End Life Of Vehicle Management : A Review

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Abstract---End-of-life vehicle (ELV) waste flow is an essential environmental matter, since of its fast growing (prenominal) amount and specific combination of precarious substances. Its recycling is a material of country's attitude towards maintains the surrounding safety and it has emerged as a unusual region of expert research. In this paper, we confer a holistic conception of the environmental engineering test of the ELV recycling by casement a broad range of peer-revision journal papers. The aim of this review paper is to give an broad satisfied analysis overview of the literature published in the period 2012- 2018. In addition, the major assortment system and a disposal list of journal papers reveal in the estimate period are constitute to recognize the primary publication outlets. Finally, on the basis of the accomplish review, several significant recommendations for the prospective research are spotlight and investigate.

Key words: *content analysis, end-of-life vehicle, environmental engineering, general discussion, mathematical modeling, review.*

I. INTRODUCTION

According to recent market strategies, the working life of most goods is contemplated to keep shortening. Consequently, a growing amount of waste material is convoy every year to landfill. In the automotive field, it has been observed that an excessive amount of material is an exhibit from vehicles disable, still with high market value (e.g. steel, aluminium, glass and plastics). There is thus an economic drive to the effective reuse of such matter; in accession, most of them should be carefully handled by reason of their possible environmental impact. In order to effectively address the problem, the common approach of "use and throw" (i.e. disposable) must be conquered: a new policy of reusing and recycling has to start for the uneven materials that formality has worn out goods. Currently, 75-80% of each end-of-life vehicle is recycled or re-used, the vast majority of which is ferrous metal. These are average numbers if some European countries have already execute higher standards (Germany, Belgium), others are far to reach the appoint targets (Italy above all). Outside the EU, Japan, Taiwan, and South Korea have established uniform Extended Producer Responsibility (EPR) legislation, which is also seemly increasingly prevalent in North America. In China, despite the vast number of ELVs, quite a huge delay in the ELVs policy and legislation exists when compared to Europe. This contemplation is based on the need to increase resource effectiveness, and thus tap precious gains, in the End-of-Life Vehicle (ELV) industry in India. End-of-life vehicles restrain many materials and parts that can be refurbished and reused, thereby exhibit an essential occasion for visible gains in resource efficiency. A broad range of materials, from costly metals to low grade used oils, are present from an end-of-life vehicle. Understanding the proceed of these materials is accurate for improving their able use. In the EU, which has been muster data on ELVs for a relatively extended duration of time, more than 85 per cent of a vehicle's weight is retrieve, recycled or reused, accordingly to Eurostat data. Currently, in India, the administration of ELVs is really left to an informal and unregulated sector. It does, however, interact with the formal sector, especially in the field of scrap metal and other high-value, low-poisonousness materials. The materials that support within the irregular sector through their revival life-cycle tend to be of the lowest value and most highly poisonous, due to the lack of interest for these materials from the formal sector. Although the irregular sector is often seen as highly effective in resource revival, it is also understood for its lack of record-restraint and, therefore, its incapability to supervise and display completion and get belief for its work. Also, assumed the nature of their usage, the irregular sector is not always environmentally liberal, particularly with attend to material revival. The Indian vehicle industry is development exponentially every year. More importantly, this advancement trend originates nearly twenty ages ago, intimate that the inquiry for ELV handling will start to show a uniform trend in the next few pages. It is necessary, therefore, to interpret this industry, in order to ensure that policymakers have sufficient proof to base the severe decisions they will extremity to make, for effectual and sustainable economic growth in the tomorrow.

II. LITRATURE REVIEW

In the year 2012 Dr. Ashish Chaturvedi, GIZ-IGEP,Dr. Rachna Arora, GIZ-IGEP, Bharati Chaturvedi, Chintan and Aiden Short, Chitin used methodology Study of economic and flow material in ELV and qualitative and quantitative data collection and concluded that For increasing efficiency of ELV waste reduction process as well as its required to improve recovery and collection process of old vehicle. In the year 2013 Vladimir Simic used methodology of content analysis and holistic view of the environmental engineering issues of the ELV recycling and concluded that Long term planning and more research is necessary in recycling and documentation of industrial process for real life case study is required. In the year 2014 Carlo Enrico Carcangiu, Pier Francesco Orru and Maria Teresa Pilloni used methodology case study and uses flow chart and FMECA and concluded that Design for dismantling and easy identification of parts are required in ELV management. In the year 2018 Yee Choong Wonga, b Karam M. Al-Obaidia and Norhayati Mahyuddina used methodology of Analysis of existing ELV management policies and technology in world and applying this knowledge for recycling of ELV in Malaysia and concluded that ELV can be used in building construction and gives Environment as well as economic benefits.

III. RESEARCH GAP

i. End life of vehicle causes serious impact on environment.
ii. On global level various policies are made to control pollution due to ELV.
iii. Various researches go on making economic and environment benefits from ELV.
iv. Central government of India does not made any laws / rule on ELV or old vehicles.
v. Currently only Delhi government is working on this issue.
vi. Indian people prefer reselling of old vehicle and its parts.
vii. Till date no as such work goes on ELV waste management in Mumbai.

THE CURRENT ELV MARKET REMINISCENT OF THE SOLID WASTE MARKET

The guidance of municipal solid waste, assumed to most of us as "rubbish", "waste" or "trash", has changed drastically in the past 20 years. Several comparisons can be made between the ELV industry of today and that of the municipal waste industry 20 years ago. Just like ELVs today, municipal waste management used to be under the thumb of by an unregulated informal sector, unbitted by any central policy to monitor their behavior. Over time, the private sector has become involved in waste management, drawn by its increased profit margins and legislatorial changes. In some areas, the modulation has been positive for the surrounding and society in general. In most cases, however, this passing has not been thoroughly managed, ensue in a detriment of native efficiency in the informal sector. Avoiding misunderstanding made in such situations will betroth a smooth transition to a more formal and better direct ELV sector. By draft on these parallels, it will be possibility to devise an efficient generalship to move from an unregulated ELV disposal system to a govern, clean, and socially encircling system. Further, some of the mistakes made in the Solid Waste Management sector, such as unnecessarily favoring large corporations with little experience over small dealers with particularize, first-hand knowledge and expertise, can be refute.

OBJECTIVES OF THIS STUDY

This contemplation scope to take a snapshot of the common ELV dismantling sector in North India, to assist policy makers with empiric data for their regulatory decision-making. The study will focus on the people and materials complex in the dismantling and recycling of an ELV. A advance plan will draught the interactions of the separate participants.

This will provide policy makers with the data needed to understand those who are affected by their decisions. Secondly, the study will compile a list of toxic materials that are generally not being dealt with properly. This will highlight the areas of the ELV industry that need proximate study and action, as of the reluctant result that common procedures pose to human health and the surrounding. Lastly, a "Knowledge, Attitude and Practices" (KAP) survey of actual car users and disposers will show how final users make their vehicle control determination and in what aspect they get rid of their cars. This will permit an skillful of the measure to which final disposers need to be involved and/or the incentives that exigency to be on condition that in any policies recite to the ELV sector. The study will then determine with a set of recommendations for new policies, and areas of action for policy makers which would improve resort revival and everywhere sustainability of the ELV sector.

IV. METHODOLOGY

ELVs themselves, but to a greater extent, the parts extracted from them, are traded across regional boundaries. This seems to be due to the huge number and variety of parts that comprise an ELV -- some require a high level of specialisation and aggregation to extract their value. Particular "trading platforms" can, therefore, be identified and mapped out according to the general geographical area, across which the parts of one ELV are traded. These are, obviously, not clearly defined and overlap, but this study has tried to capture as much of the trade in one of these platforms by focusing its research on five major cities in Delhi and Uttar Pradesh. A snapshot of another platform was taken by conducting some research in Kolkata.

The survey was conducted in seven major cities of North India: Delhi, Manesar, Kolkata, and Lucknow, Meerut, Moradabad, and Nazibabad, in Western Uttar Pradesh. Interactive sessions using standardized questionnaires were used to interview the owners or managers of dismantling, reprocessing, or repairing units in these areas. The areas in Delhi and Western Uttar Pradesh were chosen in order to capture all the data from one "dismantling platform". Kolkata was chosen in order to get a snapshot of different ELV platforms, which require additional study.

CURRENT LADSCAPE

The Automotive Recyclers Association published a report on End-of-Life Vehicles Worldwide in 2016, which clearly describes the industry. This report underscores many of the existing best practices and key challenges faced by the industry. According to the report, more than 100,000 family units are involved in ELV dismantling in India, usually organized around informal centers specialized in particular tasks. These units were originally formed around the outskirts of major towns, but have now been integrated into highly densely populated areas as a result of the explosive expansion of urban cities in India. The informal sector performs a critical role in recovering valuable resources from ELVs and is surprisingly efficient in doing so. It, however, does not adhere to any particular environmental norms and is responsible for large amounts of toxic compound releases into the air, ground and water. Guidelines need to be issued and enforced alongside a strategy to ensure the sector remains efficient whilst incorporating all modern social and environmental legislation.

BEST-PRACTICES: TREATMENT OF ELVS IN OTHER COUNTRIES

European Union

The European Union (EU) was the first to initiate regulatory legislation on ELV recycling with the Directive 2000/53/EC of the European Parliament, on 18 September 2000. The
Directive was designed to reduce the amount of landfill space required for ELV disposal, while ensuring a uniform treatment schedule across all member states. It also includes
Provisions to eliminate leakage of hazardous compounds from the treatment system, by introducing an EU-wide Certificate of destruction (CoD), required for a vehicle owner to stop paying registration and road tax, if applicable in their member state. The directive includes major stakeholders, such as manufacturers, in the process. Manufacturers are required to provide dismantlers with specific dismantling information for their vehicles, particularly for hazardous parts.

Japan

Japan also moved early with an ELV Recycling Law in 2002. It holds similar provisions to the EU Directive, but goes one step further in applying "the polluter pays" principle. Indeed, vehicle manufacturers and importers are tasked with creating reverse logistics systems for any parts and components that are not recyclable or reusable. These include Automobile Shredding Residue (ASR), airbags and chloro-fluorocarbons (CFCs). Manufacturers and importers are not simply in charge of collecting these materials but must also organize and fund their safe dismantling. As a result of this regulation, the cost of recycling a vehicle is absorbed by the industry. This has pushed the industry to take disposal costs into account when designing and manufacturing new vehicles.

SUSTAINABLE DEVELOPMENT IMPACTS OF THE INDUSTRY

We now outline the sustainable development impacts of the current processes of ELV recycling by outlining the social, environmental and economic aspects in turn.

Social Aspects

First, disposers can be categorized based on their disposal practice. Bulk disposers, such as government transport agencies operating large fleets, always sell at auction.
Individual disposers, however, would only have access to vehicle showrooms where they would return their old vehicle in exchange for a discount on a new one, or to local dismantlers. Between these two types of disposers are the medium-size disposers who would sometimes have enough ELVs to bring to auction, but would, most often, have to turn to automobile workshops.
Whether it goes to auction, a workshop, or a showroom, an ELV always has to go through a dismantler, the cornerstone in this whole interaction. Dismantlers, then, redirect the
different parts either to a scrap dealer for reuse, to recyclers, or simply dispose of the product in an uncontrolled and unregulated fashion. Through the surveys, it has been possible to quantify the interaction described above. It is important to realize, however, that the entire process is highly dynamic and complex, and it responds to a number of different market signals and pressures. The whole system is highly efficient, and all the key participants have a strong ability to respond quickly to market changes.

Environmental Aspects

Each ELV is dismantled into thousands, even tens of thousands, of different individual parts, each with its own distinctive market and environmental burden. For the purposes of clarity and effectiveness, this study focuses on a selected number of ELV components based on considerations of their toxicity and waste. These components are broken down into simple categories, fluids on one side and solids on the other. Further to these toxic parts, the economics of on-toxic, more valuable parts was studied in order to understand the major source of revenue generation for dismantlers.

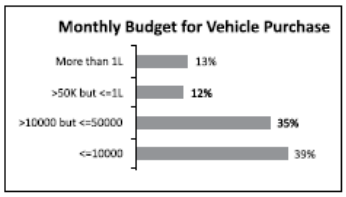
Economic Aspects

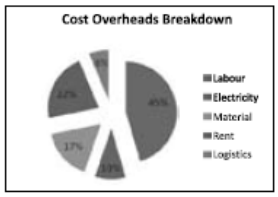
It depicts the economics of various parts that most dismantlers have to deal with. It is important to realize that the price of purchase of the vehicle to be dismantled is not included in this data. This table shows the disparity in profit margins related to recycling different vehicle parts. Although a lot of these are based on less than five data points.

Part Name	Cost of Recycling	Selling Price	Margin	Margin of Recycling Cost
Cylinder *	3250	26000	22750	700%
Engine Lock *	18333	55000	36667	200%
Starting Assembly *	13500	40000	26500	196%
Silencer *	13000	33000	20000	154%
Piston	14400	36000	21600	150%
Temperature Meter *	8500	18500	10000	118%
Brake Shoes	14200	26000	11800	83%
Air Duct *	20000	36000	16000	80%
Speedometer *	12000	21000	9000	75%
Wiper *	7000	12000	5000	71%
Oil Pump *	17250	28333	11083	64%
Hydrometer *	9000	14500	5500	61%
Clutch Plate	25200	40500	15300	61%
Axle *	20000	30000	10000	50%
Sensor *	14500	21500	7000	48%
Steering Wheel *	14250	21000	6750	47%
Battery Accessories *	11000	15000	4000	36%
Water Pump *	15000	20000	5000	33%
Gear Box *	26666	35000	8334	31%
Engine	44444	56250	11806	27%

Economics of the ELV Business

The surveys show that the ELV industry is dominated by small businesses operating on limited capital. Figure shows the breakdown by size of the respondents, clearly showing that over 70 percent of recyclers have a budget of under Rs. 50,000 per month for vehicle purchase.





The Figure shows the high proportion of dismantler costs spent on labour. Such statistics help to understand the high potential for job creation within this sector. The Delhi case study explains this further. Across 28 valid observations in the city, a total of Rs. 417,000 was spent on labour, at an average of Rs. 14,893 per unit. Per the local minimum wage laws, and the generally understood minimum viable living wages in Delhi, this sum would allow for two workers to be hired on average. By extrapolating this data to the 3,200 ELV recycling units in Delhi, as recorded by Chintan in 2016, this comprises 9,600 jobs, including the laborers described above and the owner of the unit. It is, therefore, clear that the ELV sector also Provides livelihoods, a role that must be augmented.

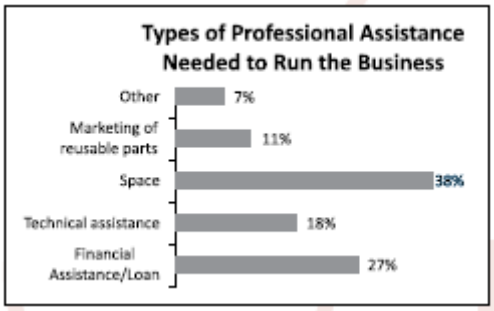
PERSPECTIVE

Recycler's Perspective

Aside from the data displayed in the Methodology chapter describing the movement of parts within the industry, the survey also included information concerning the Dismantlers' knowledge of their own industries and their needs within it. A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

Outside input

The dismantlers were asked what type of professional assistance would be of most use, if they were to be offered help from an external agency. Their responses are shown in Figure.



Overwhelmingly, 38 percent of the respondents claimed that space was the main limiting factor to the expansion of their business activity. This issue has come to the fore, because the areas that dismantlers have used traditionally were set up when they were on the outskirts of cities. These sprawling cities have now engulfed the dismantlers struggling to cope with the density and new zoning regulations around them. Another large part (27 percent) of the respondents claimed that loans would provide them a greater ability to improve their business. Indeed, buying and selling vehicles is a capital-intensive business, which will be discussed in more detail in the following section .A surprisingly small number of respondents claimed that technical knowledge would be appreciated. Only 18 percent believed they could benefit from training by an external body. It was clear to researchers on this project that all the participants in the industry are highly knowledgeable in their own sectors. It was astonishing to see how accurately and agreeably traders could decide prices for extremely specific parts, sometimes with Variants in the hundreds. An unexpected request for marketing came from 11 percent of respondents, who required assistance in bringing some of their parts to a suitable market. One respondent even claimed that car manufacturers were designing new parts with the intent of keeping *kabaris* out of work, through the practice of "planned obsolescence". In referring to buses and heavy vehicles, one recycler said, "As TATA gets richer, we recyclers get poorer." A certain amount of cooperation in the ELV industry, to ensure that parts which have reached the end of their life are reused, would be very helpful to the recovery of resources from vehicles.

Disposer's Perspective

The study surveyed 550 individuals who had recently disposed of their vehicle through the channels studied above. These people were asked how much they knew about the disposal process and different aspects concerning the economics of the process itself.

Disposal Method and Reason

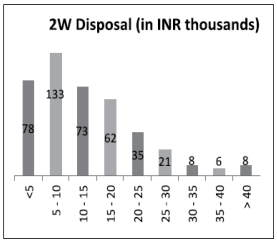
Respondents were asked why they chose to dispose of their vehicle. The majority (54 percent) told us they simply wanted to purchase a new vehicle. This is significant, because it tells us that a certain number of our data points may not represent ELVs as per the definition, but may represent vehicles that could or would be reused after "disposal". Indeed, this is compounded by data collected through the method of disposal question. It shows that 54 percent of respondents either exchanged their vehicle for a discount on a newer vehicle or simply sold their old vehicle to a friend or relative. This data seems to suggest that disposers only approach mechanics or used vehicle agencies when their vehicle is damaged or cannot be operated.

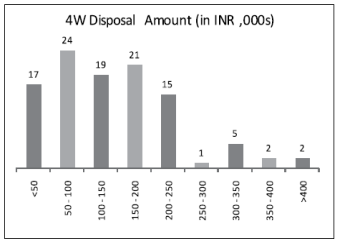
Personal Use before Disposal

Respondents were asked how long they had been using their vehicle before disposing of it. The data shows that 65 percent of respondents had been using their vehicle for between three to eight years, this number itself spread perfectly evenly, with 33 percent in the range of three to five years, and another 32percent for six to eight years.

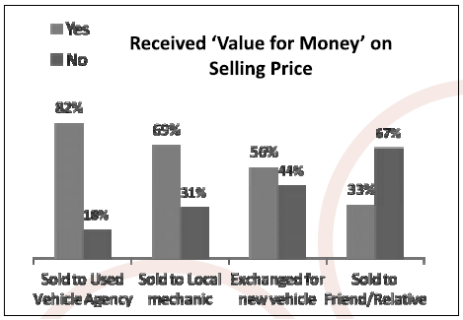
ELV Value

The following two graphs show the value recovered by the final disposer, broken down into two-wheeler and four-wheeler categories.





Value for Money



It is clear that disposers expect to monetize their ELVs. When asked whether they felt they received good value for money from their disposal, respondents could be categorized into four main groups, depending on the method of disposal they used. Figure 12 shows, as disposers moved further away from using the dedicated ELV purchasers, they were less and less satisfied with the value for money received for their vehicle. This data reveals some valuable information. First, as people expect to be paid well, it is difficult to pass on any increased costs involved in the improved ELV recycling to the final disposer. Secondly, the data shows us how the consumer is increasingly satisfied as they deal with more specialized market participants. The specific used vehicle agencies provide customers with the greatest value for money, also suggesting they are the most efficient layers in the market.

V. EXPECTED OUTCOME

This study of the ELV industry has shed light on some of the complexities involved in dismantling and recycling ELVs, and we present some recommendations for the future. These recommendations can be broken into two main sections. First, recognition of the advantages offered to society by the informal ELV recycling sector, enabled by formalizing and organizing the work-flow process and the industry. Second, recognition by vehicle manufacturers of their responsibility to ensure their products are safely and efficiently treated at the end of their life, enabled by a program of Extended Producer Responsibility (EPR), common in many other countries. All these recommendations, however, have a cross-cutting impact on all three sustainable development goals: economic, environmental, and social.

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