recycling in solid waste is reasonably good. However, knowledge on the concept of ELV reuse need to be improved so as to ensure that ELV reuse can be implemented successfully. Results from the study has shown that out of the nine questions given to respondents, a total of seven questions attained answers in the range of 'agree' and 'strongly agree' giving a total percentage of 80.83%. While two questions attained answers in the range of 'strongly disagree' to 'not sure', giving a total percentage of 19.17%. The government and industry should develop and implement programs related to ELV reuse in order to enhance the understanding, knowledge and awareness of the public community in Malaysia. The government authorities will also need to develop directives or legislations on ELV recovery similar to the ones in countries such as Japan and Europe. Concerted efforts need to be undertaken by the various stakeholders in achieving the ELV goals.

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