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POTENTIAL OF END OF LIFE VEHICLES DIRECTIVE IMPLEMENTATION IN THAI AUTOMOTIVE INDUSTRY

ศักยภาพการนำระเบียบยานยนต์ที่หมดอายุไปประยุกต์ใช้ในอุตสาหกรรมยานยนต์ไทย

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Abstract

The objectives of this research were to study the potential of end of life vehicles (ELV) directive implementation in Thai Automotive Industry in Thailand. This research was divided into 2 parts; a survey research using questionnaire with 113 Thai automotive entrepreneurs, qualitative research using indepth interview with relevant persons related to automotive industry. The results indicated that Thai Automotive entrepreneurs had impacts from the ELV directive at a medium level, the average score was 2.94. The readiness for undertaking ELV directive was at medium level, the average score was 3.22. Problems and obstacles in implementing ELV directive were knowledge and understanding level of each organization (72.70 %), high cost of non-hazardous material and components (70.10 %), increasing cost of testing of hazardous substances (63.60%). Regarding the management of ELV directive in Thailand, it was found that there was no direct legislation for ELV implementation enforcement. The control and management of industrial hazardous waste were not systematic. Technology and knowledge were still dependent on western countries.

Keywords: End of Life Vehicles Directive, End of Life Vehicles, Automotive Industry

บทคัดย่อ

การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาผลกระทบของระเบียบยานยนต์ที่หมดอายุต่ออุตสาหกรรมยานยนต์ไทยและเพื่อประเมินศักยภาพในการจัดการยานยนต์ที่หมดอายุของไทยโดยแบ่งออกเป็น 2 ส่วน ส่วนแรกเป็นการวิจัยเชิงสำรวจโดยใช้แบบสอบถามและเก็บรวบรวมข้อมูลจากผู้ประกอบการอุตสาหกรรมยานยนต์ไทยจำนวน 113 คน ส่วนที่สองเป็นการวิจัยเชิงพรรณนา โดยการรวบรวมข้อมูลปฐมภูมิจากการสัมภาษณ์เชิงลึกกับบุคคลที่เกี่ยวข้องกับระเบียบ ฯ ของไทย ผลการศึกษาพบว่า ผู้ประกอบการอุตสาหกรรมยานยนต์ไทยได้รับผลกระทบจากระเบียบยานยนต์ที่

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หมดอายุในระดับปานกลางเฉลี่ยคือ 2.94 และมีความพร้อมในการดำเนินการตามระเบียบ ฯ ในระดับปานกลางเฉลี่ย 3.22 ส่วนปัญหาและอุปสรรคในการปรับตัวเพื่อดำเนินการตามระเบียบ ฯ คือ ระดับความรู้ ความเข้าใจของแต่ละองค์กรเกี่ยวกับระเบียบดังกล่าว ร้อยละ 72.70 ต้นทุนค่าชิ้นส่วน วัสดุปลอดสารต้องห้ามสูงขึ้นร้อยละ 70.10 และต้นทุนในการทดสอบปริมาณสารต้องห้ามสูงขึ้นร้อยละ 63.60 สำหรับการจัดการซากยานยนต์ที่หมดอายุของไทยพบว่า ยังไม่มีกฎหมายเกี่ยวกับการจัดการซากยานยนต์โดยตรง การควบคุมและการจัดการของเสียอุตสาหกรรมยังไม่เป็นระบบและยังคงพึ่งพาเทคโนโลยีและความรู้จากชาวต่างชาติ

คำสำคัญ: ระเบียบยานยนต์ที่หมดอายุ, ยานยนต์ที่หมดอายุ, อุตสาหกรรมยานยนต์

Introduction

Today the automotive industry is the third largest industry in Thailand, employing an estimated total workforce of more than 300,000 employees. In the post 1997 crisis era the automotive industry has been seen as one of the big driving forces behind the recovery of the economy. Recently, Thailand has drawn up the “Automotive Industry Master Plan” which aims at the production of 1.8 million units in 2010 (1.3 million pickup trucks and 500,000 passenger cars) of which 800,000 units are to be exported. This will make Thailand the world’s 9th largest and Asia’s 4th biggest producer of cars. This expansion certainly affects the rising speed of growth of the supporting industries, which are involved in the auto parts production [(1)].

On the other hand, technology development and industrial growth have tremendous effects on the environment. The automotive industry contributes air pollution from carbon monoxide that vehicles discharge as well as noise pollution. But there is one factor that is often overlooked; vehicle scraps and vehicles that no longer function or no longer road worthy. The increasing amount of new registered vehicles every year results in more vehicles on the streets. As a result, vehicle scraps are increasing, including depleted spare parts like tires and batteries. If there are no regulations to control them, they will soon have serious repercussions on the environment.

The tons of vehicle refuse in EU consist of auto spare which can be reused or recycled, such as tires, glass, metal, plastic and foam to name a few. Other refuse is considered hazardous waste, including engine oil, batteries, brake discs and heavy metal in vehicles. The discussions on the ELV Directive started in October 20, 2000 with the goal of reducing the environmental effects when vehicles expire by putting the onus on manufacturers to control their vehicle scrap to reduce the effects on the population. Members of EU declared the directive a law in April 2002, and implementation followed gradually: The law implemented in October 2002 covers

all vehicles that were put on the market after July 1, 2002 and the law that will take effects in October 2007 covers all vehicles that were put on the market before July 1, 2007. The ELV directive covers 6 main areas. They are prevention, collection, treatment, reuse and recovery, coding standards/dismantling information and reporting[2].

The ELV directive has implemented in Europe. Japan and Korea have also introduced standards outlining strict measures for handling depleted parts and cars that no longer function. Europe and these two Asian countries developed the standards to reduce the effects on their limited landfill space and to protect the environment. The ELV directive affects automotive spare part manufacturers that export their product to Europe, Japan and Korea. The trend of applying ELV standards might eventually reach Thailand. Even though no laws are on the books in the Kingdom, many automotive spare parts manufacturers that export to these countries are required to use substitute raw materials or non-hazardous production processes to comply with ELV directive.

Thailand has yet to apply ELV regulations. There is currently a campaign afoot to goad manufacturers into showing that the vehicles are made with environmentally friendly manufacturing techniques. This includes using a “green” label project to show the vehicles complying with such ideals. But compliance is strictly voluntary. To comply, manufacturers can obtain ISO 9000 certification, which indicates they control the amounts of heavy metals (Pb, Hg, Cd, Cr(VI), Triphenyl tins and Tributyltins) in paints and chemical substances, that they recycle plastics, and that they safely remove and dispose of engine oil and other hazardous liquids, have less polluting emissions levels, noise control and low rates of gas consumption. There are two methods used to test amount of prohibited substances in ELVs: screening tests and verification tests. Moreover, techniques and methods vary depending on the materials[2].

ELV standards are one of many non-tariff barriers that have a direct impact on industrial enterprises. Hence, the private and public sectors must study the latest developments and become well-versed in technology development in order to select acceptable materials and improve production processes. The benefits of compliance are not only making Thai-made products acceptable in major export markets, but also reducing the effects on the environment. This research therefore aims to study the impact of ELV directive toward the automotive entrepreneurs and to evaluate the potential management of ELVs in Thailand.

Conceptual Framework

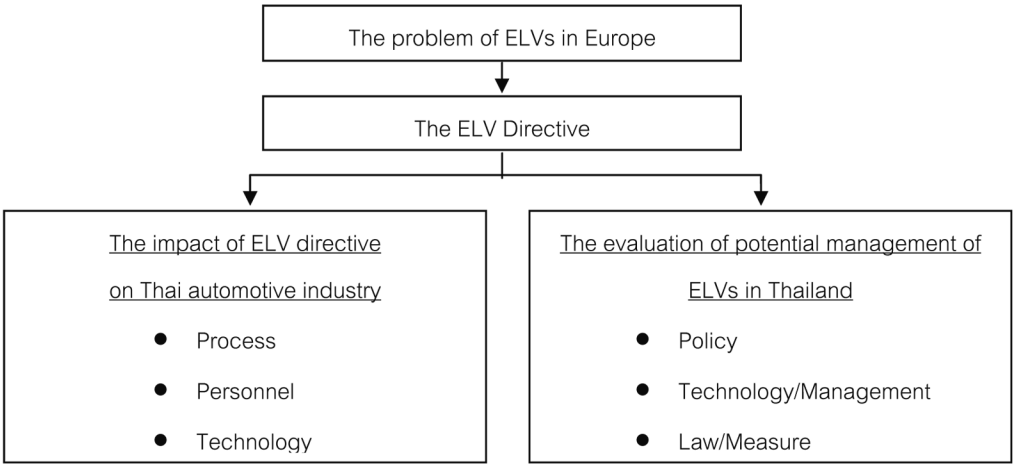

Figure 1 Conceptual Framework

Scope of the study

(1) Study the impact of ELV directive on Thai automotive industry and the readiness of the automotive entrepreneurs for implementation of the ELV directive.

(2) Evaluate the potential management of ELVs in Thailand on primary management only.

(3) The population of the automotive entrepreneurs is 514 entrepreneurs who registered to be member of Thailand's Auto-Part Manufacturers Association.

Terms and Definitions

(1) End of life vehicles (ELVs): that are categorized as waste. Their components and materials are also classed as waste.

(2) Motor vehicles waste: anything that you discard, intend to discard or are required to discard. This includes material being sent for recycling or reuse.

(3) Industrial entrepreneur: the executive or an officer, who is responsible for environmental management of organization.

(4) Automotive industry: industry related to automobile and auto-parts.

Materials and Methods

Population and sampling

Population was divided into 2 groups; automotive entrepreneurs and automotive industrial institutes.

1) Automotive entrepreneurs

- The population of the assembly entrepreneurs were 15 companies, which were selected by the purposive sampling (Table 1).

- The population of the auto parts entrepreneurs were 541 companies. Taro Yamane's formula[3] was applied for the calculation of the appropriate sample size. Size of auto parts entrepreneurs was 230 samples.

- Each type of auto parts entrepreneurs was sampled by Stratified random sampling and each stratum was sampled by proportional stratified random sampling.

Table 1 The proportion of the samples from the automotive entrepreneurs

	Auto-part Type	Population	Sample	Response rate number	%
1	Assembly	15	15	7	46.67
2	Engine component	61	26	7	26.92
3	Electrical system	57	24	12	50.00
4	Fuel system	19	8	6	75.00
5	Cooling system	19	8	2	25.00
6	Exhaust system	16	7	7	100.00
7	Transmission system	52	22	11	50.00
8	Brake system	42	18	6	33.33
9	Suspension system	42	18	11	61.11
10	Steering system	24	10	5	50.00
11	Bodywork	61	26	10	38.46
12	Mirror & Safety Glass	14	6	5	83.33
13	Accessories	59	25	8	32.00
14	Others	75	32	16	50.00
	Total	**541**	**230**	**113**	**46.12**

The lists of auto parts entrepreneurs was sampled by simple random sampling and each list was picked up without return until complete the sampling.

2) Automotive industrial institutes

The 5 samples of automotive industrial institutes were obtained from purposive sampling and all of them were interviewed. The lists of them were;

(1) The Thai Automotive Industry Association (TAIA)

(2) Automotive Industry Club, The Federation of Thai Industries (AIC)

(3) Thai Autoparts Manufacturers Association (TAPMA)

(4) Auto Parts Industry Club, The Federation of Thai industries (APIC)

(5) The Thailand Automotive Institute (TAI)

Tools

1) Questionnaire: the questionnaire were closed-end question divided into 3 parts as follows;

1.1) Part 1: General characteristics of organization

The questions were about general organization data including environmental management. The characteristic of question was checklist with at least 2 answers, some questions has only one answer but some questions have more than one answers. (Questions 1-5)

1.2) Part 2: The impact on the organization

The questions were about ELV directive implementation which can be divided into 5 issues that were production, personnel, technology/management, policy/regulations and business. The characteristics of questions were checklist (Questions 1-4) and rating scale, that was the answers have to be rated according to the significance or attitude (Question 5).

1.3) Part 3: The readiness of organization.

The questions were about readiness in the ELV directive implementation in 5 issues that were production, personnel, technology/management, policy/regulations and business. The characteristics of questions were rating scale (Questions 1-17), checklist (Question 18) and opened-end question (Questions 19-22).

2) Test of questionnaire

2.1) Drafted questionnaire and interview form were reviewed by the thesis committee and the ELV directive specialist (Mr.Thanawat Boonpradit, the officer of Thailand Automotive Institute)

2.2) The reviewed using question-

naires were pre-tested 25 samples.

3) Interview form: The main issue in the interview form was following.

(1) Thai Automotive Industry Association were;

- The impact of ELV directive on Thai automotive industry.

- The potential management of ELVs of Thai automotive industry.

(2) Automotive Industry Club, the federation of Thai Industrial;

- The adaptation of automotive industry on ELV directive.

- The design and production of new vehicles which take into full account and facilitate the dismantling, reuse, recovery and recycling.

(3) Thai Auto Part Manufacturer Association;

- The impact of ELV directive on the ability in assembling of automotive entrepreneur.

- The impact of ELV directive on the ability in exportation.

(4) Auto Part Industry Club, the federation of Thai Industrial;

- The impact of ELV directive on domestic auto parts industry.

- The potential management of ELVs in Thailand.

(5) The Thailand Automotive Institute;

- The impact of ELV directive on Thai auto parts entrepreneurs.

- The impact of ELV directive on ability in exportation.

Data collection

1) The secondary data were also collected from relevant organizations such as Department of Industrial Works, Pollution Control Department and Thailand Environment Institute.

2) The primary data were collected by mailing questionnaire to the 230 environmental managers. Non-response questionnaire was followed up by after 2 weeks of mailing.

3) The interviews of 5 automotive industrial institutes were conducted by making an appointment individually.

Data Analysis

Statistical analysis including percentage, mean, SD, frequency were used in this study. Lease classification and rating were as following.

Rating: 1 point lowest
2 point low
3 point medium
4 point high

5 point highest

Score classification:

Score 1.00 – 2.33 low
2.34 – 3.66 medium
3.67 – 5.00 high

Evaluation of Potential Management of ELVs in Thailand

1) The secondary data were collected to study the document from relevant organization. Furthermore articles and researches from 2002-2007 were also collected to be a guideline in the data analysis.

2) The primary data were collected from the interview of relevant government and private sectors, for example Pollution Control Department, Department of Industrial Works, Department of Environmental Quality Promotion and Thailand Environment Institute, etc.

3) Analysis primary and secondary data.

4) Evaluate the ELVs management in 5 aspects, as follows:

(1) Policy
(2) Technology/Management
(3) Law/Measure
(4) Personnel
(5) Problem/Obstacle

5) Discussion and conclusion of potential evaluation in form of descriptive analysis.

Results

The impact

The automotive entrepreneurs received medium impact from ELV directive (score 2.94). When considered in each topic found out the supplier selection that can implement ELV directive was the topic which most of the automotive entrepreneurs received impacts with average score 3.47, the next was material/component purchasing/ procurement changing with average score 3.32 and the least was number of machine/ tool for new process with average score 2.49.

The readiness of automotive entrepreneurs

The readiness of automotive entrepreneurs was at medium level (score 3.22). The most when readiness was the production of non-hazardous substance customers require (3.61). The second readiness was the preparation of environmental requirement/regulation in the future and the least was acknowledge/ understanding of personnel about ELV directive (2.84).

The ELV directive implementation

Thailand Automotive Institutes and the Thai Automotive Industry Association and Automotive Industry Club, the Federation of Thai Industrial. Both organizations did not directly assist to the

automotive entrepreneurs who received an impact from ELV directive. They were performing as information center among entrepreneurs. Besides, they were the coordinator to solve the problems and obstacles of automotive industry between entrepreneurs and government.

Potential management in Thailand

The government assigns DIW to responsible for the control and management of all industrial waste but they were not systematic implemented. Moreover there were problems and gaps in issuing the law concerning the control and management of hazardous, however there was no direct laws enact to manage ELVs. Most automotive entrepreneurs had ELVs management policy which follows headquarter policy but only the restricted domestic law was carried out. For technology aspect, it was found that both government and private sectors still depended on foreigners' technology and knowledge. Large automotive entrepreneurs would obtain technology and knowledge transfer from headquarter as well as local automotive entrepreneurs which depended on technology and knowledge transfer from foreign countries but they would adjust them to be appropriate with their business. For personnel of both government and private sector, they still lacked of specialist in ELVs management.

Conclusions and Discussions

The study of ELV directive showed the present situation of the adaptation of automotive entrepreneurs toward the impact of ELV directive. They had a little impact from ELV directive (33.60%), a medium impact (23.00%) and a serious impact (8%). The first three decisions to implement the ELV directive of automotive entrepreneurs were implement under customer's request (74.03%), in need of green products (57.14%) and implement under the order of mother company (32.47%). These results are consistent with a study[4] which found that most of the decision of auto parts entrepreneurs to implement the ELV directive were implementing under customer's request (67.32%). Moreover MTEC[5] studied the overall readiness of Thai industry and found that the first three decisions of automotive entrepreneurs to implement the ELV directive were implement under customer's request (90.00%), global market (57.00%) and in need of green producing (56.00%). It can be shown that the decision of automotive entrepreneurs to implement the ELV directive will be more in form of positive force such as market driven, competitive advantage and sustainable. Besides the ELV directive implementation of automotive entrepreneurs were no plan (31.90%), having plan but not implementing

yet (23.90%) and implemented (23.90%). Whereas the ELV directive implementation of automotive entrepreneurs from the study[5] were implemented (67.00%), being implemented (29.00%), having plan but not implementing yet (3%) and no plan (1%).

This research also evaluated potential management of ELVs in Thailand and found that DIW undertook the government's waste management. Most of automotive entrepreneurs had ELVs management policy that proceeded following headquarter policy and operated following domestic law. Environmental management system had an influence on the ELVs management. For technology aspect, it was found that both government and private sectors still depended on foreigners' technology and knowledge. Furthermore, the control and management for industrial waste of government were not systematic. Large automotive entrepreneurs would obtain technology and knowledge transfer from foreign mother company as well as local automotive entrepreneurs which depended on technology and knowledge transfer from foreigners but they would adjust them to be appropriate with their business. As for law aspect, it was found out that there still were problems and gap between the enforcement law of the waste control and management, and there was no direct law to control ELVs but they still were under the control of DIW. Besides, the governmental and private sectors were also lacking of specialist officers in the ELVs management. According to Electrical and Electronics institute[6], who studied the impact of WEEE directive and RoHS directive to electrical and electronic products industry in Thailand, reported that in Thailand there was no support centers for the entrepreneurs to give them knowledge and technology. In addition, they still lack of the gathering mechanism for electrical and electronics waste including in lack of knowledge on the elimination and separation of product waste. Moreover, law structure was not encouraged the commercial recycling. As for the entrepreneurs, the research and development potential to manage the impact of WEEE directive and RoHS directive were uncompleted. The large entrepreneurs had to wait for technology and knowledge transfer from foreign mother companies.

Whereas the small entrepreneurs met a problem of technology, i.e. improving products to be in line with WEEE directive and RoHS directive. From both researches it could be seen that waste management of both industries had similar aspects and problems. The EU regulations had more impact on Thai entrepreneurs because of the management system of domestic industrial waste not fulfilled to the complete

of regulations implemented.

Recommendations

1) The relevant organizations such as government and automotive entrepreneurs can use these results as an appropriate guideline for undertaking ELV directive and should promote the cooperation among organizations through the establishment of coordinate center by the government.

2) The government sector can bring these results to push forward the enactment of law that similar to ELV directive to protect the domestic automotive industry and revise the law of industrial waste management to be the same approach from collection, sorting, waste management and establishment of treatment and disposal factory.

3) ELV directive had presently put in to force, hence the details of automotive entrepreneurs implementation under ELV directive could be a case study for the appropriate ELV directive performance to other entrepreneurs.

4) This study can be applied to further studies as appropriate guideline and technology in ELVs management in Thailand.

5) There were many ELVs in Thailand and they were also valuable. Further study on the probability of commercial ELVs management should be investigated to know the real value.

References

(1) Royal Danish Embassy, Danish trade Council. 2006. Sector overview The Automotive Industry in Thailand. Available online at http://www.ambbangkok.um.dk/NR/rdonlyres/ 12A0FF0C-04AA-442E-A31B-223EBB6BA0F9/0/SectorOverview AutomotiveIndustryin ThailandJune2006.pdf [30 February 2007]

(2) Thailand Automotive Institute, The Thai Automotive Industry Association, and Automotive Industry Club, the federation of Thai Industrial. 2006. Asean & Thailand Automotive Industry Directory 2006-7. Cosmic Enterprises Co., Ltd,, Bangkok. Thailand.

(3) Silpjaru, T. 2007. Research and Data Analysis Using SPSS. V Interprint Co., Ltd. Bangkok: 47-48.

(4) Boonpradit, T. 2007. Study report of measure and impact of ELV directive. Available online at www.thaiauto.or.th/ngv/informationnew1.asp [16 April 2007].

(5) National Metal and Materials Technology Center (MTEC). 2006. ELV Directive. MTEC. 15p.

(6) Electrical and Electronics institute. 2005. The Impact on Thai Industry and Mitigation Measures to Cope with EU WEEE and RoHS Directives. Bangkok. Thailand.