International Symposium
Sustainable Automotive Recycling: Driving Toward a Circular Economy

Factors Promote the Proper Management of the End-of-Life Vehicles: Case Studies in Southeast Asian Countries

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Introduction (1)

- Southeast Asia has one of the fastest economic growth and population increases in the world. Due to this rapid middle-class increase, vehicle sales (both new and second-hand) are also increasing, and the problem of end-of-life vehicles (ELVs) is gradually becoming more serious in society. Therefore, establishing an ELV management system in the region is an extremely important theme in solving environmental protection and health hazard issues.

- In developing countries, including Southeast Asia, it is often said that the informal sector is involved in ELV dismantling. These people make a living by extracting reusable parts and reselling them, but they also have the potential to directly cause negative externalities such as environmental problems and health hazards, including improper disposal of CFCs and waste oil.

Introduction (2)

- On the other hand, in order to promote proper automobile dismantling, it is necessary for formal businesses to be active under appropriate regulations and management. Existing studies and policies address the internalisation of negative externalities through the formalisation of the informal sector, and it is often thought that this will be achieved in the process of economic growth progressing from developing countries, by applying pollutoion control regulation to recycling industries.

- In this study, by targeting the Southeast Asian region, which is experiencing strong economic growth, we will clarify the mechanisms of how the formalisation of the informal sector progresses due to economic growth and the development of the automobile industry.

Introduction (3)　Pollution by ELV and others

- Since 1978 Teshima Sogo Kanko Kaihatsu (a company) dumped industrial waste including shredder dust of ELV, in Teshima island in Kagawa Prefecture, without pollution control.
- In 1990, the Police of Hyogo Prefecture arrested the owner of company on illegal dumping of hazardous waste.

Illegal dumping of waste including shredder dust of ELV.

Photo by M. Kojima.

Soil.

A video on Teshima in English

https://www.youtube.com/watch?v=wOGKOBXBVy8

Literature Reviews(1)

- Regardless of waste management, informal sectors play a major role in developing countries (Harfadli et al. 2024), and it often face issues in terms of the environment and health due to low wages. Possible routes to formalising informal sectors include economic growth and the formalisation of regulatory policies.
- Harfadli et al (2024) points out that the research trend of informal sectors is shifting to "formalizing the informal waste sector and its implications and risks." In the case of the ELV dismantling process, for example, Hu and Wen (2015) explains the economic, social, historical and administrative backgrounds of thriving informal ELV dismantlers in China. Kojima (2018) also points out the activities of the informal sector on ELV recycling in the ASEAN region.

Literature Reviews(2)

- Some studies try to investigate the factors to establish ELV system. For example, “The important factors in the development and establishment of sustainable ELV recycling system are **eco-design** vehicles, **proper ELV collection** network, **cost effective and efficient recycling and recovery methods**, **disposal of ELVs, creating environmental awareness and implementation of ELV legislation**.(Shrivastava et al. 2024)”
- However, it is quite limited in understanding the interaction of formalizing ELV management and establishing a sustainable ELV management system as well as the mechanism (or factors) that encourage the formalization of informal ELV dismantlers.
- In this study, by targeting the Southeast Asian region, which is experiencing strong economic growth, we will clarify the mechanisms of how the formalisation of the informal sector progresses due to economic growth and the development of the automobile industry.

Research Questions

- Q1: The more developed a country is, the more likely it is to implement the formalisation of proper dismantling;
- Q2: The more strongly a country's regulation is, the more likely it is to implement the formalisation of proper dismantling.

Research Questions

- The study method is qualitative (Yin 2017), though the authors tried to obtain the data as much as possible.

- In order to obtain the data, **the authors conduct field surveys in 4 countries, total 3 weeks from September to December 2024**. The authors conducted semi-structured interviews with government officials, government-related agencies, and private-sector automotive dismantlers and recyclers (both formal and informal) in each country. We conduct the surveys mainly in cities and their suburban areas (not visiting very rural and remote islands).
- In this study, by targeting the Southeast Asian region, which is experiencing strong economic growth, we will clarify the mechanisms of how the formalisation of the informal sector progresses due to economic growth and the development of the automobile industry.

Results 1: Malaysia

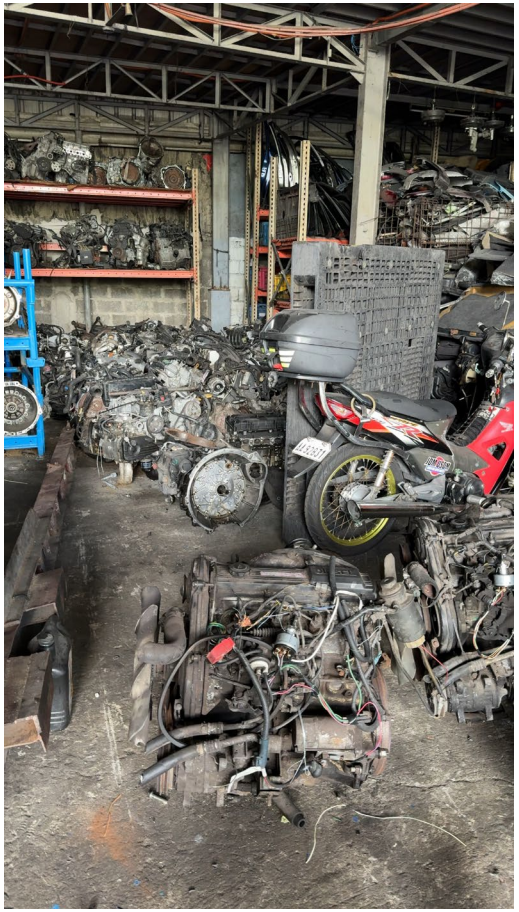
- **Malaysia** has the highest GDP per capita and the highest car ownership rate per capita. Although the dismantling industry is generally informal, the government has set up Authorized Automotive Treatment Facilities (AATF) to promote proper dismantling (as of March 2025, two companies have been registered). Incentives for AATF include preferential access to insurance companies for the dismantling of accident vehicles. The AATF we visited had introduced mechanized dismantling of vehicles.

Results 2: the Philippines

- **The Philippines**: The Philippines has the smallest economic growth and less maturity of the automotive industry within 4 countries. Informal small-scale businesses are mainly involved in purchasing ELVs from insurance companies and dismantling them.
- A proper dismantling company was established with the support of Japanese companies. The company makes efforts to create partnerships with taxi companies to secure sufficient numbers of ELVs.

Results 2: the Philippines

- Japanese ELV parts are high quality and popular in the Philippines, however, due to the transformation of the Japanese passenger cars from ICE(Internal Combation Engine) to HEV, then the imports of ELV from Japan are reducing (Photos of an ELV parts importer).

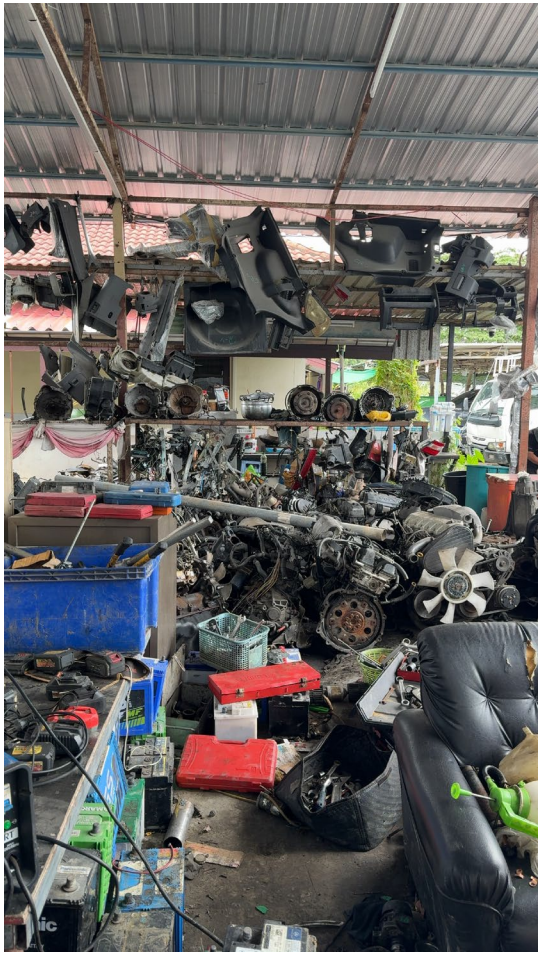


Results 3: Thailand

- **Thailand** has the oldest and most advanced automotive industry cluster. The development of its automotive society is the most advanced in ASEAN, but the dismantling of vehicles is not well-structured and is mainly covered by informal dismantlers.
- A project to build a system for the proper dismantling of ELVs is being promoted with support from JICA, but the introduction of certifying formal dismantlers and a recycling fee collection has not progressed. Japanese companies implement pilot projects for proper dismantling, these companies are struggling to secure sufficient ELVs because there is no incentive for car owners to hand over to proper dismantlers. This is because the ELV procurement is mainly covered by the auction system.
- With regard to hybrid vehicle (HEV) batteries, which are prospected to increase the number in the near future, Japanese companies are working with Car makers to build a proper supply chain for detoxification and reuse.

Results 3: Thailand

- Parts are mostly imported from Japan (left). HEV batteries are treated to be stainless (centre). Informal dismantler near Bangkok (right).



Results 4: Viet Nam

- **Viet Nam** is the most authoritarian administration of the 4 countries. However, it did not recognise the certification system of specific formal operators or activities.

- Although the government plans to introduce an extended producer responsibility (EPR) law for automobiles, it has set a very low target of 1% or less for the recycling rate, so it is not clear that this regulation will work effectively immediately.

- At a famous vehicle dismantling business site (Te-Lo village), the number of commercial vehicles and heavy construction machinery is dominant, compared with passenger cars, because of their limited lifespan by regulations (Only commercial vehicle has lifespan regulations).

Results 4: Viet Nam

- Informal sectors also need to secure a regular volume of dismantling ELVs to manage their business (according to the interviews with an informal dismantler in Te-Lo village).
- A Vietnamese local automotive car maker, VinFast, has embarked on a system of battery replacement and the re-purposing of used batteries as large-scale storage batteries in industrial parks.
- Untreated waste oil and CFC gas (Photo).

Results 4: Viet Nam

- Most of the end-of-life vehicles are heavy machinery, and large commercial vehicles in Te-Lo village (Photos by authors).

Results 4: Viet Nam

July, 6, 2023, Photo by Kojima, near Hanoi, Vietnam.

Act on Recycling, etc of End of Live Vehicle (Act No.87. of July 12, 2002 in Japan

Ch. 1: General Provisions

Ch. 2: Implementation of Recycling etc.

Ch. 3: Registrations and Licenses

Ch. 4: Recycling Deposit

Ch. 5: Report on Movements

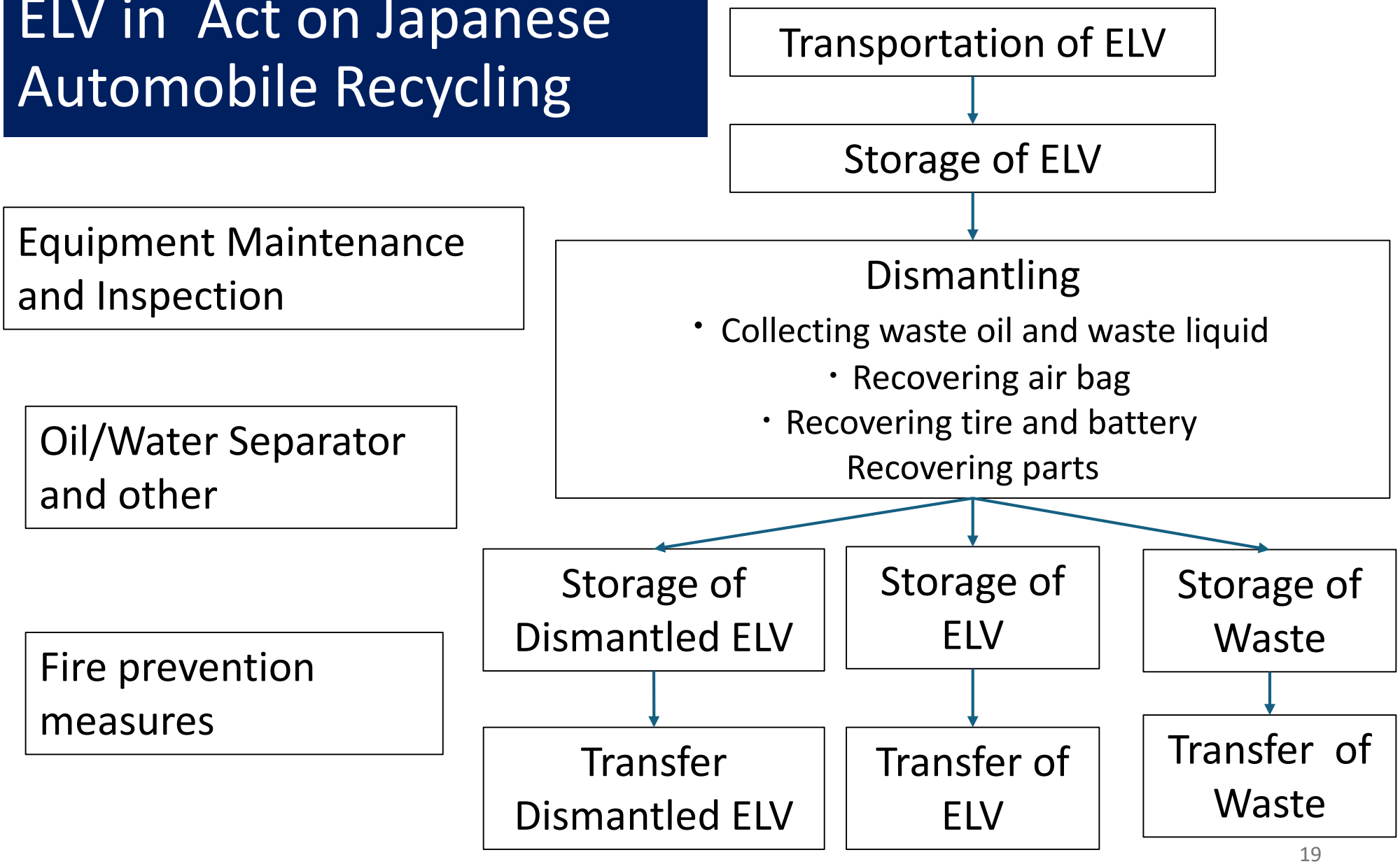
Ch. 6: Designated Entries

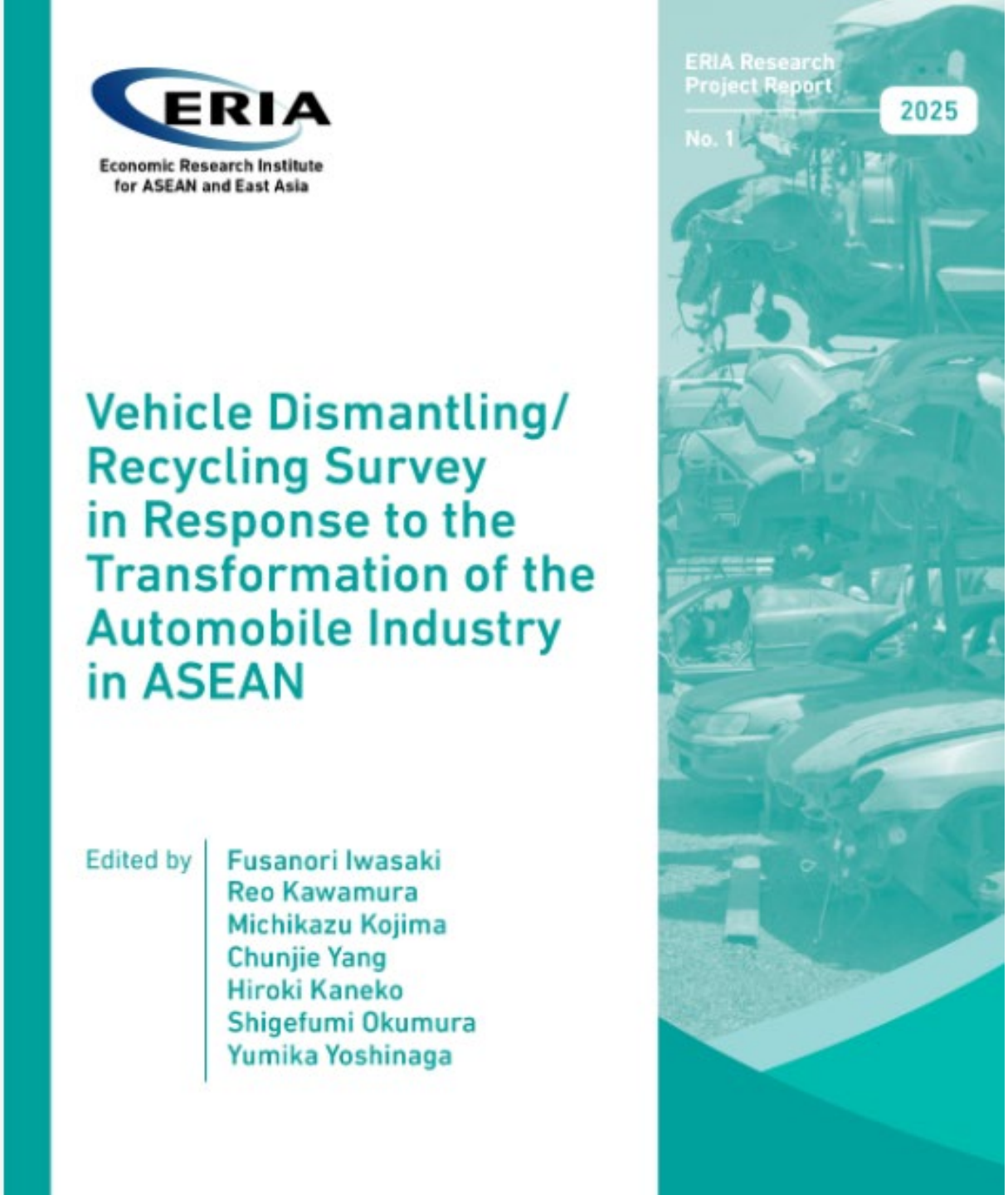
Ch. 7: Miscellaneous Provisions

Ch. 8: Penal Provisions

https://www.meti.go.jp/policy/mono_info_service/mono/automobile/automobile_recycle/law_notice/pdf/english.pdf

Guideline on Dismantling ELV in Act on Japanese Automobile Recycling





Ch.1. Background, Objective, and Method of the Study

Ch.2. Current Status of End of Vehicle Recycling in Selected ASEAN Member States

Ch.3. Current Challenges in End-of-Life Vehicle Recycling

Ch.4. Recommendations for Proper Processing of End-of-life Vehicles and Development of Relevant Legislation

Recommendations (1)

1. All AMS should establish legislation or systems on appropriate ELV dismantling and recycling in consideration of their own national circumstances in terms or the economy and capability.
2. Vehicles owners should be encouraged to replace poor exhaust system with new ones. Strict implementation of the inspections is the necessary to secure the performance of exhaust systems and the safety of the vehicles on road. Setting maximum age limit for passenger vehicles could also be considered.

Recommendations (2)

3. Current efforts to develop a license scheme for recyclers with appropriate measures and facilities (e.g. Malaysia, Philippines, and Viet Nam) should be encouraged and strengthened. License schemes should include tracing mechanisms for ELV and materials for recycling, collection and reuse of batteries, and the appropriate disposal of automotive shredder residues (ASR) chlorofluorocarbons (CFCs) waste oil, and other waste generated from the dismantling process. Any priority measures for licensed recyclers should also be considered.

Recommendations (3)

4. For second-hand parts, quality guidance and test measures for reuse, repurpose, and refurbishment should be established. Especially for used EV batteries, a battery passport system should be established for proper management.

5. Capacity building regarding ELV in central governments and local governments is necessary.

6. Non-AMS such as Japan should support AMS efforts to establish legislation or systems on appropriate ELV dismantling and recycling.

Recommendations (4)

7. Non-AMS should support private sector efforts on transferring advanced technologies for ELV dismantling /recycling to local partners in AMS as well as their initiatives to establish an ELV circularity ecosystem between ASEAN and non-AMS.

8. It is desirable for non-AMS to collaboration with AMS feasibility some standards for recycled materials to increase the international circularity of ELV –relevant materials through analysis of the cost and capacity of material recycling in each country and to conduct research on battery level testing for reuse and safety.

Discussions and Conclusions

- Through various interviews, to formalise the promotion of appropriate dismantling of vehicles, though economic growth is one important factor, creating circumstances to ensure a sufficient number of ELVs is rather important.
  - Malaysia: Authorized facilities can be prioritized to get ELVs from insurance companies.
  - Philippines: A recycler tries to make a partnership with a taxi company.
  - Thailand: Both formal and informal sectors are relying on the auction system to get ELVs.
- Although the strength of the regulatory system is necessary in terms of introducing laws and regulations etc., some governments also recognize the difficulties of its effective implementation.
- It was also revealed that rather than the increase in the number of cars per person due to the advancement of motorisation, the spread of next-generation vehicles such as hybrid and battery-electric vehicles, which cannot utilise existing dismantling technology, could lead to the rapid spread of proper dismantling through formalisation.

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