

Analysis of End of Life Vehicles (ELVs) Sector in India



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Chairman's Foreword

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Executive Summary

Following the phenomenal expansion of the Indian automobile market over the last two decades, the issues pertaining to end-of-life management of vehicles have gained new centrality in debates about the environment, material efficiency and the labour and social dimensions of circular economies.

While the prevailing informality of the end-of-life vehicle (ELV) sector in India is one of the major hurdle to meet the challenges of the next decades, as very little is known about how this sector is operating currently. This has posed a basic obstacle in devising effective policies and addressing the problems associated with informal ELV sector in terms of inefficient, undignified and polluting material recovery, in spite of significant contribution of this sector to national welfare.

This study follows up a previous survey in 2012 carried out by GIZ and Chintan (Annexure 2) that delved into ELV management practices in and around Delhi. The present effort draws a broader and more systematic picture of the ELV sector in India, by exploring & analyzing five other major automotive production hubs, and the thriving ELV markets that developed around them: Kolkata, Chennai, Pune, Jamshedpur and Indore. **By highlighting systemic links and nation-wide challenges, the report offers insights that will be strategic to design a regulatory and legal framework that reflects accurately the economic, social and environmental reality of the Indian ELV landscape.**

The report identifies a number of key trends:

The domestic ELV sector has been facing the challenge to continuously adapt the changing material flows, vehicle **technology and manufacturing standards used by vehicle manufacturers since the late 1990s**. The capacity of ELV operators to adapt is hampered by their limited access to professional development and financial opportunities for business expansion and development in particular.

All stakeholders in the ELV sector today are very much inclined to be included in the blueprint of a formal ELV industry, and this formalization is perceived as instrumental for developing businesses in the coming future. Traders and dismantlers, which are mostly running established family businesses, require new space and financial inclusion to keep being competitive; Original equipment manufacturers (OEMs) are willing to support quality control mechanisms; disposers of vehicles are looking forward for regulations that minimize environmental risks while legitimizing the economics of ELV trade; distributors and service centers are gazing into the used part market a vital market they are longing to enter.

The absence of legislative and regulatory policies for the Indian ELV sector has resulted into several malpractices in this sector. It has been realized that whenever legislations have been enacted, as in the case of batteries and used vehicle oils, the sector has proved largely willing to comply. The lack of standard operating procedures, proper licensing system and delegation of responsibilities to the concerned authorities regarding the handling of ELV waste remained the major issues.

Based on these observations, the report suggests to:

- Support — through legal recognition, the allotment of space for auto markets and financial inclusion — an upgrade of ELV businesses to combine business sustainability with environmental and social sustainability. In particular, it is recommended to establish an ELV licensing system, allot space for dismantling outside urban centers and transform existing markets in space for ELV parts' retailing; facilitate ELV operator's access to mainstream financial tools like business development loans and insurance;
- Leverage the existing national ELV trade network and subsequently enforcing a 100% ELV take back policy across the national territory. In particular, it is recommended to develop & specify systematic as well as smooth procedure and players for the de-registration of ELVs. Further the administrative burden on the ELV sector can be lightened by assigning to the vehicle dealers the role of facilitators in the processing of de-registration applications, like they already have for the registration of new vehicles;
- Enforce clear occupational safety and environmental standards in the ELV sector, design a monitoring system and standard operating procedures for dismantling and handling of hazardous waste, in coordination with manufacturers and they should develop manuals also in vernacular languages;
- Recognize and leverage the convergence of interest between manufacturers, disposers, dismantlers, traders and dealers, to strengthen the capacity of the sector for increase material efficiency rates. This should be based on the fundamental notion that each player in the economic automotive chain shares the responsibility for establishing an enabling environment conducive to a thriving ELV sector, with maximum gains and minimum hazards.

1. Introduction

Though hiking statistics of commercial or private, vehicles are on the centre stage of any discussion around pollution, traffic and consumption in India. And yet, rarely does any discussion ever venture towards dealing with end-of-life vehicles, or ELVs. Every vehicle that comes on our roads will nonetheless become an ELV, sooner or later, and its safe and sustainable handling is an issue of critical importance.

In 2013, the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (or GIZ) and Chintan initiated a study on the ELV sector in the Delhi region. The resultant report of the study that followed, *Story of a Dying Car in India* (Annexure 2), suggested that vehicles have a thriving after-life which required more attention than it had received so far. The study threw light on the fact that a whole sector of entrepreneurs (working almost entirely in the informal sector) recycles ELVs to a surprising extent of material efficiency, and many parts are reused and sold in a dedicated market extending well beyond the city boundaries. Evidence from Delhi, Meerut, Manesar, Moradabad and Najibabad are just fragment of the enormous ELV landscape in India.

The sheer deluge of ELVs that are expected along the next decade has been an issue of environmental concern and called for in-depth analysis of the prevailing ELV market in India for coming up with optimal & feasible solution on ELVs handling. Therefore, the Central Pollution Control Board, GIZ-IGEP and Chintan in 2014 further expanded the scope of the work to delve upon the issues of environmental impact, waste management, perceptions and aspirations of the informal ELV sector in 5 new cities: Kolkata, Jamshedpur, Pune, Indore and Chennai.

The impetus behind this effort was expected toll in the number ELVs in the near future. The original data presented in this report confirms this concern: in 2015, the total number of ELVs is estimated at 87,31,185. By 2025, this figure is estimated to rise to 2,18,95,439 — an increase of 250%. How should India address this challenge?

All over the world, the challenge of waste management is being viewed increasingly through the lens of materials efficiency. In India, the scenario is also same, except for the fact that the reuse and recycling happens in, the large domestic informal sector

It is essential to understand the existing sector in terms of the sustainable infrastructure that policy makers and regulators could build on, leveraging its material efficiency and its benefits. Further it is also very essential to understand, whether players in the sector itself want to continue this work? Does the ELV business have a future, and what does this future look like?

It is paramount to notice that, as shown in Figure 1, based on this study, virtually every ELV business surveyed for this study across the country is currently financially sustainable.

This study also found that more than recycling, sustainability is a function of reuse. Indeed, as figures 2 and 3 below reveals, up to 70% of a vehicle can be dismantled, and most of its spare parts can be re-used. From the perspective of the waste management hierarchy, which frames reuse as a superior practice to recycling in terms of material efficiency, this is a very desirable situation.

Most of the entrepreneurs the surveyed & interacted were young, second generation business owners and were well aware of the intricacies of reuse and trading on the second hand markets — much against the commonplace that frames this practice as virtuous but out-dated.



Figure 1: 96% of the traders stated that the profit margins are high enough to ensure business sustainability. However, everybody also expects margins to go down because of the increase in non-reusable parts in newly designed vehicles.

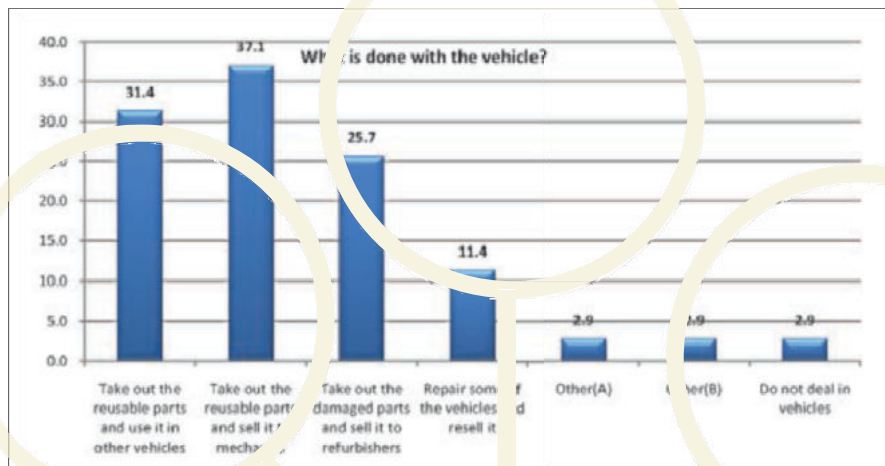


Figure 2: Up to 70% of an ELV's parts are recovered through the dismantling process. In some cases, entire vehicles are refurbished and sold.

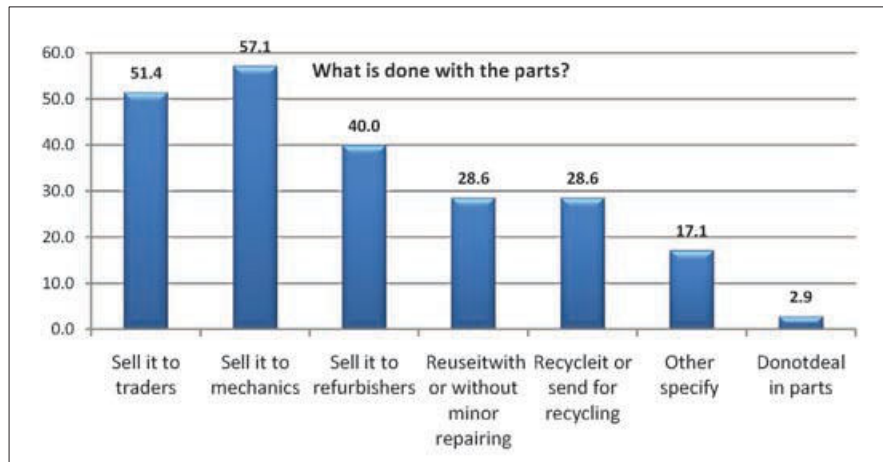


Figure 3: The ELV parts trade chain ends with mechanics, who place parts in running vehicles. More than half of the ELV parts traded are directly procured by mechanics. Refurbishers use them to put back onto the market old vehicles that are still operable.

New trends are setting in and vehicles are increasingly discarded not because they are old, but because they are simply damaged. The automobile industry, at the same time, is thriving on models that have a decreasing scope for dismantling and recycling. It is interesting to note that traders in the ELVs market have preference for old vehicles over the new ones. A trader from West Bengal remarked how much he disliked brand new vehicles that had met with an accident: “They are so new; there is no urgency for their spare parts. They have such little value for us.”

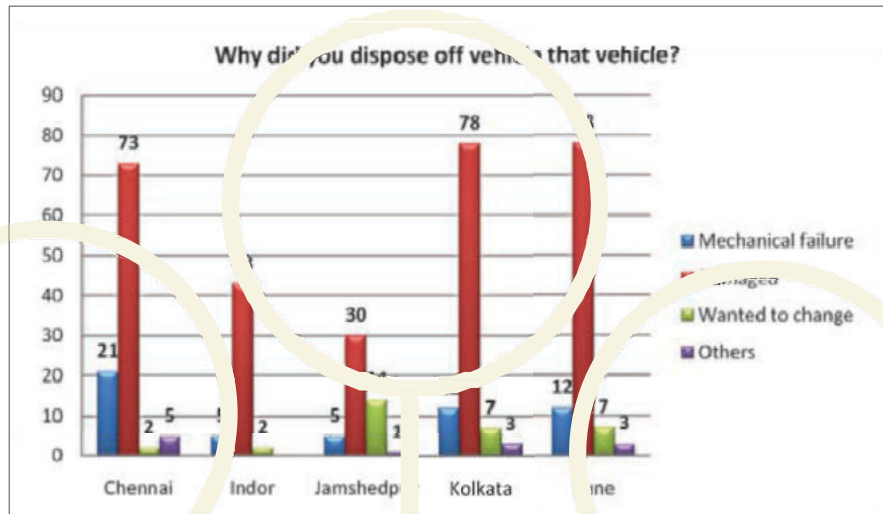


Figure 4: Damage to the vehicle or its parts is the most important reason why vehicles are disposed off. This shows that the cost of repairing and maintaining a vehicle and its maintenance is the prime reason for turning into an ELV.

More than other trades, ELVs and their dismantling requires space — an endemic deficit resource in India, unless planned for. As Figure 5 shows, many entrepreneurs reported that their growth as a business was dwarfed by the land crunch,. This is a key priority given the projected growth of ELVs in the near future.

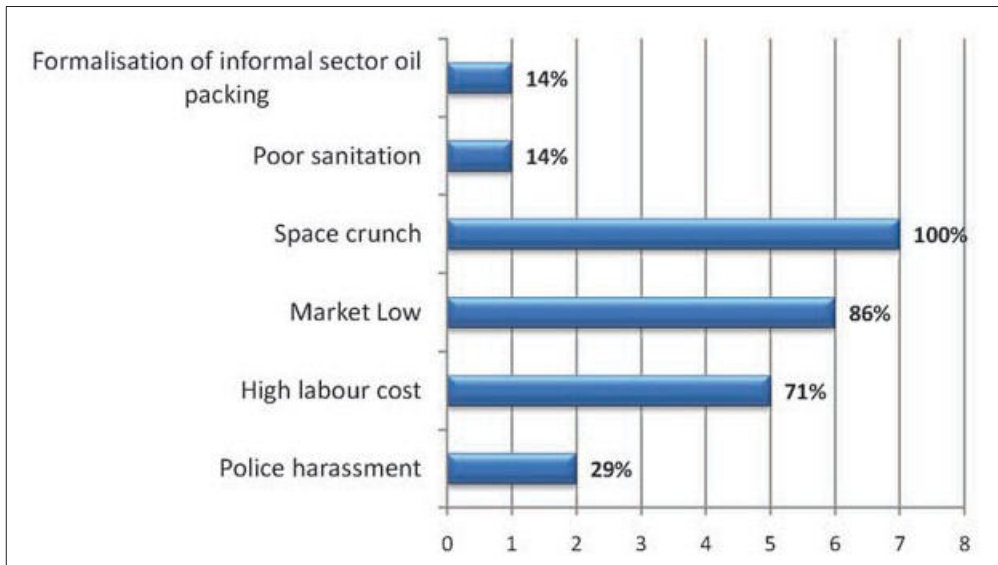


Figure 5: Lack of space is a major impediment. Slow sales and growing stocks can also cause liquidity crunches that cannot be addressed through mainstream financial assistance like other businesses. The cost of labour has also increased exponentially over the last few years, reducing the margins of the traders significantly.

Many are however aware of the fact that land might be available only far from the markets and customer base of today, and offered innovative ideas like splitting retail and dismantling activities of a same business. It is based on these and many other insights from this informal, or semi-formal, sector that this report formulates a number of recommendations in the final chapter.

It is expected that the original data and case studies presented below — a first of its kind — will enable policy makers and regulators, informing their decisions as they seek pragmatic incentives to promote ELVs management and bring the country ever closer to enjoy the benefits of a circular economy.

2. Scope of the Report

The term 'End of Life Vehicles' (or ELVs) covers all those motorized vehicles that are no longer in use — because they are no longer fit to operate or because they have become too expensive to operate. Like any other consumer durable, the moment vehicles become waste for consumers, they enter an altogether different economic sector where they acquire a second life and new value in the hands of recyclers, scrap dealers and sellers of parts in the second-hand markets. In India, much of the post-consumer recovery of recyclable, reusable and re-sellable material happens in the informal sector: outside the regulatory frameworks. For the ELV sector, the fact that a mass demand for motorized vehicles in India is just two decades and a half old means that end-of-life management has only started to gain attention as an issue in its own right.

This study aims to throw a first light on India's ELV market, as a preliminary step to define the features a regulatory framework should have. This study has been envisaged on the belief that understanding how the sector currently operates across the country is instrumental to retain — and expand — its capacity to extract as much value as possible from this distinct type of waste, while respecting the environment and safeguarding its precious human resources.

This effort follows up to an earlier exercise, in 2013 by GIZ and Chintan (Annexure 2). This previous work was dedicated to the unexplored contribution of the informal sector to the automobile industry in and around Delhi. Considerably expanding the first study, the present effort explores 5 more major automobile hubs across the country. The study is expected to not only help in understanding the ELV market's material and waste streams in greater depth, but also to provide an overview of the diversity of operating practices at work across the country, whose inclusion in any future regulatory effort will be instrumental.

A Brief Overview of the Industry

The Automobile sector has been one of the strongest pillars of the growing Indian economy since last two decades and a half. In 1991, when the decision was taken to progressively open up the domestic economy to foreign investments, India could only count on 2 major companies operating in the passenger car segment. By 2015, this figure has grown ten- fold, with large Original Equipment Manufacturers (OEMs) from across the world setting up their shops in India. Foreign Auto Component manufacturers followed soon, injecting in the domestic landscape new technology and improved materials — with both greater performance and safety standards in mind.

Consequently, the last two decades saw very significant changes in the resource usage of domestic manufacturers. Most notably, plastic and plastic composites substituted metal, gradually but incrementally, and the weight of vehicles decreased while their volume grew very rapidly.

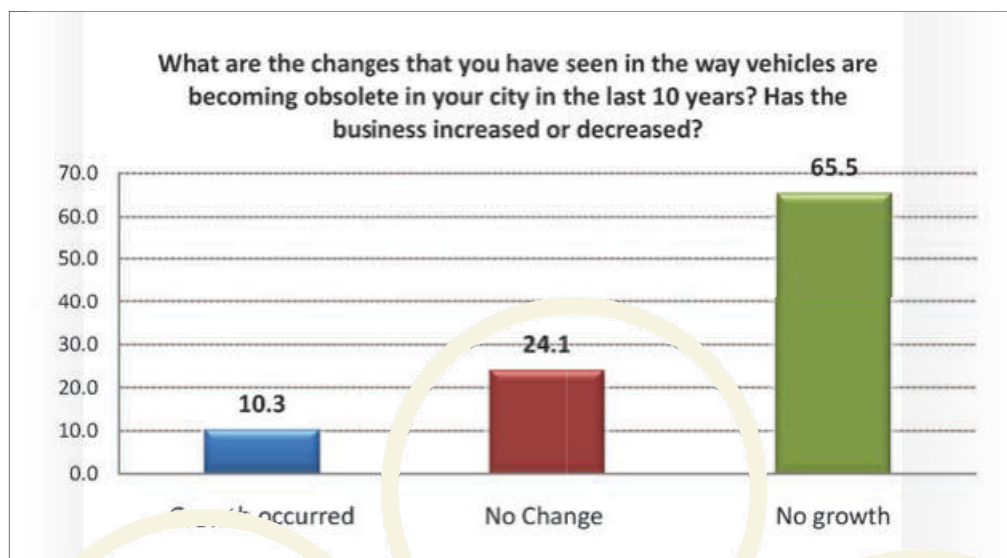


Figure 6: More than 65% of the respondents stated that there has been no growth in the business over the last 10 years. Just 10% of the respondents stated that they have experienced growth in the last 10 years.

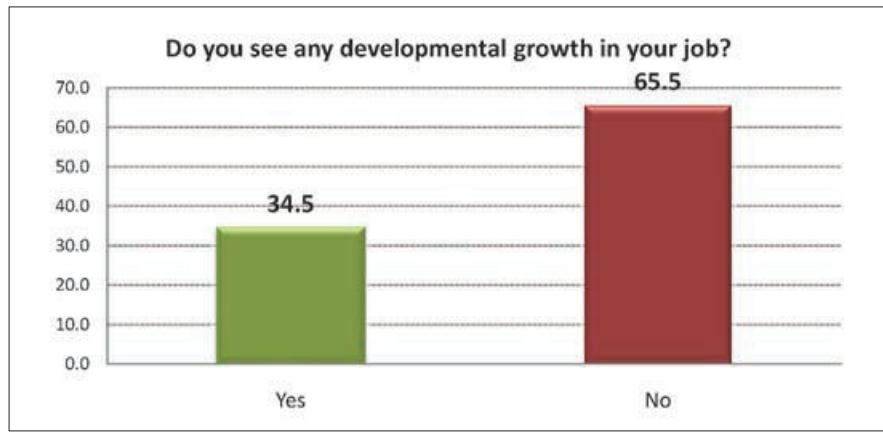


Figure 7: About 66% of the respondents state that there has been no developmental progress in their work. They are doing the same thing that they were doing 10 years ago.

While India’s century-old recycling sector successfully adapted to new designs, absorbing any valuable material from ELVs, constant technological innovation and the new scale of the industry also posed challenges. With growing sophistication in OEMs’ production, the scope to reuse parts fell to an unprecedented low. As a result, what was for decades a profitable used parts market is increasingly shifting its operations to trading in scrap and waste, a much less materially efficient economic activity. Profits have decreased, and the soaring cost of labour, an essential input in this sector, menaces to push some of India’s marginal ELV operators out of their business.

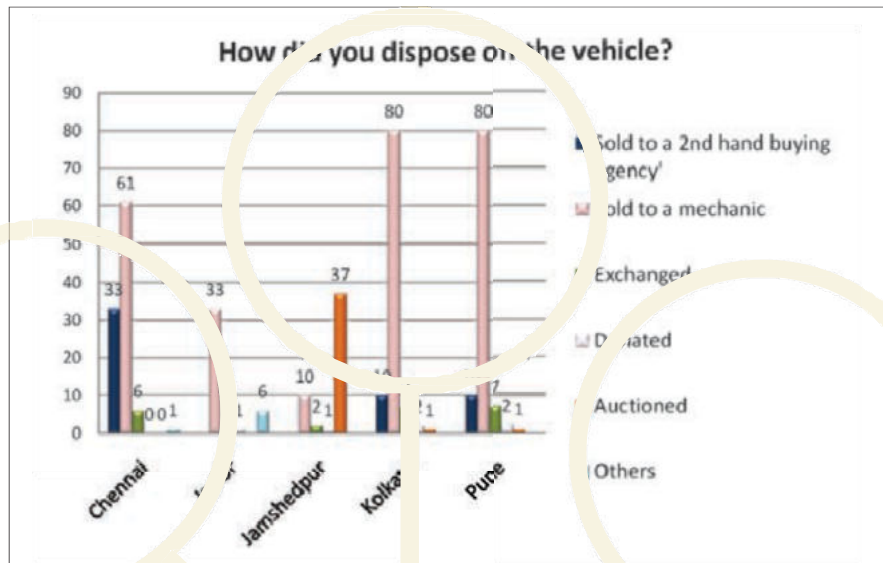


Figure 8: Vehicle owners expect to maximise their gains when selling to a trusted mechanic, whom in most cases they have known since purchasing their vehicle..

The major implication of these changes, however, is that with the number of registered vehicles in India reaching 160 million in June 2014 (from 40,00,000 in June 2000, a four-fold increase in less than a decade and a half¹), the country's capacity and preparedness to manage ELVs — the automotive industry's post-consumer waste — has decreased sharply. If the demand for new vehicles generates employment and puts the vehicle manufacturing industry at the forefront of India's GDP growth, the decreasing scope for recycling is set to impose new systemic costs and pose important challenges

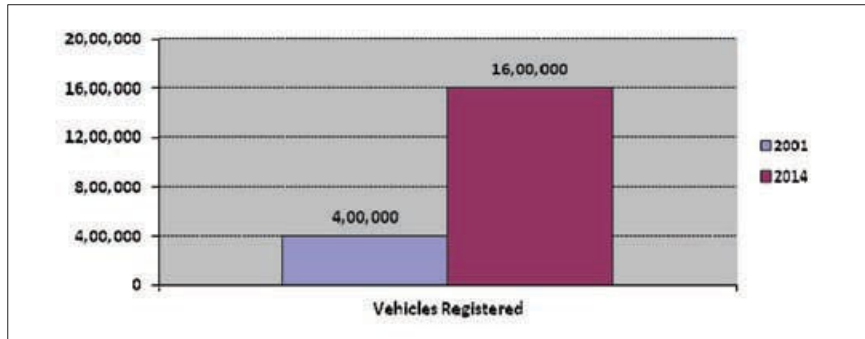


Figure 9: Growth of registered vehicles in the last 15 years (SIAM data)

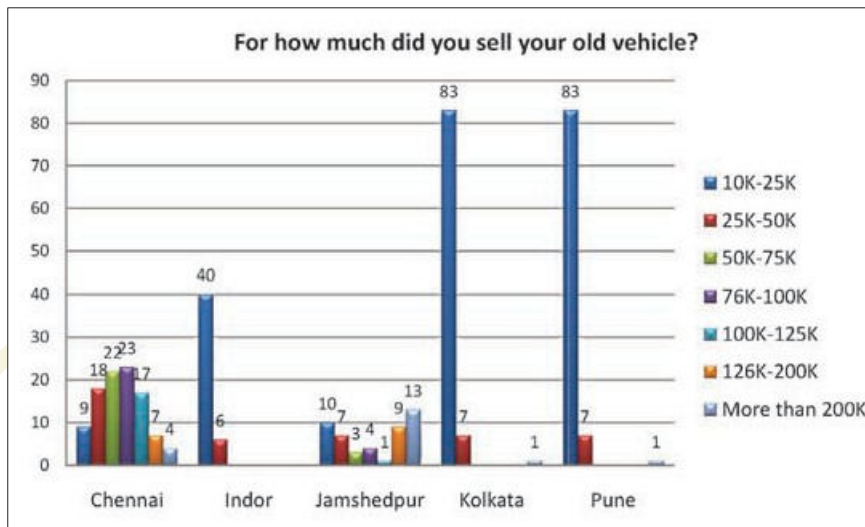


Figure 10: Disposal rates of vehicles in Chennai are far lower than those of other cities.

¹ (SIAM data)

3. The Methodology of the Study

Objectives of the Report

This report delves into the processes of the ELV sector across five major locations. In each location, the key stakeholders, formal and informal, have been interacted & queried about the causes for the disposal of vehicles, the economic value created through disposal, reuse and recycling practices, information on the life cycle of a vehicle and its parts, the structure of existing markets, the kind of problems ELV operators face with respect to the law, and the sourcing channels of the ELV trade. The study also records the aspirations of operators in the sector, as these are expected to be instrumental to design and implement any upcoming policy.

In particular, the study focused on the material flows in the ELV industry, tracking chains of transactions and attempted to quantify both economic and waste management dimensions. It also mapped the life of different types of vehicles across automobile hubs. Overall, this study brings together new data about the size of national ELV sector in India and its estimated development over the next decade, based on original calculations of the obsolescence rates of different types of vehicles available in the market.

The project team interacted with all the concerned stakeholders includes manufacturing companies (OEMs and auto component manufacturers), automotive associations, state pollution control boards, formal sector recyclers and Regional Transport Offices (RTOs), ELV traders, dismantlers, sellers, refurbishers and laborers. The ultimate aim of these interactions was to understand the attitude of stakeholders to the notion that ELV — beyond a large economic sector — is also a distinct waste stream that requires dedicated regulations, and a shared effort of responsibility between manufacturers, the government and the informal sector.

Sampling Design

The study focuses on five major Indian automobile hubs: Kolkata, Jamshedpur, Chennai, Indore and Pune. Given Delhi and the capital region had already been covered as part of the 2013 study, the data from that study has also been incorporated wherever possible.

For each city, the project team identified a shortlist of stakeholders of the ELV sector, including:

- Manufacturers (OEMs)
- Traders and dismantlers of ELVs
- Disposers of ELVs
- State level pollution control boards
- Distributors and service centres
- Recyclers (if any)

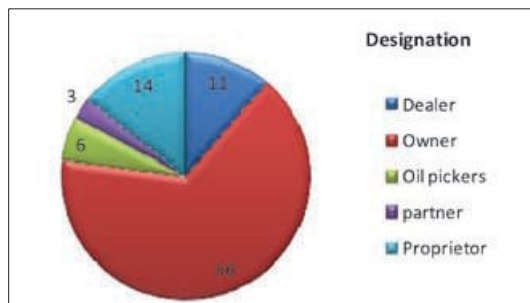


Figure 11: Sample composition

Mapping stakeholders at 360 degrees helped in getting answers to some of the key questions of the study: the obsolescence rate of vehicles, material flow from ELVs and dedicated value chains. The sample design followed, and the research methods used for each stakeholder, are summed up in the table below along with the respective sample size.

Table I: Sample size and methodology of data collection

Stakeholders	Cities	Methods and Tools	Sample
Producers	Chennai, Jamshedpur, Indore, Kolkata, Pune	Face to Face interviews with Discussion guide	1 in each city
Distributors	Chennai, Jamshedpur, Indore, Kolkata, Pune	Face to Face interviews with Discussion guide	6 in each city
Consumers	Chennai	Questionnaire and FGDs with Discussion guide	100
	Jamshedpur		50
	Indore		50
	Kolkata		100
	Pune		100

Stakeholders	Cities	Methods and Tools	Sample
Collectors/ Traders	Chennai	Face to Face interviews with Discussion guide and FGD dependent on availability of participants	10
	Jamshedpur		5
	Indore		5
	Kolkata		10
	Pune		10
Recyclers (if existing)	Chennai	Face to Face interviews with Discussion guide	5
	Jamshedpur		3
	Indore		2
	Kolkata		5
	Pune		5
Regulatory bodies	Chennai	Face to Face interviews with Discussion guide	1
	Jamshedpur		1
	Indore		1
	Kolkata		1
	Pune		1
	Pan INDIA		1



Overview of Research Process

Methodology

The study relies on original primary and secondary research. Primary research combined qualitative and quantitative methods.

Quantitative Data

A structured questionnaire was designed and administered to ELV operators to gather cumulative and comparative data across the five cities about the flow of material linked to ELVs. For each city, the project team identified the market areas where ELVs are processed (traded and dismantled for parts sale or recycling), with the help of local partners. Typically, it was observed that smaller vehicles (scooters, motorcycles, auto rickshaws and small passenger vehicles) and large or commercial passenger vehicles are traded and processed in separate markets. A total of 400 disposers across 5 cities were engaged. A dedicated questionnaire was used to interview an additional 40 traders and collectors of used parts, to allow a degree of triangulation in data collection as well as to complete a map of the ELV value chain. The data was analyzed using SPSS and Microsoft Excel.

Qualitative Data

With the support of an in-depth, semi-structured interview guide, qualitative data was collected across all stakeholders. Key data areas covered were the profession of the stakeholder, knowledge regarding material resources and their flow in the sector, perceptions about other stakeholders in the sector and the future of the ELV trade, including future regulatory frameworks. Data collection with all stakeholders was done at their respective premises.

Secondary Research

Secondary research was essential to complement primary data, with particular regard to official data and the policy literature. In many cases — for example for obsolescence and material flow maps — secondary data was triangulated with survey and in-depth interview data.

Secondary research on industrial data focused specifically on:

- Sector trends for sales and registrations of new vehicles, including computation of **obsolescence rates**, i.e. is the number of years between a vehicle's first registration and its last owner's decision to dispose it off. Data on vehicle registrations was collected from official sources, namely the Society of Indian Automobile Manufacturers (SIAM)² (through www.ceicdata.com), which publishes monthly data on the sector.
- Data for **vehicle weights** was collected from the website of each OEMs. Vehicle details on company websites list the total weight of the vehicle. The vehicle weight

² SIAM data is the most reliable source of information on the sector since 2001. Data from June 2001 onwards has been used in computing current obsolescence rates for most types of vehicles.

was important to understand the amount of material that enters the informal sector as an ELV.

Secondary research was also instrumental to understand how the ELV sector operates in other countries, including existing policy models.

Methodology for the Calculation of Obsolescence Rates

Obsolescence rates are an average measure of the time a vehicle of a specific category takes to reach its end of life, irrespective of the number of owners. Specifically, a vehicle can be describes as going through 3 different lifecycle stages:

- Active life: a vehicle's active life is defined by the number of years it can be effectively used, with its original parts in place.
- Passive life: the passive life of a vehicle is the additional period the owner carves out from damaged or worn out vehicles by refurbishing or substituting parts.
- Storage: Storage is time period where the vehicle is not in use and is waiting to be dismantled, or awaiting disposal after being dismantled

The obsolescence rate is the sum of these three stages, defined as:

Obsolescence rate³ = Active life + Passive life + Storage

In developing countries that have large informal markets for first and second-hand vehicles like India, the obsolescence rate of a vehicle (and of vehicle parts) is comparatively high. A thriving informal market for used parts caters to a large section of vehicle users, offering more competitive prices than new vehicle parts dealers. In developed countries, obsolescence rates, for both complete vehicles and parts, are easier to track. There is a state regulated market for dismantling, disposal and recycling, and EPR rules bind companies to be responsible for resource recovery. This makes the inventory process both compulsory and automatic.

In view of the constraints that exist in tracking informal sector transactions and product movement in India, this study has concentrated on the disposal of fully assembled vehicles by the final user. Hence, we calculate the obsolescence rate as the time a vehicle is disposed off for dismantling and/or recycling. The data used for calculating obsolescence computes the number of vehicles that have been bought and registered by users in a year, and the number of years that these users operate the vehicle for. Yet, it is important to understand that the used parts market recovers, refurbishes and reuses about 70% of the gross weight of a vehicle's parts.

³ The analogy for obsolescence rate has been derived from a publication on e-waste by UNEP which can be accessed at link http://www.unep.or.jp/ietc/Publications/spc/EWasteManual_Vol1.pdf. This document delves in the constraints that exist, in developing countries specifically, with respect to data availability on parts' life after they enter the informal market.

Data on vehicles bought and registered across categories is available from the Society for Indian Automobile Manufacturers (SIAM), which publishes data on the sector on a monthly basis. This study has used SIAM data to compute the total number of vehicles registered over the last 15 years, disaggregated by category: two wheelers including scooters and motorcycles, three wheelers, four wheeler including cars and jeeps, commercial goods vehicles and commercial passenger vehicles.

The reference life span of vehicles by category, instead, was sourced from primary data collection, survey and structured interviews in particular. Respondents who were prompted about on this point include:

- Disposers of vehicles;
- Traders of vehicles and their parts;
- Manufacturers, including OEMs and auto component manufacturers;
- Auto associations;
- Regional transport office
- State pollution control boards.

Interacting with stakeholders operating at different points of the vehicles value and supply chains allowed significant triangulation of data. The figures below represent the average of respondents' obsolescence rate quotes, with very little standard deviation across professional categories.

Type of vehicle	Obsolescence rate (in years)
Two Wheelers	10
Three Wheelers	15
Private Cars/SUVs	15
Commercial passenger Vehicles	12
Commercial goods vehicles	11

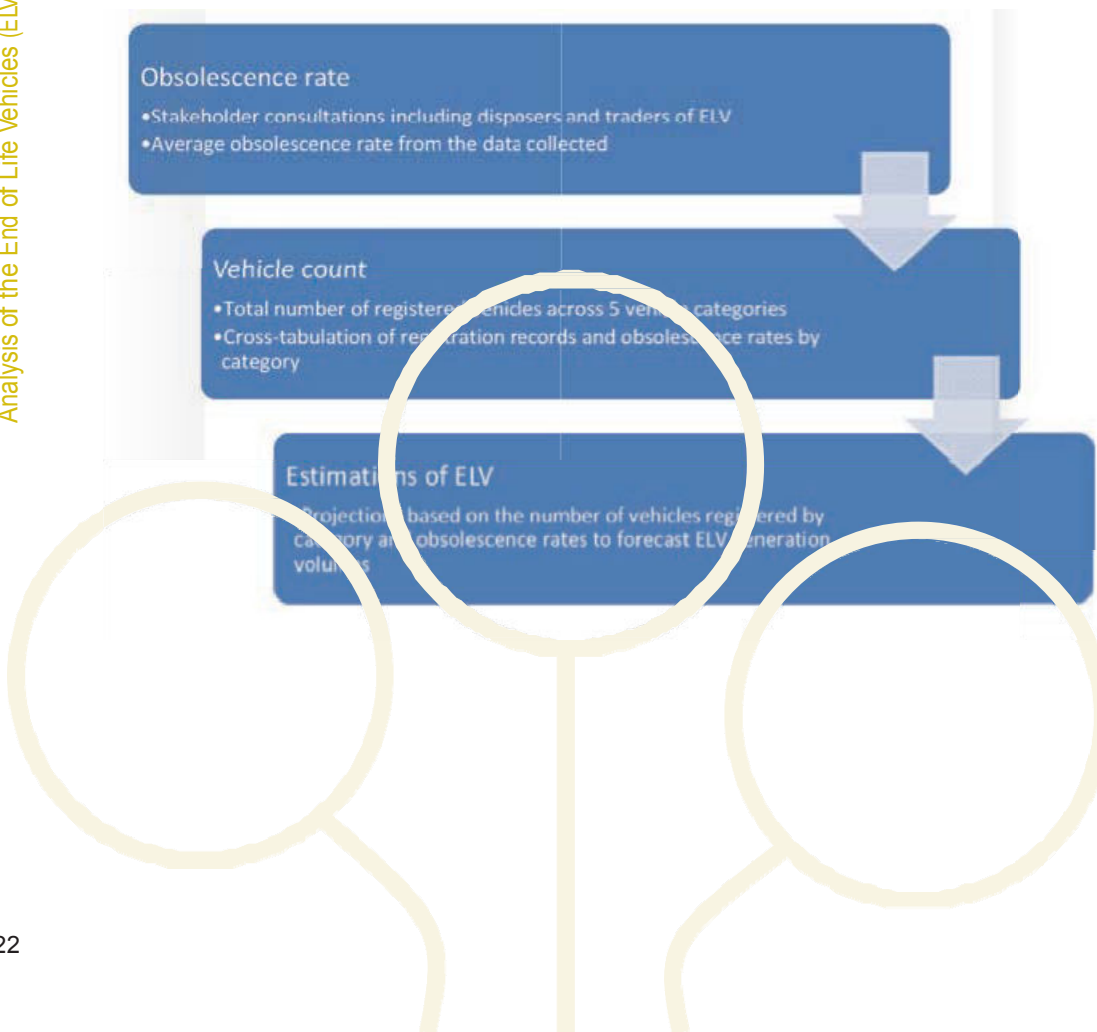
The data above describes accurately the average active life of a vehicle, by category, in India. This methodology also allows assuming the relative impact of different factors affecting obsolescence: handling of the vehicle, terrain in which the vehicle has operated, servicing of the vehicle and its parts, etc.

To compute total numbers of vehicles reaching obsolescence in 2015, the study cross-tabulated registration records by year and by category with the obsolescence rate obtained above. For example, if the average life of a 2 wheeler is 10 years, to arrive at how many 2 wheelers will reach obsolescence in 2015 the study looked at the number of vehicles within this category that were registered in 2005. Similar computation of all

vehicles within this category that were registered in 2005. Similar computations of all types of vehicles were mapped to their respective obsolescence rates, with the results shown below:

Type of vehicle	Total ELV count in 2015
Two Wheelers	72,89, 442
Three Wheelers	2,62,439
Private Cars/SUVs	7,21,558
Commercial passenger Vehicles	46,522
Commercial goods vehicles	4,11,230
Total vehicle count likely to be ELV in 2015	87,31,185

The figure below illustrates this methodology.



4. Current Landscape

How Big a Challenge? A Calculation of Obsolescence Rates and Sector Projections for the Next Decade

Obsolescence describes a state where a product, service or practice finds no more use for the user, even if still functional. Obsolescence frequently occurs if a replacement is readily available in the market, or if the repair cost for a product, or its running cost, is higher than the cost of purchasing a new product.

A note on obsolescence and ELV

The obsolescence rate of a vehicle is the age at which the vehicle will reach ELV status. This rate depends on many factors. The rate is normally lower in cities and higher in locations with terrains which are more difficult. Given the focuses of this study on cities, the estimates on the ELV volume should be considered conservative, if not perfect.

Vehicle obsolescence is not just influenced by the age of the vehicle, but varies based on geographical area of operation, the driver, the nature of the parts used and replaced, and the rate of maintenance of the vehicle. Obsolescence of vehicles varies from one type of vehicle to another, depending upon their use.

The surveys conducted with disposers and traders of vehicles tried to capture the obsolescence rates of vehicles currently operating on the national territory. Across the 5 categories of vehicles for which the survey was conducted (commercial goods vehicles, commercial passenger vehicles, cars, auto rickshaws, and scooters and motorcycles) obsolescence rates varied, both by category and by city.

The obsolescence rate presented below is the weighted average of the rates reported for each particular category of vehicle by disposers and traders. Whenever obsolescence rates differed between disposers and traders, we computed data provided by traders, based on the fact that they deal with larger volumes of ELVs and can count on a larger sample.

Type of vehicle	Obsolescence rate (in years)
Two Wheelers	10
Three Wheelers	15
Private Cars/SUVs	15
Commercial passenger Vehicles	12
Commercial goods vehicles	11

Obsolescence rates for 5 major categories of vehicles based on our survey

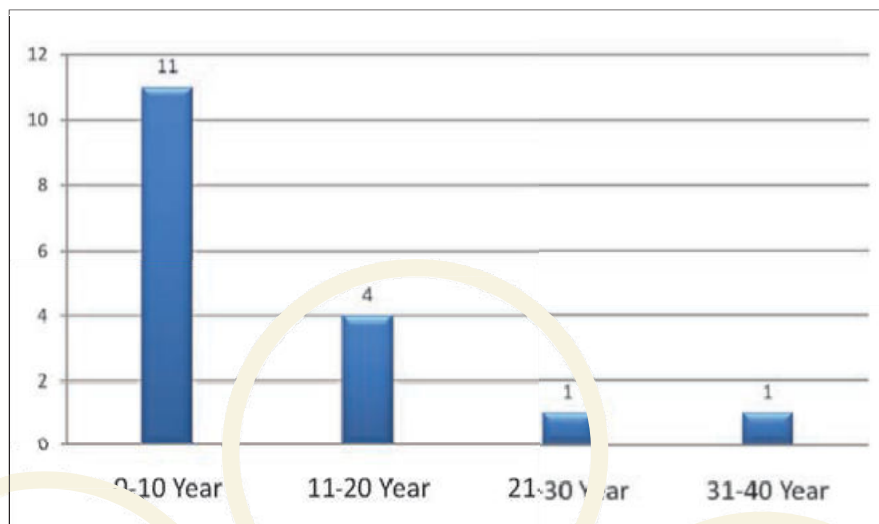


Figure 12: Almost 75% of ELVs are 10 years old or younger. The respondents are ELV traders who were asked about the age of the vehicles that come to them as ELVs.

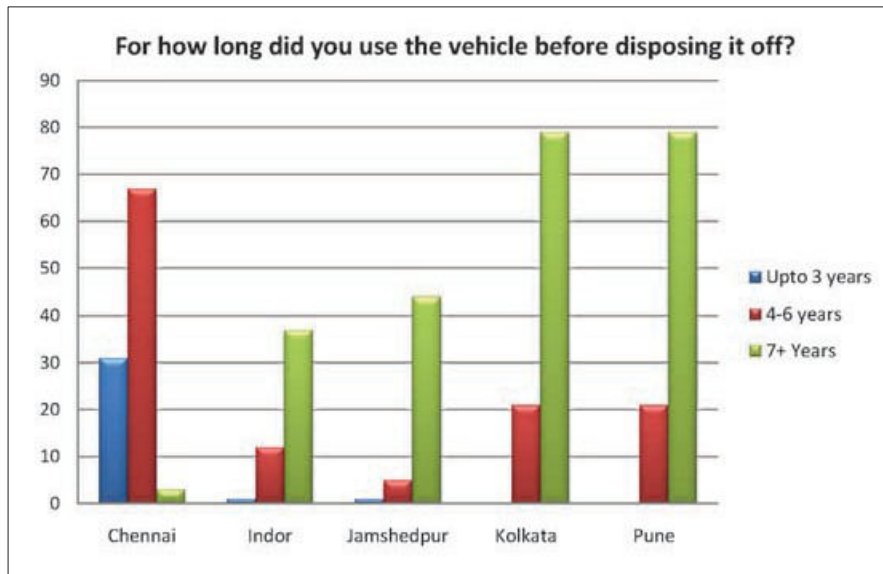


Figure 13: Most of the study's respondents had used their vehicles for more than 7 years before they disposed it off as an end of life vehicle.

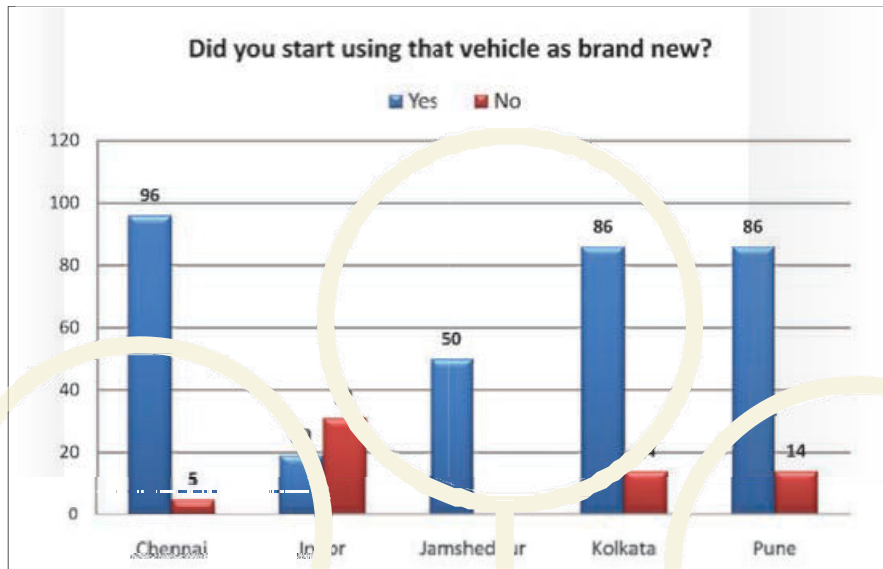


Figure 14: More than 80% of the disposers started using the vehicle as brand new while the rest had purchased used vehicles which they disposed at end of life.

ELV Generation and Projections

When we look back at the number of vehicles that have been sold in the last decade and a half, the impact of ELVs and the challenge that it poses becomes clear. The numbers of vehicles that are likely to be ELVs across India in the year 2015 are:

Type of vehicle	Total ELV count in 2015
Two Wheelers	72,89, 442
Three Wheelers	2,62,439
Private Cars/SUVs	7,21,558
Commercial passenger Vehicles	46,522
Commercial goods vehicles	4,11,230
Total vehicle count likely to be ELV in 2015	87,31,185

Figure 15: Number of vehicles reaching obsolescence in 2015

When we project this number for all of India on a 10-year horizon, the figures we obtained show the magnitude of the challenge facing the country:

Type of vehicle	Total ELV count in 2025
Two Wheelers	1,77,23,951
Three Wheelers	7,57,932
Private Cars/SUVs	28,09,966
Commercial passenger Vehicles	94,757
Commercial goods vehicles	11,88,833
Total vehicle count likely to be ELV in 2025	2,18,95,439

Figure 16: Number of vehicles reaching obsolescence in 2025

The ELV count - across all segments — is projected to show a steep growth, as depicted below.

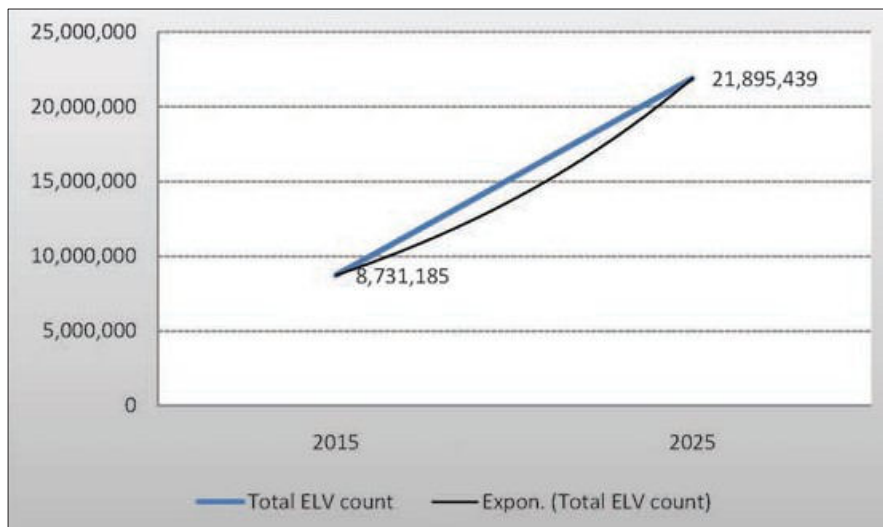


Figure 17: Growth of ELV across the next decade

If this picture is alarming, it is imperative to understand what is working, and what needs attention, in the ELV sector today, to be able to plan the ELV sector of tomorrow.

Trade Chains and Material Flow in the ELV Sector in India

The Informal sector operators across the 5 cities covered during the course of the study showed a deep technical knowledge of the use and reuse of ELV parts. The trading and use of ELV parts has existed for generations, across the country. Today's traders have learnt the business from their forefathers, and applied their knowledge to changing circumstances. The sector is built on relationships between traders, and on the reputation that each one created for themselves. As the automobile industry grew and the affordability of people for the vehicles also increased the trade has also become more competitive, especially in the 2-wheeler and small 4-wheeler segment. For the commercial goods and commercial passenger transport segments, large transport companies still rely on a network of informal traders with whom they entertain generation-old collaborations.

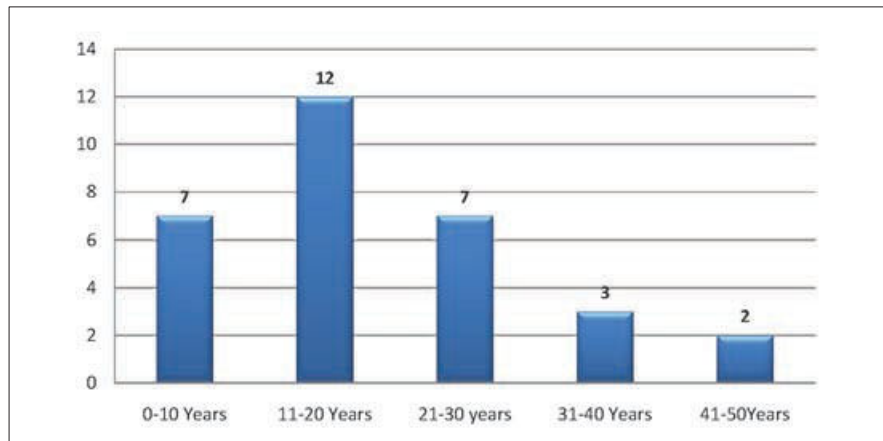


Figure 18: The graph above indicates that over 80% of ELV traders have been involved in this business for more than a decade. For at least half of the traders surveyed, the business is being passed to a 2nd generation of owners.

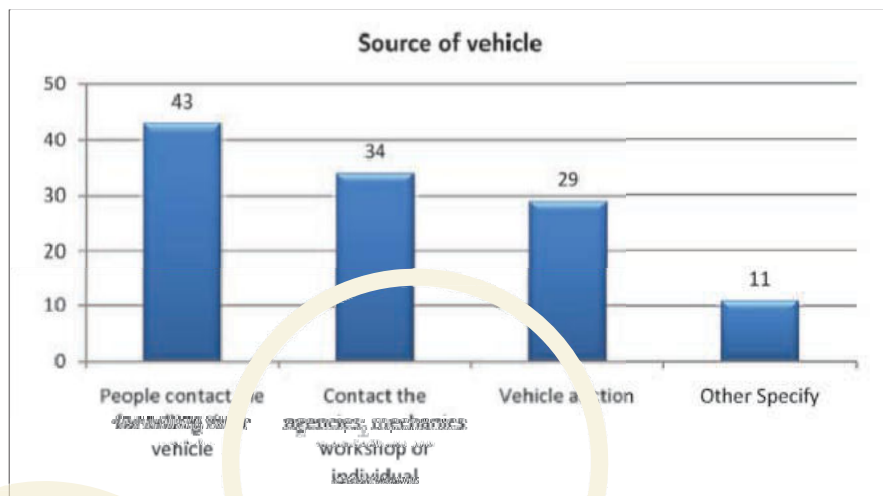


Figure 19: The graph above suggests the existence of very dense network in the ELV trade. Agents working across different cities in the country exchange information regarding ELVs.

Formal and informal interactions were instrumental to trace the lifecycle of different parts and the key actors those are involved in trading them. A significant feature of the sector is that trading and sourcing platforms have developed over decades in most cities, and operators in one city are connected to counterparts across the country.

These links support a highly materially efficient trade loop between manufacturers and consumers, channeling valuable resources back into the manufacturing systems once their value as products, or as parts, is fully exhausted – but long after they entered the consumer market as new vehicles.

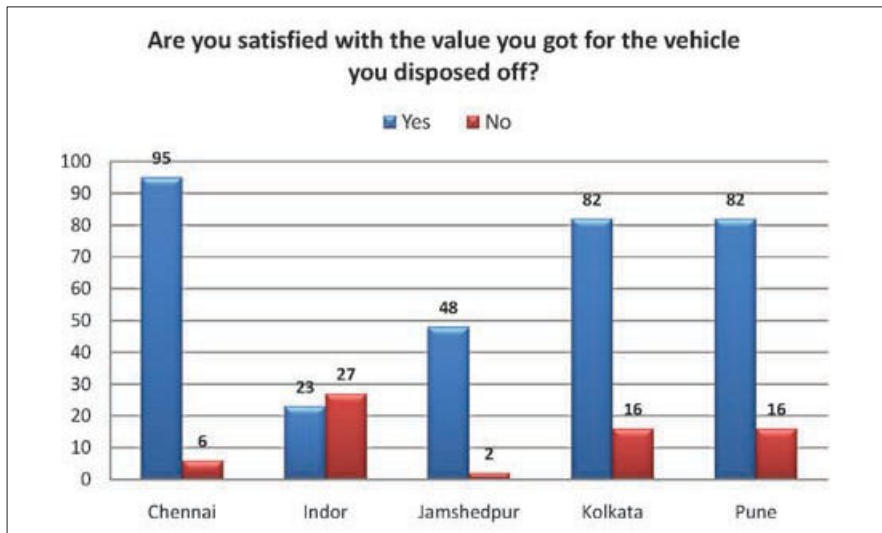


Figure 20: More than 80% of disposers in the large metropolitan cities are satisfied with the value that they derived from disposing off their vehicle.

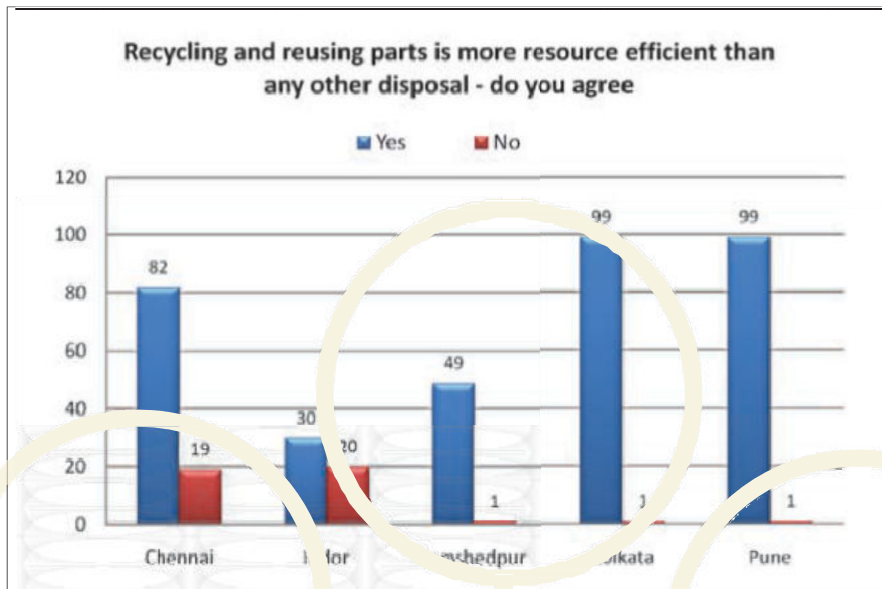


Figure 21: Disposers of vehicle believe that recycling and reusing of parts is more resource efficient than any other form of disposal of the vehicle.



Figure 22: The ELV sector circular value chain

Most importantly, at each point in the chain value is created. The chain starts when a n OEM sells a vehicle to the distributor. The distributor then sells the same vehicle to a consumer. The consumer runs the vehicle till it reaches its end of life (EoL) point.

Key factors in the value creation in the automotive sector that are enabled by the existence of the ELV sector are:

- Usage of vehicles: Commercial vehicles are usually overloaded, run beyond their capacity so chances of reusing their parts diminish. In comparison, private vehicle and commercial passenger vehicle parts can be reused to a greater extent.
- Trends in market rates: selling prices are nearly fixed and common knowledge to ELV traders, but fluctuations can reduce significantly the profit margins.
- Maintenance: 75% of the parts of a vehicle which has received high-quality maintenance can be reused.

Through this cycle, several interactions take place between consumers and used parts traders or service stations. Value is created through each of these transactions, in a way that is directly proportional to the age of the vehicle. As the vehicle reaches obsolescence and these transactions increase in frequency, the consumer disposes off the vehicle to either the used parts trader, or to a scrap trader. Then a reverse movement of parts

starts, with other consumers purchasing and selling specific parts until parts too reach obsolescence. Finally, parts are scrapped and converted into secondary raw material that will be traded to Auto Component manufacturers, completing the cycle.

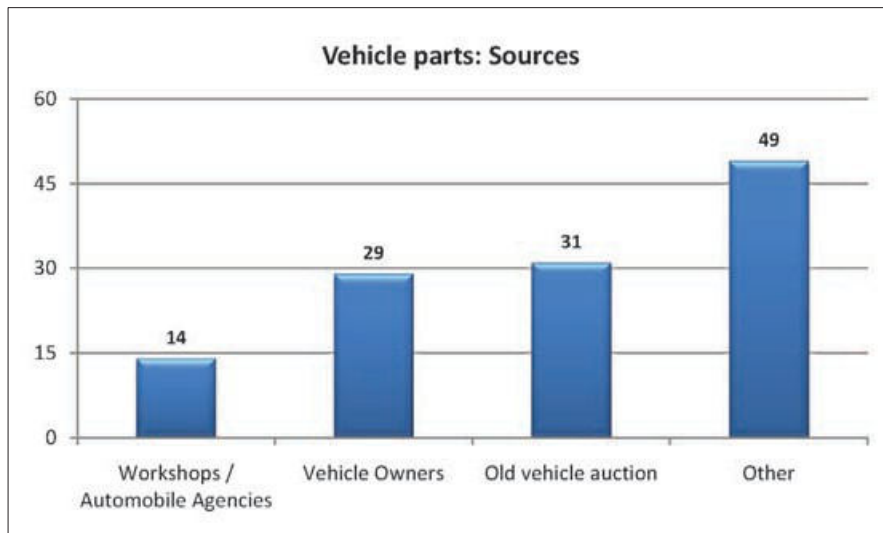
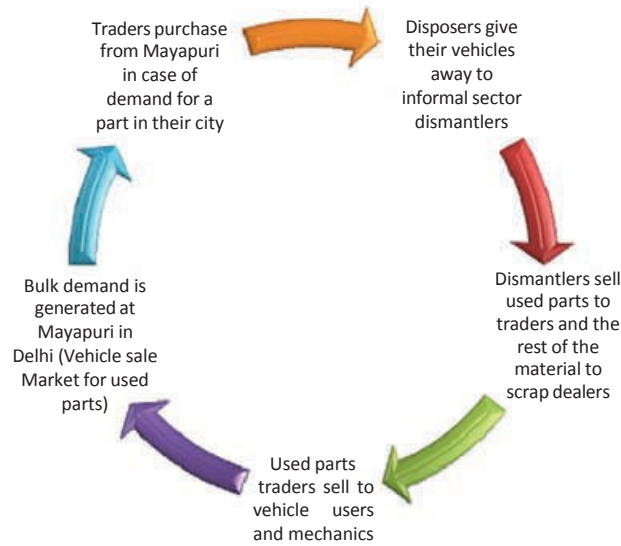


Figure 23: Almost 30% of the vehicles are procured directly from disposers. Auctions also are an important sourcing platform of vehicles for large traders. There is also a thriving market of agents that ensure that there is a constant supply for dismantling.

Pivotal to the ELV part trade in India, in terms of demand and price levels, is the Mayapuri market of Delhi. Mayapuri is notoriously the largest ELV market in India as well as the SAARC region for ELV parts.

Traders and users from different countries come and visit this market to purchase parts in bulk or retail. This is a market that can count of significant liquidity and large traders and dismantlers participate regularly in auctions across the country. Across all cities surveyed, traders stated that they would interact with at least one large trader from Mayapuri on a monthly basis. The country-wide integration of this trade is essential for smaller and more peripheral traders, whose market access and customer base would otherwise be limited to high-demand, high-value parts.

OEMs which auction rejects at manufacturing are also procured by traders from Mayapuri and are sold off on demand from different areas across the country. A large number of these parts are refurbished as well in the area.



The large informal sector that runs the market is highly specialized: there are traders who deal in engines, while other deal only in gear systems and differentials; some traders deal in tyres and some deal in wheel rims. Finally, some deal in other ferrous body parts, which are refurbished and sold in retail shops. Parts that are sold as scrap and parts that are treated as waste, also have dedicated markets. The most visible of these is the trading of used oils extracted from the vehicles and then sold to waste oil traders.

Engines

Across the 5 cities, the trade of engines and engine parts follows a similar pattern. Demand for engines, however, varies: for example, engine parts traders in Kolkata enjoy a proximity to Bangladesh and benefit from a regular demand for engines for commercial goods and passenger vehicles. Almost every month a large trader from Bangladesh visits Phoolbagan market in Kolkata, and often parts are sourced from Chennai or Mayapuri to meet this trans-border demand.

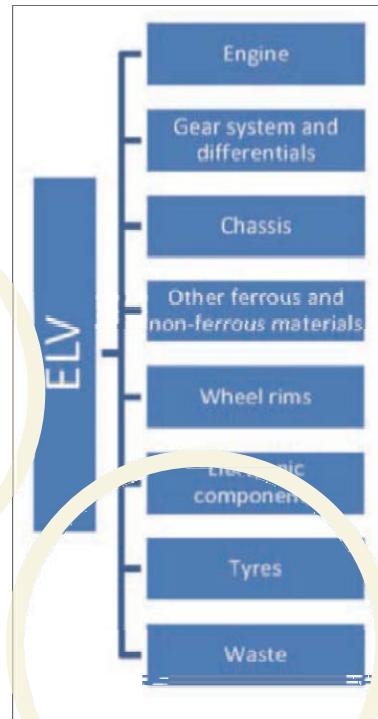


Figure 24: Commercial and non-commercial material flows emanating from an ELV

Engines are sold either in compact form or in parts. The parts of an engine with the highest commercial value are the head, the valves, the pistons and pinions. These are 'slow moving' items — that is items with an inventory period longer than average — and hence traders require larger access to liquid capital to enter this segment. Profit margins in the trade of engines are very significant, and can go up to 50%. Markets in Kolkata and Chennai are fast moving in this segment — with a higher demand for parts than in other parts of the country, while secondary markets like the one in Jamshedpur depend upon the larger markets (like Panagarh and the Kolkata area, in this case) for orders.

The engine market of Indore depends on Delhi and a limited local demand, with a lower rate of trading. Large traders have to stock up to meet orders from Delhi. The market in Pune, instead, depends on Mumbai and Ahmedabad, which are larger markets that source parts from surrounding regions to meet shortfalls in supply. In some cases, as is the case of Jamshedpur, engines are not sold but exchanged. The buyer pays a nominal price for purchasing a used engine and cedes the original one, which is either refurbished or sold as scrap by the trader.

The trade of engines in smaller vehicles also follows a similar pattern, but unlike large traders of engines for commercial vehicles, this is typically a business line for small traders. The profit margin for engines of smaller vehicles is lower, and so is the demand. The normal holding time for an engine is as long as 12 months, after which it is broken down into ferrous and non-ferrous components and sold as scrap to traders who in turn supply it to rolling mills in nearby areas, in every city.

Engines from large commercial vehicles are also used as generators in rural areas, while engines of smaller vehicles are often used to draw ground water for irrigation. In some cases they can also be used to motorize small rickshaws that are employed to transport grains between villages and local markets.

Gear Systems and Differentials

The gear systems and differentials business for commercial goods and passenger vehicles is normally in the hands of large traders who have the space to store these parts. These parts are mostly refurbished and then sold as used spares, and only very rarely sold as scrap.

Unlike engines, the gear parts and differentials trade always operates at a local scale. Very few customers, other than in the case of accidents, look for the entire system at once. Accordingly, these are normally broken down into gearbox, shaft, differential and axle, before being sold.

Since these parts are ferrous in composition, in case there is any defect, which cannot be fixed, gears and differentials are sold to scrap traders and finds their way to rolling mills in the vicinity, where they are used to manufacture girders for the construction industry.

In case of smaller vehicles, innovative techniques have been devised for reusing these parts. Gears from scooters and motorcycles (and even from auto rickshaws) find their way into rural areas where they are used to motorize smaller vehicles used for local transportation of grains and other goods.

Chassis

This is one of the heaviest parts of a commercial vehicle. Indeed, the entire weight of the vehicle rests on the chassis and this is one part that — according to the traders interacted with — has the lowest obsolescence rate. Chassis have been known to last as long as 50 years, resisting use in multiple vehicles during their life.

The demand for chassis, however, has dipped over the last 10 years. The traders blame primarily the newer designs, but also the use of far stronger metal alloys than before.

The chassis of military vehicles are in particularly high demand: in reason of their limited use, they are treated as almost new.

Ingenious ways to reuse chassis have also created a market for them in rural areas. Tractor trolleys, which are used to transport grains or passengers in rural areas, are typically built on chassis which has been extracted from a commercial ELV.

Smaller vehicles, except SUVs and large sedans, do not have a chassis, and the structural component of these vehicles is simply sold as scrap.

Other Ferrous and Non-Ferrous Materials

Commercial goods or passenger vehicles have a large number of parts which are non ferrous in nature. Tin plates, for example, are used for the outer body of the vehicle. In case these have not been sheared in accidents, they are used in other vehicles and only later they are sold as scrap.

The item in highest demand are however bumpers and vehicle doors. Smaller traders are normally engaged in this segment. The supply comes from auctions of older vehicles, auctions conducted by insurance companies and auctions conducted by service stations.

Rims of Wheels

Wheel rims represent a separate category because they are at the centre of a very fast trade. Typically, once a vehicle is dismantled, a trader who deals in the rims separates the tyres from the rims and refurbishes it to sell it in on the local market on the same day.

Electronic Components

Electronic components are normally sold as scrap. Large traders of commercial goods and passenger vehicles try to sell electronic components to scrap traders, who then extract copper and other precious metals from them, often by burning them.

In very few cases in Kolkata and Chennai, it was observed that the traders have shredding machines that separate the copper from the wires (in these cases, the rubber is then sold as scrap).

Fuses in newer vehicles, instead, are treated as waste: they are either dumped with municipal solid waste or abandoned along highways. Fuses from small vehicles meet the same fate, except for a few which are reused.

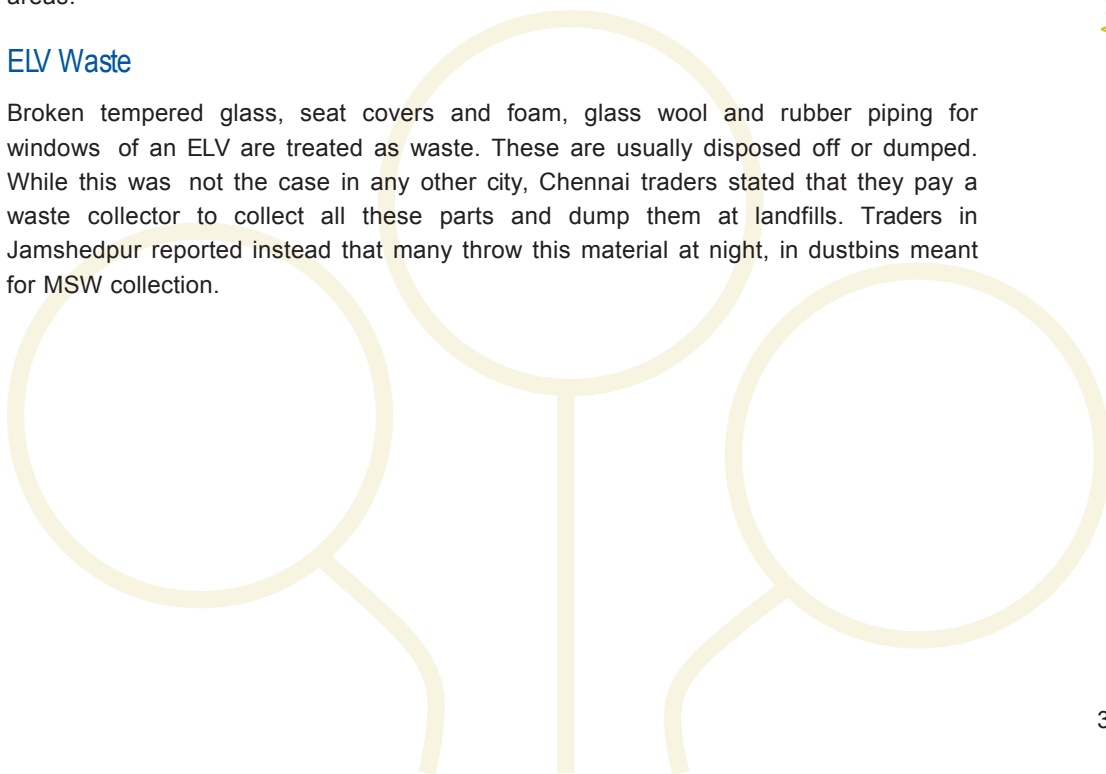
Tyres

Tyres represent a major source of rubber, and are converted for multiple uses. The most common use for tyres across all cities is as a spare in running vehicle — depending on the conditions of the piece. While in Kolkata, Chennai, Pune and Indore spare tyres are sold, in Jamshedpur they are also rented out to vehicle owners.

In Jamshedpur and Chennai (especially in the urban outskirts), tyres are used as a fuel for melting tar for road construction. In Indore, oil is extracted from tyres through pyrolysis process, and then sold on the market as fuel. In some cases, carbon black, a by-product of pyrolysis with very low calorific value, is used for paving roads in rural areas.

ELV Waste

Broken tempered glass, seat covers and foam, glass wool and rubber piping for windows of an ELV are treated as waste. These are usually disposed off or dumped. While this was not the case in any other city, Chennai traders stated that they pay a waste collector to collect all these parts and dump them at landfills. Traders in Jamshedpur reported instead that many throw this material at night, in dustbins meant for MSW collection.



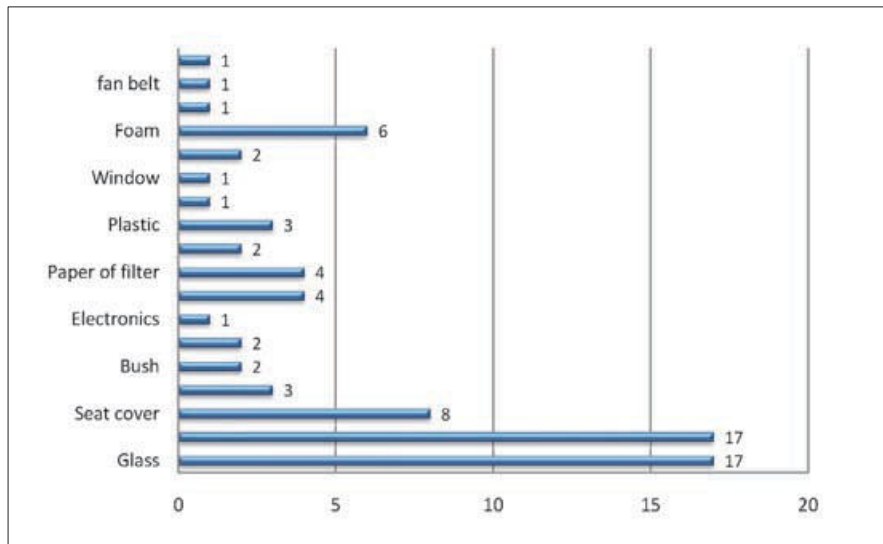


Figure 25: Glass and rubber are the 2 components most often cited as non-reusable. Disposal practices for these parts have not been regulated yet.

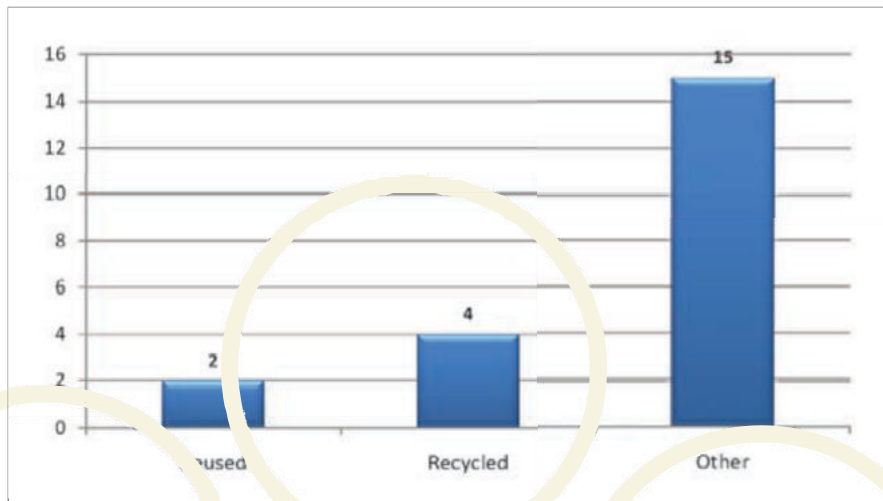


Figure 26: A majority of respondents stated that glass wool cannot be reused or recycled. It is treated as waste and is either thrown with Municipal solid waste or disposed off along highways.

Profits from Trading of Parts

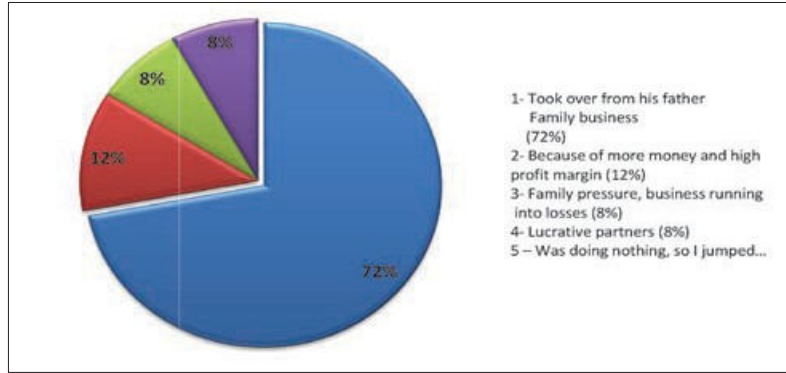


Figure 27: High profit margins are a driving force for newcomers in the ELV sector.

Any vehicle is a sum of its parts. There are close to 3,000 components in a vehicle, and each is manufactured based on the sought durability and prescribed safety standards.

Over decades, used parts traders have become specialists in using and reusing these resources to a maximum. Whenever a vehicle reaches ELV status, there are parts, which are in working condition, whether because they have not been used long enough, or because they have been recently replaced. These parts are extracted and retailed by specialized traders at a premium.

The study computed data on the profit margins for main ELV parts traded in the informal sector currently. The graph below illustrates these rates:

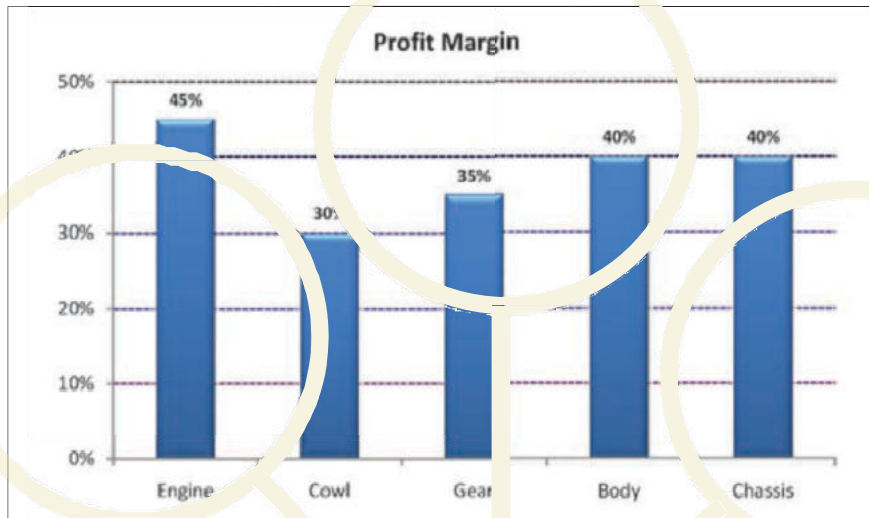


Figure 28: Profits are the highest from engine trading

The parts mentioned above are normally metallic, ferrous or otherwise. Beyond these materials, there are several parts that are extracted from vehicles like plastics; rubber and wood — almost all find a market.

A used tyre dealer normally makes a profit of 15-20% while someone dealing in plastics makes a margin of close to 15%.

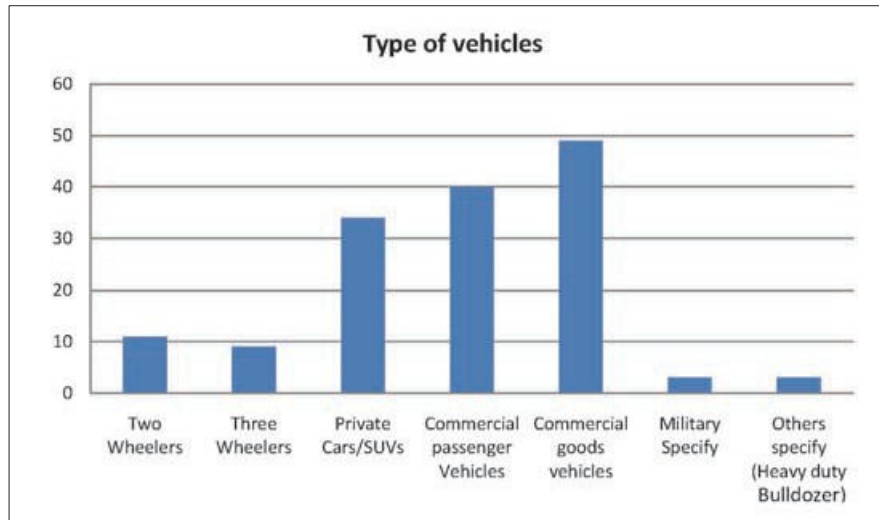


Figure 29: A large number of traders like to work in the commercial goods and passenger vehicle segment because the margins are very high and the shelf life of the used parts is short.

Unused Parts: Toxic

An ELV contains also parts and substances that are toxic or highly polluting. These include asbestos found in brake pads and any of the oil used in the engine, gears, brakes, etc. Batteries also contain toxic acid that can be a potent water pollutant if not disposed properly.

Central & State Pollution Control Boards are responsible for implementing the various Waste Management Rules ex. Hazardous wastes, Battery Wastes and e-Wastes, some of wastes generated from ELV sector may come under the purview of these Rules.

Waste oil management rules, for one, are implemented strictly by the Pollution Control Boards. Vendors are required to obtain and renew their oil refining licence yearly.

Fluid	Disposal mode	Reuse end
Engine Oil	Sold	As grease in machines
Transmission	Drained	
Coolant Fluid	Drained	
Power steering	Sold	Used as grease in machines
Brake Fluid	Drained	
Hydraulic Fluid	Drained	
Diesel	Sold	In machines, agricultural pumps, grass cutter.

Figure 30: What happens to vehicle fluid

The enforcement of the Battery Management and Handling Rules 2001 needs to be vigilant in this area. Toxic battery water is systematically drained to reduce the weight of the battery before they are sold to recyclers. Recyclers demand that this be done so that their costs are decreased — recycling the toxic acid is in fact a separate process.

Sellers of batteries from ELVs include mechanic/dismantler/service stations, and buyers are typically only authorized recyclers.

The sector still does not have any way to neutralize or extract any value from asbestos, and it is usually dumped either with municipal solid waste or alongside highways. The SPCBs and the municipalities need to ensure that Waste Rules are strictly complied with.

Unused Parts: Waste

Each part of an ELV has its own market value, a demand and a supply. There is however parts which have no market because they cannot be reused. These include: coil wire, fan belts, fog lamps, glass wool, bolts, foam, rubber, seat covers, small pipes, electronic components, wires (either plastic or rubber), oil and air filters, and clutch plates. The air or oil filters body; catalytic convertor, carburetor, brakes and clutch plate are reused only if in good condition, else they join the list of ELV components that are simply disposed off as waste.

These small items make their way to some corner of the dismantling yard, only to be later dumped or disposed in landfills, or often simply alongside highways.

How is the Indian ELV Landscape Changing According to Key Stakeholders?

Markets across different places have evolved towards use of materials over time. Delving into the history of these markets suggests that traders have been handing knowledge of the work across generations, through family businesses.

The ever-increasing size of the automobile industry has however started to take a toll on the infrastructure that is available for the players in the ELV sector. Land availability has become a major issue in cities like Kolkata, Pune and Chennai. The varying availability of labour and its rising cost is another issue that these traders have to deal with on a regular basis. Smaller cities like Jamshedpur and Indore have been able to offset land issues by allocating areas like Transport Nagar in Indore and a stretch on NH-33 in Jamshedpur for these activities. However, these once peripheral areas are now being integrated in the quickly expanding urban fabric.

Over the last 10 years, the automotive industry has developed considerably, and the ELV sector has had to adapt and catch-up, also in terms of technology. Smaller markets like Indore, Jamshedpur and Pune are today on the verge of closing down, had it not been in integration with the larger national ELV market driven by Mayapuri in Delhi. Many large players have either moved to different businesses altogether, or have started selling branded spares. With dramatic dip in the profit margins, in these cities only large players have maintained sustainability.

Chennai and Kolkata are still flourishing primarily because of their capacity to trade in bulk with Bangladesh or with the Mayapuri market in Delhi. The sustainability of these markets will however be tested over the next few years when the used parts trade is likely to dwindle due to changes in design of vehicles and new challenges in refurbishing parts. The existing ELV material flow is likely to take a new route from the disposer directly to the scrap trader, and used parts traders may have to find a new space for themselves, decreasing the material efficiency of the whole sector. Capacity building for this sector is a huge priority, particularly if the goal is to increase resource efficiency of the automobile industry.

Over the last 10 years, vehicle obsolescence rates have also started to be defined by law, and civic authorities within city boundaries have implemented stricter rules. In Chennai, for example, state buses and other goods and transport vehicles are currently issued permits to run only for 8 years – compared to 15 years earlier. Once the permit expires, they are either dismantled or sold off through auctions. Many of these vehicles, however, change registration numbers and start operating in rural areas.

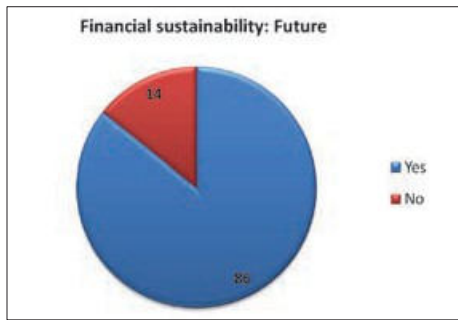


Figure 31: ELV trade stakeholders predict that in the future a growing portion of ELVs will be sold for scrap, because of technological changes in the vehicles manufacturing process itself.

OEMs have also designed warranties for parts for up to 3 years, and the emergence of authorized service stations have further reduced the volumes of the trade. OEMs do not sell used parts in the ELV market, but scrap it. The product then finds its way into rolling mills where it is converted into girders for the construction industry. The major implication of these changes is a depression of the ELV parts market across the country.

The number of vehicles becoming obsolete today is 4 times as high as 15 years ago. Capacities, however, have not been built systematically during this period and the sector is still extremely labor intensive. Policy frameworks have set barriers for the very few formal ELV operators and, in the informal sector, material efficiency is being lost because much material is now being scrapped rather than reused.

The Informal Recycler

The informal sector has played for decades an invaluable role in managing ELVs, extracting value through their work from materials whose disposal posed only costs to public authorities or private consumers. Till the early 2000s, these actors managed to carve an economic sector that exploited the automobile industry's resource-heavy production processes. The accumulation of knowledge thrived owing to a family businesses model, turning reuse and recycling practices into a profitable economic sector. In the last two decades, however, the opening of the Indian market for FDI, a spiraling demand for private vehicles, and government support to the industry, has impacted deeply the ELV landscape. The sector still manages the piling ELVs for the major part, but new actors have entered the market in one way or another. A move such as that of the redesign by OEMs of commercial goods and passenger vehicles resulted in hundreds of engines, gears and differentials losing their market as second-hand parts, and being sold by weight as scrap.

Labour has been another critical issue for the sector. Earlier, inter and intra-state migrations provided an easy source of cheap labour for ELV traders, guaranteeing margins that would drive the growth of the business. Later, and particularly from 2008, an increase in wages combined with falling rates for scrap starting squeezing traders' profit. Many large traders today feel that, unlike earlier, their only capital are the parts they often sell as scrap to keep the business running, including often to buy new parts.

The commercial value of ELVs naturally precedes any other consideration for the informal sector. Many believe that their work should be recognized, as has been the case for other sub-sectors of India's recycling industry. Moreover, in just three decades their physical location within the urban fabric has shifted from the outskirts to residential and business areas. A general space crunch in Indian cities is affecting the volume of business, particularly by increasing costs.

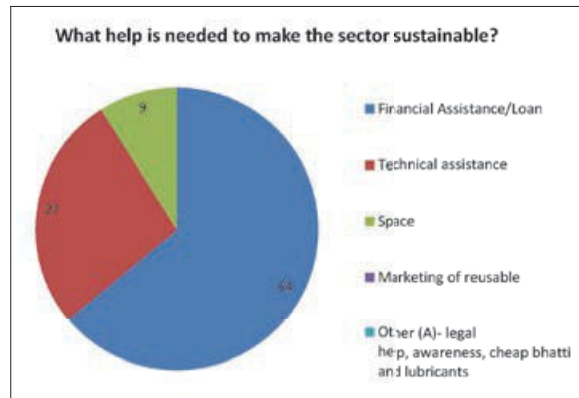


Figure 32: Lack of space is the major obstacle towards business expansion. Limited access to business finance is also a concern, and a direct implication of that of legal recognition of the sector.

Considering the growth of the automotive industry and shrinking legal obsolescence term, the economic and material management functions played by this sector are only going to become more central to the economy and the environment. Not only does the informal sector need space to work, but also access to capacities and financial tools to thrive again.

The traders believe that newer models coming into the business with high manufacturing standards will help them going forward. This is primarily because knowledge will be universal and will be shared amongst peers. Sturdy materials will also lead to higher prices for reused products because obsolescence rates of the parts will reduce and even vehicles with higher vintage will command a higher price at the dismantling stage.

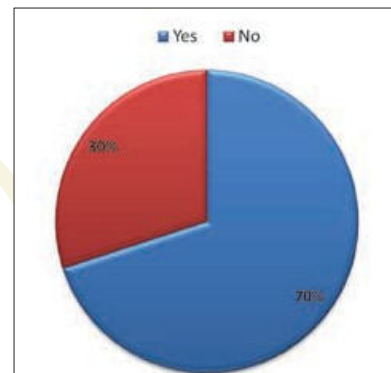


Figure 33: 70% of the traders face issues with the police and municipal staff. This is a major source of reputational hazard for the sector, and contributes to impacting negatively the business.

The traders also believe that legalizing the trade of used parts can benefit OEMs as the ELV trade is facing a tough competition from non-branded low-cost vehicle parts imported from China. More than 70% of the traders stated that demand for parts has decreased over the last 4-5 years. Besides that the supply of used parts and obsolete vehicles for dismantling will only increase after the trade is legalized.

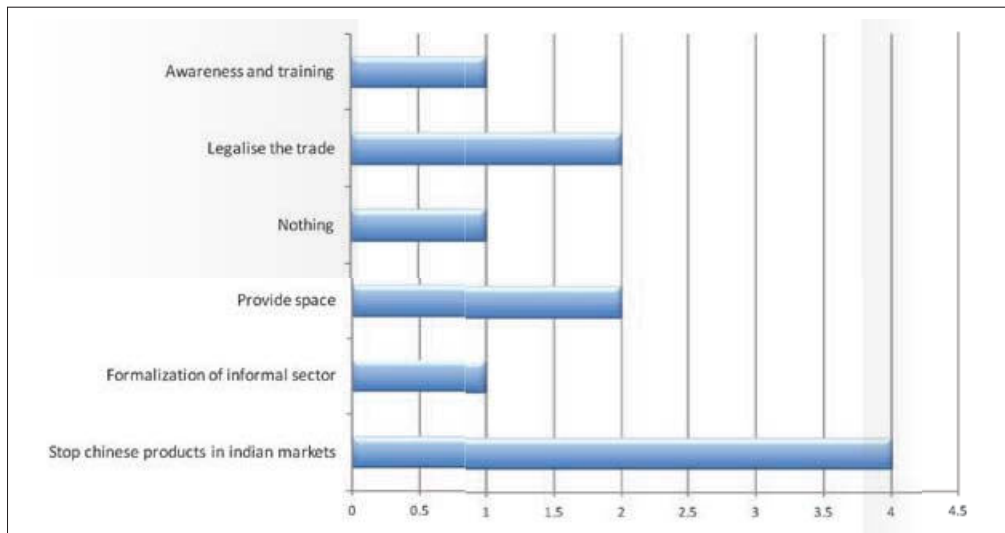


Figure 34: The ELV trade is facing a tough competition from non-branded low-cost vehicle parts imported from China. More than 70% of the traders stated that demand for parts has decreased over the last 4-5 years. They believe that legalising the trade of reused parts will provide an enormous push to the sector.

The Formal Recycler

ELV recycling as a business opportunity has yet to be explored by the formal sector. The existence of a legal and regulatory framework will be instrumental in this sense, as it has been the case for other value chains.

Other initiatives have had limited success. In 2006 the government has set up a facility at GARC, close to Chennai (NATRIP), to conduct research specifically on ELV dismantling. A number of vehicles have been provided by the OEMs to initiate research.

There is no clear implementation procedure for de-registering a vehicle. Without de-registration, no vehicle can qualify as an ELV, and unless it is declared so, it cannot be traded as scrap according to the Motor Vehicles Act 1956 and successive amendments. This poses an insurmountable obstacle to the few formal recyclers in the ELV industry.

Currently, registration and de-registration are still a localized process: a vehicle has been registered under a RTO, can only be de-registered by the same RTO. This makes legal access to ELVs difficult and often also expensive.

De-registration is also not (yet) a standard process. Different RTOs have different processes, including in some cases 6-months procedure that involve multiple taxations and insurance, or a provision that RTOs cut the chassis number and deposits it with local court to declare a vehicle an ELV.

The formal sector can access mainstream finance tools, but cannot operate outside of a regulatory framework. Also, it has to compete with the informal sector for ELVs and has to learn how to maximize its use of resources.

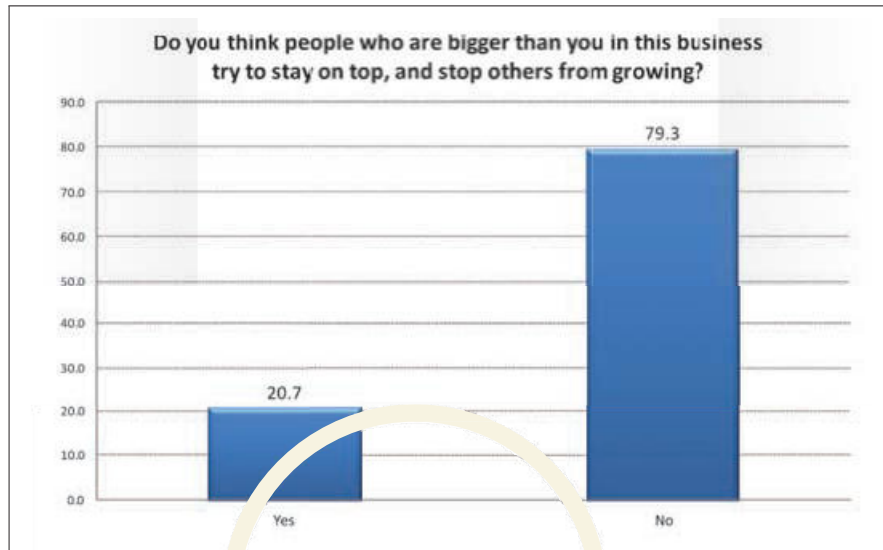


Figure 35: About 80% of the respondents feel that there are no monopolistic attitudes among larger traders in this business. They feel that since the larger players have higher operating costs, the price that they set helps the smaller players to maximise their profits.

The OEMs

OEMs are the drivers of the automobile industry, contributing in very significant measure to the growth of the national economy. Thousands of jobs have been created over the last 15 years, pushing the demand for consumer goods to unprecedented levels. Consumerism has brought the issues of waste to the forefront. While policies have been drafted taking cognizance of different types of waste that pose a problem at the moment, the government needs to focus into the waste that will pose a challenge in the future too, like that from ELVs.

Extended Producer Responsibility has been flagged many times during the last decade. According to the law, the principle makes the producer responsible for the goods it manufactures till the end of their life, including their post-consumer handling. EPR prescribes that the costs of managing post-consumer resources be built in the cost of the product itself, sharing the burden between the consumer and the law and embrace this responsibility.

In particular, OEMs may perhaps argue that they only assemble the vehicles, and hence are not responsible for the original materials. In turn, component manufacturers say that they produce based on the specifications set by OEMs, and hence they are not solely responsible. The OEMs however are also of the view that if they were allowed to trade used parts, they might change their take on EPR.

It remains to be seen what resource efficiency EPR allows. EPR models being implemented in Europe offer varying degree of success and flexibility, with implications for their material efficiency. To ensure that the ELV sector survives in India, while consumerism, demand and growth are not sacrificed it is necessary to explore whether a robust policy framework make all stakeholders accountable for their actions, proportionally to their role in the economic chain of the automotive sector.

Occupational Health and Safety Challenges in the ELV Sector

In India, ELVs are almost entirely processed in the informal sector. Despite being known for one of the highest rates of recycling in the world,⁴ jobs in the informal sector are normally precarious and insecure; they thrive in hazardous or unhealthy environments, and they cannot rely on formal health assistance or safety nets.⁵ This makes informal sector workers systematically more vulnerable to environmental and health challenges. Some of the implications of the sector are elaborated below.

Workers

ELV workers are no different from their counterparts working in comparable conditions in other resource recovery streams. They lack systematic access to basic health and welfare services, and work in an unhealthy and unsafe working environment. 62% of respondents to this study reported that the cuts and bruises happen on a daily basis.

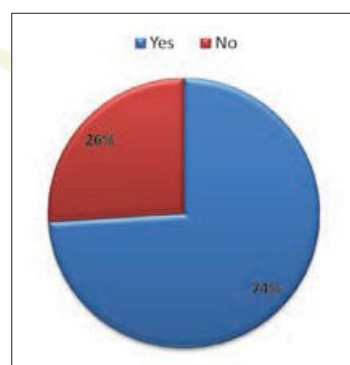


Figure 36: More than 70% of those in the used parts trade are aware that there are waste streams associated with the dismantling of a vehicle. These waste streams contain hazardous wastes as well as those for which no provisions for disposal exist.

4 Cooling Agents, Safai Sena, The Advocacy Project & Chintan 2009

5 Recovering resources, creating opportunities, GIZ, 2011

17% of the respondents agreed that when waste is burnt, the fumes from the same are “unbearable”. 24% of respondents agreed that they suffer from skin diseases because they are in constant touch with chemical substances. 17% of respondents agreed that they are troubled with frequent stomach ailments. A quarter of the respondents suffered from skin diseases and 10% reported breathing difficulties linked to inhaling chemical fumes.

The infrastructure where they operate is often rundown, and in many cases the lack of space forces them to operate from roadsides, with a consequent lack of access to basic sanitation and potable water. Less than 10% of respondents interacted with used protective equipment and contact with hazardous substances and dust was routine. Most of the workers, especially unskilled labourers, work more than 12 hours in a row. The working conditions of ELV operators present overall a higher exposure to health hazards, particularly on the workplace, and poor access to health services, inside and outside the workplace.

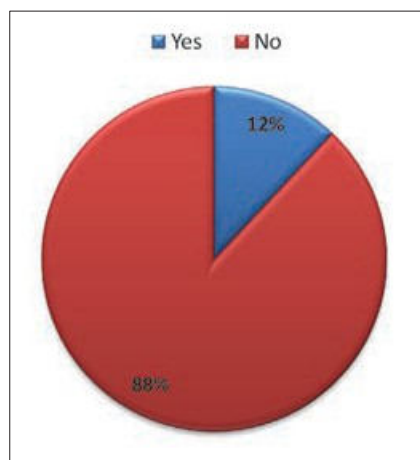


Figure 37: About 90% of the respondents are unaware of the environmental hazards associated with dismantling an ELV and trading its parts. The driving force behind the trade is economic.

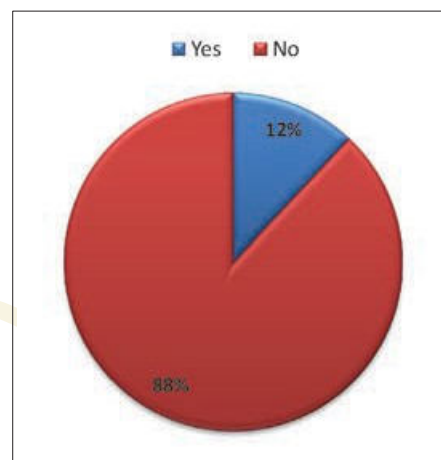


Figure 38: About 90% of the respondents believe that the work is not harmful for them or physically stressful.

Impact of ELV Trade on Nearby Areas

Field exposures to ELV markets in the 5 automotive hubs point to high ecological and environmental risks. Toxic liquid waste (like engine oil and battery water) are dispersed in the environment, even when — as is the case of engines — the aim of ELV operators is to recover it. In Chennai’s Pudupet market, the practice of discharging battery water in public drains was observed to be systematic.

Broken tempered glass, seat covers and foams, glass wool and rubber parts on windows are treated as waste from a dismantled vehicle. Chennai traders stated that they pay a waste collector to collect the same and dump it in landfills, and in no city these materials are sold. Traders in Jamshedpur reported dumping this waste in MSW bins during the night.

The implications of these practices in terms of environmental impact — ground water and soil pollution in particular — are still largely underappreciated, and more research is urgently needed to quantify and qualify the threat it poses for local communities of residents.

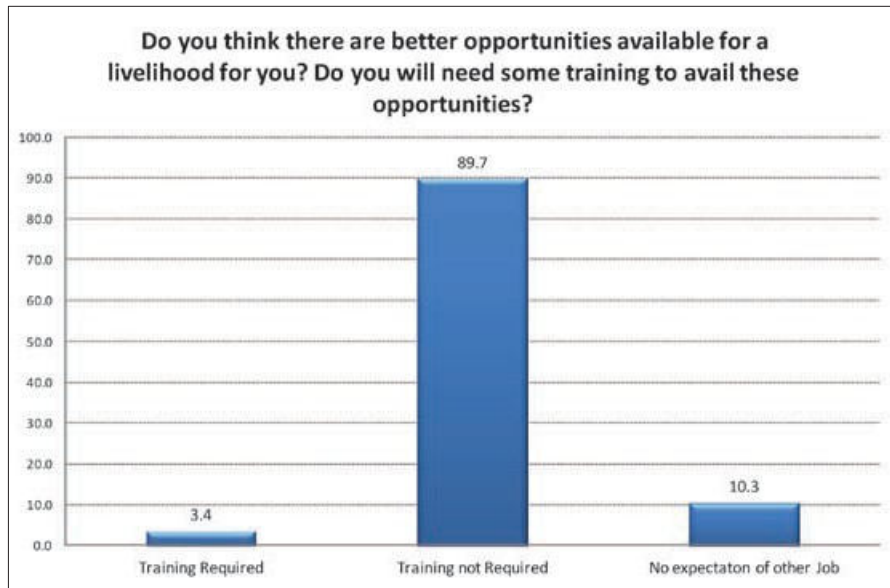
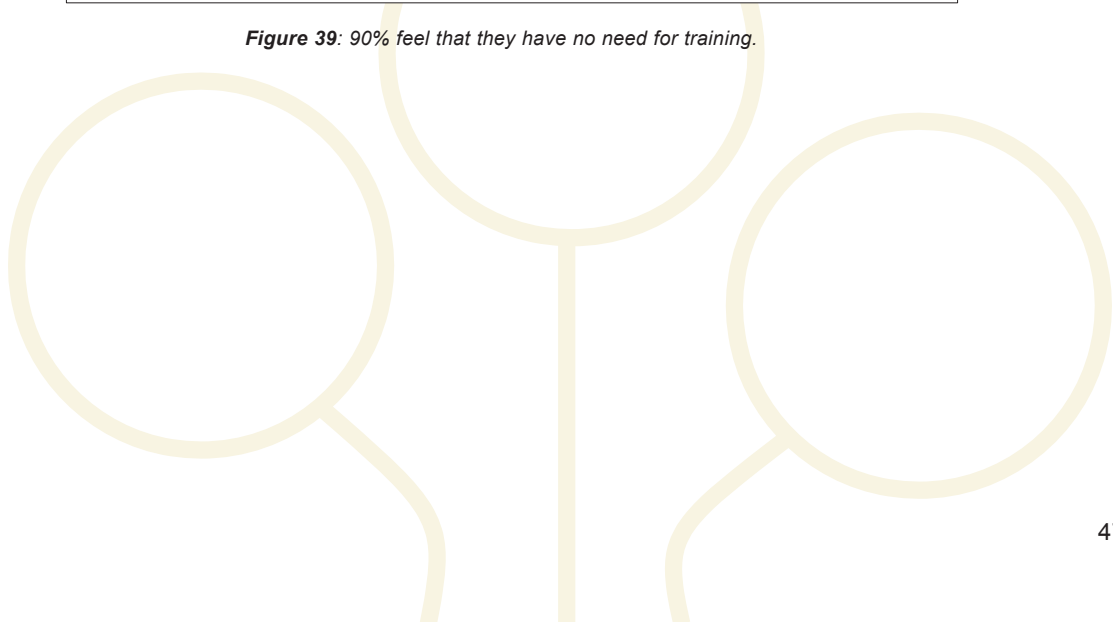


Figure 39: 90% feel that they have no need for training.



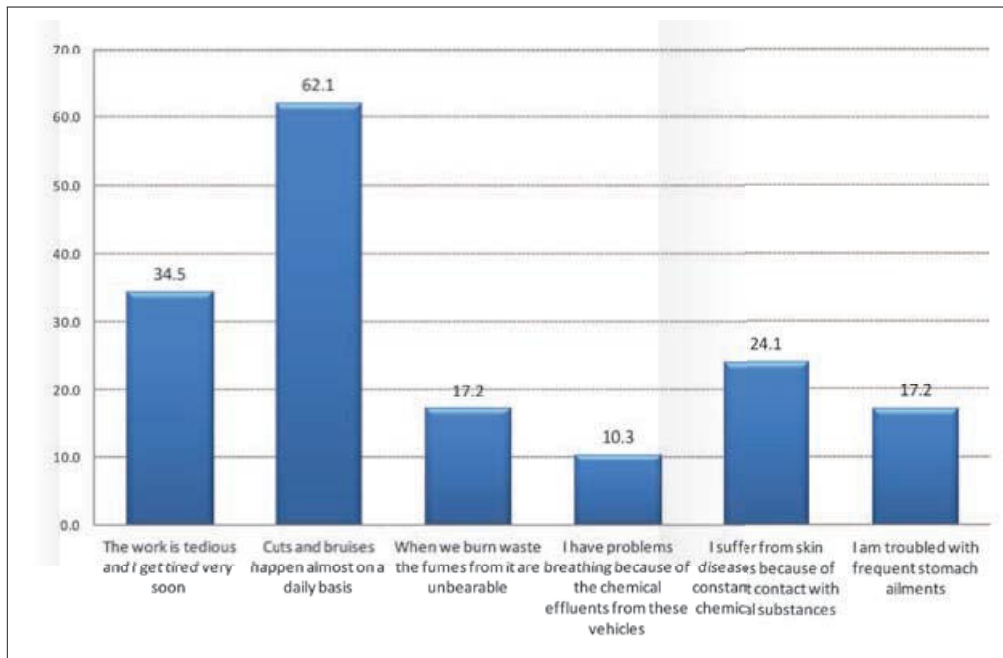


Figure 40: 62% of respondents admit that cuts and bruises happen on a daily basis.

5. Major ELV Hubs in India

In this section, an over view of the ELV sector is provided for the 5 major Automobile component hubs in cities of Kolkata, Jamshedpur, Chennai, Pune & Indore. The assessment of the sector is based on structured and unstructured interactions with ELV operators.

Chennai

There are 2 hotspots for informal sector ELV recycling in the city of Chennai: Boarder Thottam, where a majority of goods and passenger vehicles are dismantled, and Pudupet, which is the hotspot for dismantling 2-wheelers and 3-wheelers. Both markets are marked in the map below.



ELV hotspots in Chennai

Further, Chennai houses a government facility dedicated to cars and specifically ELVs, the Global Automotive Research Centre (GARC), which in turn hosts the National Automotive Testing and R&D Infrastructure Project (NATRiP). This facility was set up in 2006 in collaboration with the manufacturers to enable the study of ELV recycling. The facility has till date been able to dismantle 85 vehicles which were primarily provided by manufacturers. The centre also conducts tests for new vehicles, including for design purposes.

Boarder Thottam

Boarder Thottam is a 50 year old market located within a residential area, two kilometres away from a newly built state government multi-specialty hospital, and behind the landmark LIC building on Mount road. Vehicles are dismantled in large sheds and their parts sold on the same premises. Vehicles of various types find their way to this market, but Boarder Thottam is known as Chennai's major hub of commercial goods and passenger vehicle parts. Some of the specialty items found here include tyres in bulk and Ashok Leyland Wheel discs and engines, for which traders come from as far as Mayapuri in New Delhi.

The market features around 500 shops distributed along five streets, hosting more than 600 ELV operators — dismantler, used parts trader, used parts re-furbisher and in some cases large mechanics. An additional 1,500 labourers work in the market. Large workshops dismantle about 4 to 5 vehicles daily. The price of vehicles is set according to market rates, and varies depending upon the age of the vehicle and a cursory assessment of the value of its parts, with the typical margins being in the range of 15-20%, once all viable parts are sold. Vehicles that arrive to the market after an accident typically offer higher profits based on the abundance of re-sellable parts, with margins of up to 50%.

The market also receives vehicles from finance companies that recover unpaid credits by impounding vehicles. A number of vehicles are however also sourced through informal, and illegal, channels, as in the case of vehicles impounded by moneylenders. It was gathered that there was a system of dedicated night auctions whose purpose is the immediate dismantling of vehicles and the sale of parts to traders before the owner has the opportunity to file a complaint with the police.

ELVs come to this market from both within and outside the city. Some dismantlers based in Boarder Thottam also compete for government tenders for ELV public busses, which usually take place during February and March every year. In this case, the dismantling of buses is done in the outskirts of Chennai, close to bus depots.

The activities of buyers and sellers of ELVs and second-hand parts starts early in the morning. Typically, vehicle dismantling begins at 4 am and finishes by 10 am, before the temperature rises. Information regarding which vehicles are being dismantled spread

through informal networks, mostly by word of mouth, attracting specialized second-hand parts traders who negotiate the sale of each part separately. Auctions are informal in nature but generally transparent, with the highest bidder winning the lot on offer.

Labourers are paid by vehicle: Rs. 1,000 to dismantle a jeep and between Rs. 2,500 to Rs. 3,000 to dismantle a truck. Usually, 4-5 labourers are required to dismantle a truck. Some skilled labourers to work faster use gas cutters. The dismantler usually provides gas cylinders.

Hazardous waste like used engine oil is sold for Rs. 25 to Rs. 30 a liter. Unlike other automobile component hubs those were studied, in Chennai the used oil is usually sold to construction companies, who use it to lubricate wooden planks used to shape cement roofs in new buildings. Battery liquids are drained before batteries are sold to authorized battery recyclers.

Iron scrap was sold at Rs. 23 per kg, Aluminum scrap at Rs. 110 per kg and copper scrap for between Rs. 250 to Rs. 300 per kg during the visit, however the rates of metals fluctuates according to market prices.

Any vehicle that reaches the market for dismantling with complete paperwork is first assessed for re-furbishing, and at times sold as a functioning second-hand vehicle once a few parts have been fixed or changed. This presents advantages in terms of cash flow in the short term for traders. However, dismantling and selling parts remains a more profitable activity.

Pudupet

The Pudupet ELV market is situated about 2 Kms away from Boarder Thottam. This market primarily deals in smaller vehicles, including 2-wheelers, 3-wheelers and 4-wheel passenger vehicles, but small trucks are also occasionally dismantled. Like Boarder Thottam, Pudupet is over four decades old.

Pudupet counts 458 establishments and on an average 90 ELVs handled every day. The total number of people involved in the ELV business at this location is around 2000.

Any single dismantler works on about 50 vehicles every month. The business has increased over the years, in line with the growing demand for personal passenger vehicles. The market has a strategic position within the city and is easily accessible for customers in search of spare parts. Talks regarding a possible move to Chennai's Auto Nagar (50kms outside the city centre) are not well taken by market operators, who fear losing direct access to their customer base.

Many of Pudupet's traders source vehicles through auctions for dismantling, and a number of them are mechanics who also trade, leveraging their skills to re-furbish used parts to sell them without recurring to intermediaries. Hazardous waste (used engine oil in particular) is stored in drums and then sold off to authorised recyclers. Batteries are drained in local sewers to reduce the weight of the battery before they are sold off to recyclers.

The dismantlers provide gas cutters to the labourers to increase the dismantling turn-around. The labour employed is usually made up of waged employees, and very few shops employ daily labourers for such activities in the area.

J Mohammad Ali of Pudupet

Ali was a laborer at a mechanic shop in Myanmar, from where his father brought him to Pudupet as a teenager in 1985, after moving there himself in 1980. Ali's family is originally from Ramanathapuram, where they were agricultural labourers and into the salt business. Ali's father came back to Chennai as part of the larger flow of Indian migrants to Myanmar who moved to Pudupet in those same years, where they were given a plot of land.

Ali says that the business is still good at Pudupet. He can make a profit of 40% from his business, 4-wheel ELV being the segment with highest returns. There is no business without investment, however: a lorry for Gujarat costs about Rs. 5 lakh. A group of traders which Ali has joined created an informal shared cash pool, with monthly contributions of Rs. 50,000. Members borrow the money whenever they need. Ali would like to be able to access some government-sponsored financial support for his business.

Ali says not to be interested in shifting to Auto Nagar. According to him the demand to shift comes only from the large vehicles auto unions, for whom it would make sense. For smaller dealers like Ali, the shift would involve the risk of losing many of his clients.

Paneerselvam: Spare part dealer

“I have heard that the automobile part market here started in the 1960s. However, my father brought me here in 1979. My father was here from 1968 ,” mentions Paneerselvam. “In those days the market was small and there were less than 10 people working here. Now there are about 458 establishments and at any given moment about 92 ELVs are being handled,” he adds. Paneerselvam dismantles about 50 vehicles a month. Thinking about the past, Paneerselvam notices that people now tend to change vehicles very fast, “like they do with mobile phones”. Also, new rules on maximum mileage contribute to bringing about 80 new vehicles at the market every day and so are 5-year depreciation rules and 3rd party insurances, particularly for parts. Customer, according to Paneerselvam, still like coming to Pudupet market because they can find single spare parts: “if you need a car door handle the shop will sell 4 pieces, but from us you can buy exactly what you need”. Yet, he believes that his work is beneficial and appreciated by large companies like Hindustan Motors, they also contribute to growing the market for cars.

Many things have changed, too: Paneerselvam estimates that recycling rates for parts shrunk from “70% to 20%”: parts that use electronic circuits are not reusable, and specific models (like Sumos) have very few parts that can be reused or refurbished at all. “Buying a new vehicle sometimes might feel easier!”. Service stations have also taken over the job of local mechanics, who had strong networks within the ELV market. People like Paneerselvam have no choice but adapt, says his son. To keep operating, Paneerselvam is diversifying. He recently went to China from where he procured a fork lift. He now rents it out for additional income.

Like many others, Paneerselvam takes the opportunity to complain of problems with the police: allegations of trade of stolen vehicles is frequent. He also complains about having to pay high taxes to submit RCs to the local RTO when sourcing vehicles.

Kolkata

The study explored three main ELV markets in Kolkata: Phoolbagan, Mullick Bazar and Panagarh.



Map of ELV processing hotspots in Kolkata

Phoolbagan

Situated close to Rabindra Bharati University, on BT Road, Phoolbagan is Kolkata's hub for ELV parts traders. The market, set up to relocate to Bagbazar in the 1980s, the market is divided in two sections: one with retail shops and another with scrap yards where ELVs are 'cut' and their parts sold either to traders or to scrap dealers. There are close to 1000 businesses in the market, and in a day about 5-6 large commercial vehicles are dismantled and sold off in parts or for scrap.

The commercial vehicles that are dismantled are mostly purchased through auctions run by finance companies, insurance companies, transport companies and the police and transport department. In fact, the market mostly deals in vehicles that have been seized or were involved in accidents.

The market hosts a wide range of specialized operators: auction traders, traders who purchase parts from dismantled ELVs, refurbishers of ELV parts and second-hand traders of full vehicles who put on the market vehicles that are still functional (in these cases, profit margin can rise from 20-30% up to 50%).

Dismantled ELVs are channelled through 5 material flows, which are handled separately:

- Body including the chassis
- Engine

- Differentials including gears
- Other electronic and mechanical parts
- Plastic, rubber and glass including rims

The ELV body, including the chassis, is sold either directly to refurbish accident vehicles or sold as a part. Any damaged component of the body is sold directly to scrap dealers.

If the engine casing is intact, it is usually sold directly to private buyers. In some cases, the price of the transaction is adjusted by subtracting the scrap value of the engine being disposed off. Whenever the engine casing is not intact, specific parts (like the head and the mount) are recovered, the rest is sold by weight to scrap dealers.

Engine oil is sold to scrap dealers who filter it and market it for use in industrial machinery.

Differentials, including gears, that come from vehicles that are 8 years old or less (around 35% or all ELVs) are sold as used parts.

Most electronic and any other mechanical part are typically sold by weight to scrap dealers, except fuel tanks, exhaust pipes, air-ducts, which are often refurbished for the second-hand market if not damaged.

Parts made of fibre plastic that are intact are resold. Tyres are also resold if they are in good condition, or used as 'gattis' (or 'camel skin') on old tyres. Safety glass (with a plastic coating) is recycled and tempered glass is dumped, often on highways rather than being disposed off at landfill sites. Other plastic and rubber components, including seat foam and covers are either dumped or burnt.

Recycling of all the scrap coming from Phoolbagan takes place in Durgapur, East India's hub for iron and steel foundries. The material is however channelled by a number of intermediary small and medium-sized scrap traders operating in Bajrangbali, one of India's largest scrap markets. It is from Bajrangbali that large scrap dealers send all the material to Durgapur.

Mallickbazaar

Mallick bazaar is another large used parts market located close to Park Circus, right in the middle of the city. This market deals mostly in small passenger vehicles (including LMVs), SUVs, scooters and motorcycles. Auto rickshaws, instead, find their way into villages and smaller towns close to Kolkata after their registration expires with the Transport department. The market is located between AJC Bose road and Elliot road and houses close to 3000 businesses. On an average, close to 15-20 cars per day are dismantled in yards located within the market itself.

ELVs reach the market through a network of middlemen spread across the states of West Bengal, Bihar, Jharkhand and Odisha. This network provides an interface between owners and dismantlers or second-hand car dealers. Middlemen charge a fee of INR 300 to INR 500 for the dismantling of a car in private yards in the market.

In the case of vehicle sold directly as second-hand functional cars, the profit varies from 30% to 50% margins, depending upon the condition of the car. Middlemen prefer second-hand brokering as deals are cashed immediately. These vehicles are normally sold to the customers outside of Kolkata. Typically, these vehicles have either completed their maximum registration (15 years in Kolkata) and have been barred from running within the city by the Transport department.

In case of ELVs dismantled for parts, profits range between 40% - 60% margins, depending on which parts are recovered.

Light Motor Vehicles (LMV) are dismantled in the following parts:

- Engine
- Gear box and clutch system
- Tyres and rims
- Axles and chassis if available
- Body
- Battery
- Smaller parts
- Glass and rubber (waste unless can be resold if in proper condition)

For SUV, the chassis are sold separately. 4-wheeled vehicles are more valuable for their additional mechanical components.

Traders in this market buy used parts from Mayapuri in Delhi too, to meet the demand for specific components in Kolkata.

Ambassador cars are the only ELVs for which used parts are in greater demand than new parts, and only very rarely sold as scrap.

Panagarh

The ELV market in Panagarh first appeared about 40 years ago, in the proximity of an army camp, in an area that was a hub of transportation for the whole Northeast region. Today, it is located close to the Railway station, on Kolkata's GT Road.

The army used Panagarh to auction its old vehicles from the Eastern Region operations. At the time, ELVs from the mining industries also reached the market in large numbers. Gradually, non-industrial ELVs started being channelled to the market too, and the market has now a steady supply of large commercial vehicles from across West Bengal and neighbouring states. Auctions run by Tata Motors in Jamshedpur are a major platform for sourcing ELVs, but the market also sources material from Vijaywada, the hub for Leyland vehicles. Alongside these actions, auctions are conducted by finance companies, insurance companies, transport companies and the police and transport departments. The market still handles a large number of military vehicles coming from MSTC auctions, which happen on the opposite side of the railway line.

Panagarh develops along 3 kms on NH1 and counts around 5000 shops, which makes it a significantly larger hub than Phoolbagan. Used parts traded in this market cater to a large number of collieries operating in the area. Dumper trucks operating in mines locally also rely on this market for spares. Like other markets, the main categories of operators are traders of vehicles and parts, traders who refurbish old vehicle parts and traders who purchase vehicle parts in larger scales through auctions conducted at Tata Motors in Jamshedpur and Leyland in Vijayawada. Traders in this market confirmed that selling cars as complete units is the most profitable transaction, with 10% to 15% higher margins than for dismantling. The proximity of the wholesale market in Phoolbagan lowers the profit margins of the parts.

Dismantling feeds 5 material fl

- Body including, the chassis;
- Engine;
- Differentials, including gears;
- Other electronic and mechanical parts;
- Plastic, rubber and glass, including rims;

The trading of parts happens in the same way as other Kolkata markets, with the only difference that the proximity of Durgapur and the foundries keeps the price of scrap higher than in other markets, with lower transportation costs benefit traders.

Arvind – ELV trader

Arvind, a MBA graduate is the owner of a shop at Panagarh. He has been in the trade at Panagarh for the last 2 years and arrived here from Chennai, where he worked with Canon. Arvind runs his shop as a family business, with his father looking after vehicle sourcing and him overseeing spare parts sales. Like many operators at Panagarh, Arvind and his father are originally from Ayodhya, UP.

Vehicles traded in Arvind's shop are Volvo, Scania, TATA and Tatra. He prefers vehicles sold off after accidents as it typically reduces paperwork. He plans to expand and diversify to trade in all parts within the next five years. He also plans to expand his trade to scooters and smaller cars, and new vehicle parts. Arvind has a vision to reach out to customers in smaller centres, who are unlikely to travel long distances for low value items. He has already tied up with a partner in Pakur, Jarkhand.

Arvind handles between 15 to 20 vehicles ever month, with a lower turn-over during the monsoon and a peak between December and March, months with a higher incidence of road accidents. Arvind describes his work as a 'postmortem', "we open and look inside a vehicle and see what is working and what is not, and then decide what to do with the parts. We have 4 workers in the shop whose only work is to cut and open up the vehicles." Plastics are taken by wastepickers, who may sell the meter boards, if in working condition. Wood in large trucks is often of very good quality, at times teak. If motor parts are in working condition they are resold, otherwise they are melted. Tyres are re-soled and then sold. He also procures a few parts from Mayapuri in Delhi, and includes vehicle parts for companies like TATA, Tupper, Leyland and AMW. On an average Arvind resells 15 -20% of vehicle parts, with the rest being sold as scrap and melted.

Arvind's customers include Afghanis and South Africans. "We also get a number of returning customers from Dhanbad, who come only to me, they trust me" says Arvind with some pride. Complicated paperwork for taxation and export can be a hinderance for international trade, however, and Arvind looks forward to government action to simplify administrative practices for such ELV related bussiness

Jamshedpur

There are two main ELV markets in Jamshedpur, 'National Highway (NH) 33', and the 'Jugsalai'. NH 33 is located along the highway that connects Ranchi to Jamshedpur and is a hotspot for commercial vehicles and part. The market was set up here after it was decided to re-locate Jugsalai for lack of space. NH33 is a sequence of around 400 shops and garages on both sides of the highway, with around 12 shops engaged in dismantling. Most shops, in fact, only retail vehicle parts, with some others involved in refurbishing and assembling, repair and scrap trading. There is no specific yard for dismantling ELVs, and the work is carried out in garages. 15 to 18 vehicles are being dismantled in these garages every month.

Jugsalai is situated on the outskirts of the city, near the main railway track. It is known for its trade in parts of small vehicles such as two wheelers, three wheelers, and private cars/SUVs, as well as small commercial passenger vehicles. A total of 150-200 shops are operating here, excluding retail traders. 5 businesses also engage in dismantling. There is only one yard available for dismantling and around 45 to 50 vehicles are dismantled in this market every month.



Map of Jamshedpur with its 3 ELV markets

Largely, scrap from ELV is sent directly to Panagarh and Phoolbagan in Kolkata, because of the higher value of scrap there. Vehicles in running condition are sold directly in Jamshedpur, and re-usable parts sold throughout the city.

In Jamshedpur, traders have not formed any association, as the scale of trade is very small compared to other centres. Many traders complained about the decreasing business

, with only 25% to 30% of parts being fit for refurbishing or resale. Most components of ELVs are sold as scrap, a significantly lower margins. Now the traders are earning Rs. 3,000 to 3,500 selling parts as scrap, the same parts could profit as much as Rs. 10,000 to Rs. 15,000 if they were designed to be reusable. Iron scrap is bought for Rs. 30 to 40 per Kg (with seasonal variations of up to 20%), aluminium scrap for Rs. 70 to 75 per Kg, plastic scrap for Rs. 5 per Kg — according to national market rates.

Both markets depend on commercial vehicles, while private and individual owners prefer to buy original parts.

Engine oil and other fluids like diesel are sold to the oil refinery Mangalam Refinery Pvt. Ltd. in Ranchi. Fluids are refined to make grease and resold to factories for use in industrial machinery.

Indore

There are three famous markets for the ELV trade business in Indore: Transport Nagar, Mechanic Nagar for commercial goods vehicles and Bhamori for commercial passenger vehicles and private cars and scooters.

Transport Nagar and Mechanic Nagar

Transport Nagar and Mechanic Nagar markets were setup in the outskirts of the city about two decades ago. However, as the city limits expanded, these markets found themselves swallowed by the city, and became the hub for all things related to cars in the city: parts (old/new), refurbishing and welding of vehicle bodies, catering to the city but also for larger areas in MP and Maharashtra.

There are more than 400 shops in the market, and around 200 shops have their own garages where ELVs are occasionally dismantled. It is primarily a retail market for parts of commercial vehicle and reconstruction of heavy vehicle bodies. Most of shops are involved in refurbishing, assembling, and dismantling.

The market dismantles about 300 vehicles every month. The parts of these vehicles are sold off to traders within the market. The sale of parts has become a specialised trade here and the traders are very well off, having been in the business for decades.

Bhamori

Many of the traders at this location are working on small vehicles such as two wheelers, three wheelers, and private cars/SUVs/, and small commercial passenger vehicles. A visit to the market indicated that around 40% of operators are involved in this trade. There are 80 shops that are engaged in dismantling vehicles. There is no yard available for dismantling and this work is being carried out in rented garages in the outskirts of the city. Around 100 vehicles are being dismantled in this market every month.



Map of Indore and its 3 ELV markets

Waste pickers collect tyres so that they can use them for pushcarts employed in waste collection locally. In some cases, tyres are also burnt to melt coal tar on road construction sites. Brick kilns also purchase tyres as fuel. Profit margins from the sale of tyres are around 15%-20%.

A number of traders purchase ELVs from insurance companies to make sure paperwork won't cause delays. Some of them have developed links within the transport authority so that they get information on the kind of vehicles that have applied for de-registration, in view of future procurement and dismantling. Used parts are sold in the market to traders, but in recent years the proportion of material sent to scrap has been rising consistently.

The average profit margin in the dismantling business ranges from 20% to 40%. Vehicles that were manufactured in the decade of the 90s still command a high price because of the use of metals that can be extracted and sold as scrap at higher rates than plastic that is used in vehicles manufactured more recently.

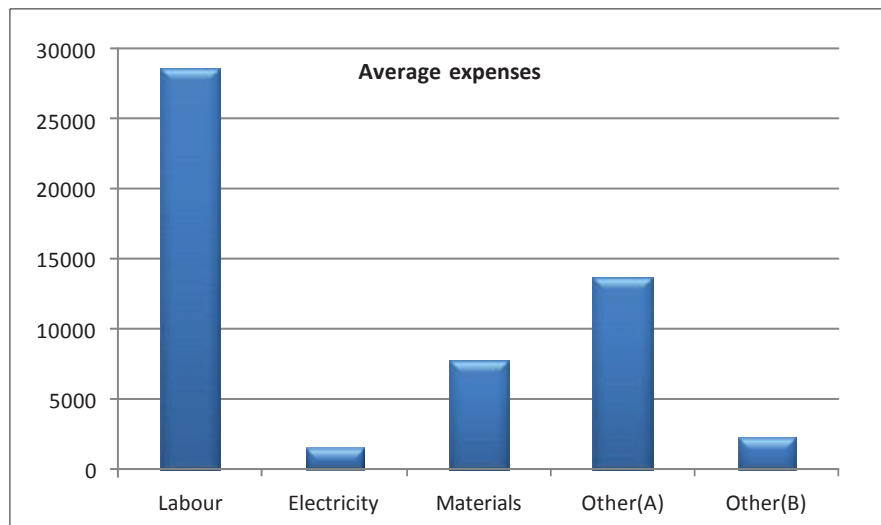


Figure 41: Labour accounts for almost half the total monthly expenditure that takes place every month.

Glass, rubber and plastics, if not scrapped, are dumped in the landfill area in the outskirts of the city.

Salaries paid by traders to skilled labour range around Rs. 11,000 monthly, and many labourers are migrants who have settled in Indore for now a decade.

Traders like Abdul Gafoor, being in the trade for the last 70 years, have devised systems (computerised, to keep track of the vehicle type and vintage of the used part) through which they can manage large inventories, which would make formalizing the business very easy.

Traders complain that over the last 5-6 years period the trade has suffered from falling scrap prices. This has led to significant losses for many who have maintained large stock over time but have not been able to sell used parts. However, dealers of engines and gears indicate that they have been able to survive the crisis because the margin in these parts is very high and even scrap values are high enough.

Many dealers who operate as family businesses are witnessing a generational change in Indore, with a larger push to strengthen links with other national markets. Parts that are not found in Indore are purchased from Mayapuri, Mumbai and Ahmedabad.

Dealers in Indore participate in local schemes where they purchase old vehicles and offer discounts on new ones. This sales strategy leads to a lot of old vehicles being exchanged. These are however further re-furbished and sold, typically in areas outside Indore, despite not conforming to norms and having reached their legal obsolescence deadlines.

Large traders in used parts have now also started to move towards the business of new parts by becoming authorised dealers of major OEMs. This strategy means primarily to offset the loss of business that followed changes in the design of vehicles.

Pune

There are 2 markets in the city of Pune dealing in ELVs. These are Putthupet and Bhimapet. **Putthupet** is a market famous for the trade of smaller vehicles and its parts. **Bhimapet** deals instead in larger vehicles, but with the growth of the city, this business has progressively shrunk for at least a decade, and many of the large traders like have diversified their business and discouraged the next generation to enter into the trade. The trade of used parts has also shrunk and is being taken over by that of new parts.

These changes follow the introduction of OEM 3-year warranties for parts, which led to a drop in demand. The growing use of plastics in vehicles has also reduced their reuse

Pune is also home to the Automotive Research Association of India (ARAI), a cooperative industrial research association established by the automotive industry with the Ministry of Industries, Government of India. It provides technical expertise in R&D, testing, certification, homologation and framing of vehicle regulations. ARAI has been working with the Ministry of Heavy Industries and has drafted guidelines on ELVs along with SIAM. These guidelines are named AIS 129 and have prescribed standards that the industry needs to follow with respect to design, manufacturing of vehicles in the future.

value and most of the material that is retrieved after dismantling a vehicle is now sold by weight as scrap.

Hazardous waste from ELVs, however, is managed properly in the city in the areas where this trade is thriving. Pune has authorized informal oil collectors to operate as a link between businesses and authorized recyclers, reducing the amount of used oil dispersed in the environment by more than 300,000 litres of used oil every month.

The regional transport office in Pune has mandated auto

rickshaws to be de-registered after 20 years, in light of pollution control priorities. The de-registration process is simple. The fitness certificate of the vehicle is checked and the owner fills a form. The vehicle is then dismantled in front of the officer and the scrap trader who dismantles the vehicle pays a token amount to the vehicle owner. The chassis of the vehicle is cut during the dismantling process, and the RTO officer collects the chassis number and the engine number.

Monitoring and environmental regulation apply to some but not other key stakeholders in the sector. The local State Pollution Control Board mandated the monitoring of all OEMs

operating in and around the city. All authorized recyclers, including the informal sector oil pickers, are monitored by the SPCB. However, there are no provisions to monitor the local mechanics and the garages where the dismantling happens, and no mechanism to monitor the amount of e-waste that comes from ELVs.

The Pune municipality itself maintains a huge fleet of vehicles. There are a total of 923 vehicles in the depots — including passengers' buses, jeeps, ambassador cars, municipal trucks, etc. The vehicles that reach obsolescence are auctioned, as is the case for busses that reach 8 year of operation. The auctions run by the municipality attract large traders from Mayapuri and from Mumbai, Nagpur and Ahmedabad. In most cases, re-usable parts are extracted before the auction by the engineering wing of the municipality, to be reused in other vehicles. The large amount of waste oil produced by municipality vehicles is handled according to the existing regulations, and sold to authorised recyclers.

Military vehicles also come for dismantling at Kothrud. There are a handful of players in this trade who participate in auctions and dismantle vehicles. Scrap rates around the city are very low and in some cases, scrap is sold to areas that are 400 to 500 kms away from Pune. Iron scrap sells for Rs. 25 a Kg, copper for Rs. 450 a Kg and aluminium is sold for Rs. 150 per Kg. Used engine oil is sold at Rs. 25-30 per litre to the local oil pickers in Pune. Broken glass and rubber are thrown away in the dustbins operated by the municipality. Doors are recycled as spare components for older cars. Window shields are also reused and sold. Good condition tyres are used in old cars, for a price that varies between Rs. 1000 and 1200. Tyres that cannot be re-used are sold at Rs. 300-400 per piece.

There are around 150 oil pickers in Pune who collect used oil from local garages, service stations, and vehicle dismantlers. A total of 97 are members of an association namely *Wapaslele Oil Kasht Kari Panchayat*. These oil pickers have been working in the business for the last 15-20 years. These 97 people collect around 300,000 litres, 1500 drums used oil (1 drum=200 litres) in a month. Some oil pickers use two wheelers and some four wheelers to collect used oil from different parts of Pune.

The Regional Office of Maharashtra pollution control board at Pune has given consent to pick oil to *Wapaslele Oil Kasht Kari Panchayat* from different parts of the city. *Wapaslele Oil Kasht Kari Panchayat* also issues an I-card to all the oil pickers. All the collected oil is sold to authorized oil-refi plants in Pune at Rs. 25-30 per litre. These oil pickers make a profit of Rs. 2-3 per litre, with a steady demand that guarantees business sustainability.

6. The Vision and Aspirations of ELV Traders and Workers in India

Resource efficiency in India is a priority area, and the End-of-Life Vehicle (ELV) sector — In lieu of its size and nature — has a large role to play. ELVs contain materials and parts that can be refurbished and reused, and offering an important opportunity for improving resource efficiency and reducing the demand for raw materials. Understanding the material flow linked to ELVs management — from valuable metals to low grade used oils — is critical to improving their efficient use.

In India, the management of ELVs is a sector that is still completely informal and unregulated. ELV operators interact with formal actors only in those few cases where regulations have targeted specific material flow as is the case of scrap metal and other high-value and low-toxicity materials. The residual materials that stay within the informal sector through their recovery life cycle tend to be of the lowest value and most highly toxic, due to the lack of interest for these materials from the formal sector. The informal sector is often seen as highly efficient in resource recovery, but the lack of regulatory frameworks and standards operating procedures make sector-wide monitoring and performance measurement (included the attribution of credit in terms of material efficiency) a difficult task. Also, in the absence of a legal framework, the economic incentives that drive the sector come often in conflict with environmental considerations: the informal sector is not always environmentally friendly, especially in the context of material recovery.

Determinants of Aspirations from ELV Traders and Workers

The study explored ELV traders' and workers' own vision regarding the future of the sector, filtered through their own personal business aspirations. Overall, most traders aspire to keep operating in the sector, but know that policy changes are needed for that to be possible.

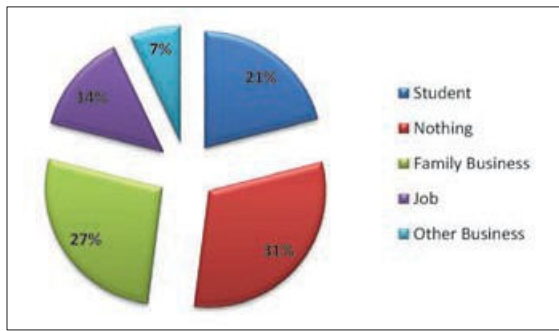


Figure 42: 52% of the respondents have been working in this sector for between 10 and 20 years. 21% have spent more than 2 decades in this business. Just about 10% of them have joined the trade a few years ago and are less than a decade in this business.

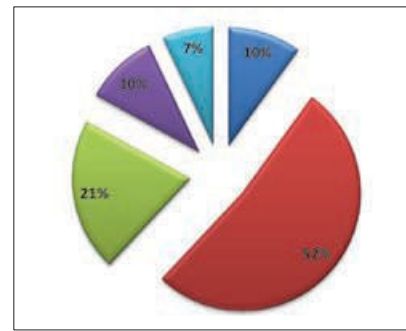


Figure 43: Almost 30% of the respondents were unemployed before they joined this trade. More than 20% joined just after they completed their studies. About 25% joined their family business. The rest left another occupation, finding ELVs more lucrative and sustainable.

Socio-Economic Aspirations

Most ELV traders have been in the business for two or three decades. A majority of them started working at a very early age; many joined family businesses and learnt the skills on the job. Most of the people work in rented shops and they pay approximately Rs. 7,000 to 8,000 per month in rent. Most traders aspire to expand their business, but the negative reputation of the sector is a hindrance in accessing formal financial support. Liquidity is a prime factor for these actors because the competition is high, and the ELV parts or entire ELVs with the highest margins are also the most expensive to source.

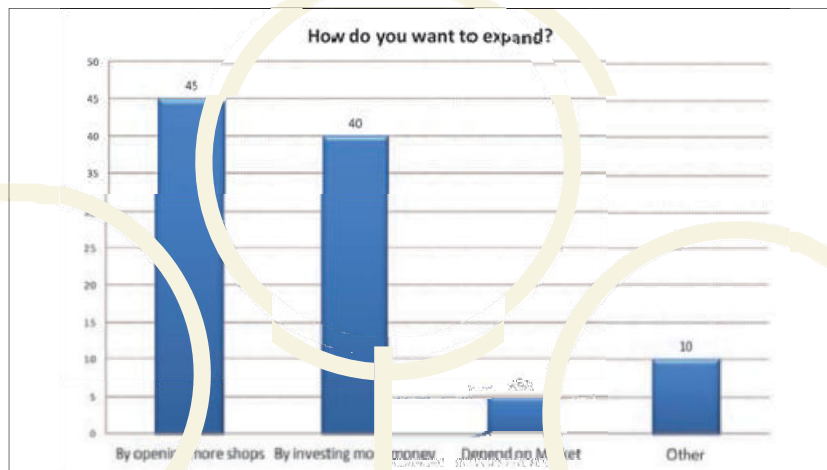


Figure 44: The greatest challenge for the expansion of the trade are financial and economic issues faced by traders. Cash flow is a major issue because of little access to institutional finance. ELV operators do take loans from non-institutional sources but these come at a high rate of interest, affecting their profit margin and motivation to expand.

Formalization and Recognition of this Sector

Traders expect that the emergence of an inclusive regulatory framework — in other words the formalization of the informal sector — would allow them to access all the financial tools and support available to mainstream businesses — loans, insurance, etc. 67% of these respondents who applied got the loan while the rest did not. Lack of documentation is the single most important reason for denial of loan to these applicants. 42% amongst them tried for a loan of less than Rs 5 lakhs. About 75% of these loans were required for investment in the business.

In Chennai, they also proposed to have an Auto Nagar and space for vehicle parking in the city.

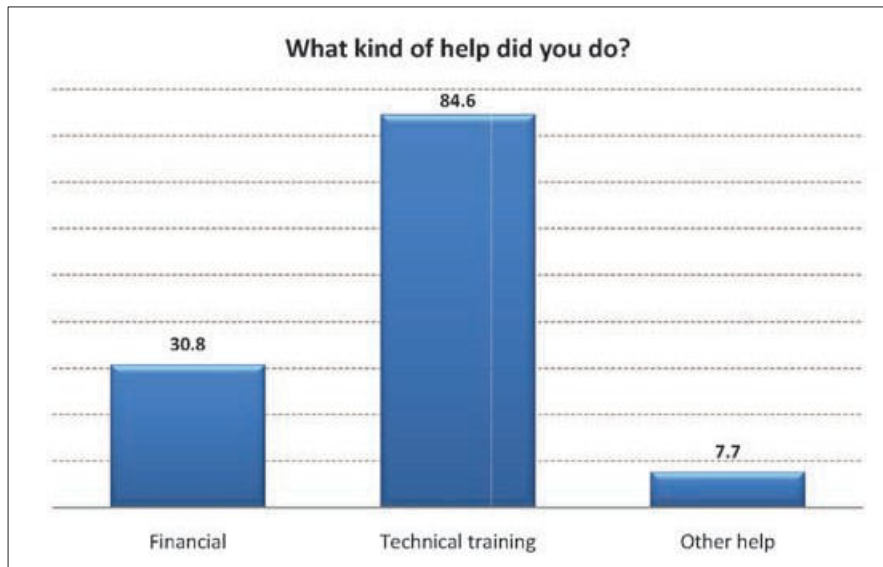


Figure 45: Technical assistance and financial assistance are the 2 most common types of help that the traders offer each other.

Obsolescence and its Constraints

The last decade experienced drastic changes in the obsolescence pattern in the automotive sector, particularly due to the decrease of vehicle mileage and the increase in technological sophistication of vehicles (which become, as a result, harder to repair). The main reason for reaching the ELV status is the expiry of vehicles papers. The emergence of authorized service centers and the constant innovation of parts have impacted the profits of the sector, where new parts are yet not available, and old ones meet a decreasing demand.

Need Technical Training for Dismantling

The ELV sector is highly knowledgeable about how to dismantle existing vehicles, but the spiraling rate at which new models and new technology is being introduced requires new technical skills. The existing skill set represents a solid foundation on which to build more specialized and sophisticated technology, but that will require investments in training and dismantling technology.

Expectations from the Government

The government should make available space for the sector to thrive and expand. Parking space is for example essential. The government could also facilitate ELV operators' access to credit by recognizing and setting up a license system.

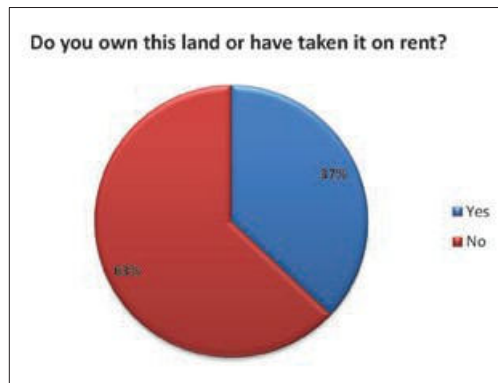


Figure 46: About 37% own the space where they work while the rest rent it.

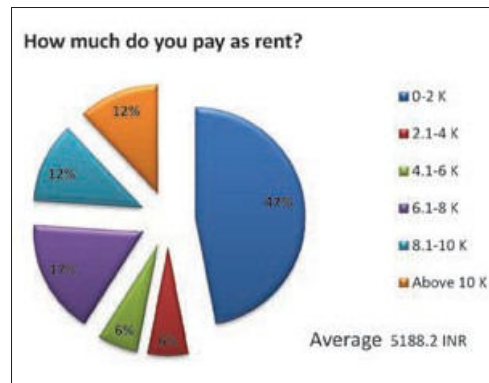


Figure 47: Most of the traders are small operators and pay Rs. 2,000 per month in rent or less. Larger traders who dismantle vehicles take up larger spaces, for which they pay more.

Set Up Auto Recycling Zones

The government should also recognize ELV processing zones as part of the national recycling industry, regulating levels of noise and other kinds of pollution. Auto recycling areas should be professionalized, with ID cards distributed to all operators and systematic accounting and monitoring procedures to improve and streamline the business.

People believe that the government is trying to build auto parks, which will be recognized as special zones for recycling. This, they believe, will help them to streamline their business and they will be able to work without any harassment from civic authorities and otherwise. More than 53% of the traders however, would not like to shift from the present area because they believe they would lose their customer base. Most (79%) respondents, however, have clients who come from far away too (in 62% of cases bulk buyers), while for small parts the markets remain local.

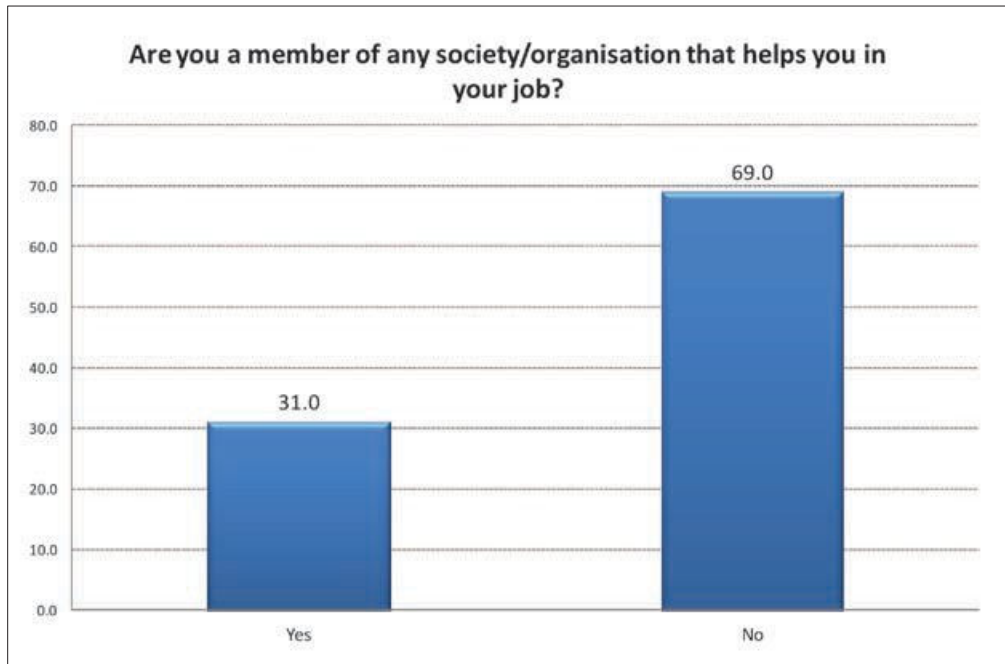


Figure 48: 69% stated that they were not a part of any association that can help them with their job.



7. International Best Practices

End of Life Vehicles (ELVs) have gained prominence globally due to the growing concern around excessive pressure on energy resources, water and raw materials. Automobile ownership worldwide has been increasing at a higher rate than the global population, reaching more than 1 billion units in 2010⁶. It is expected to cross over 2 billion units in 2030⁷.

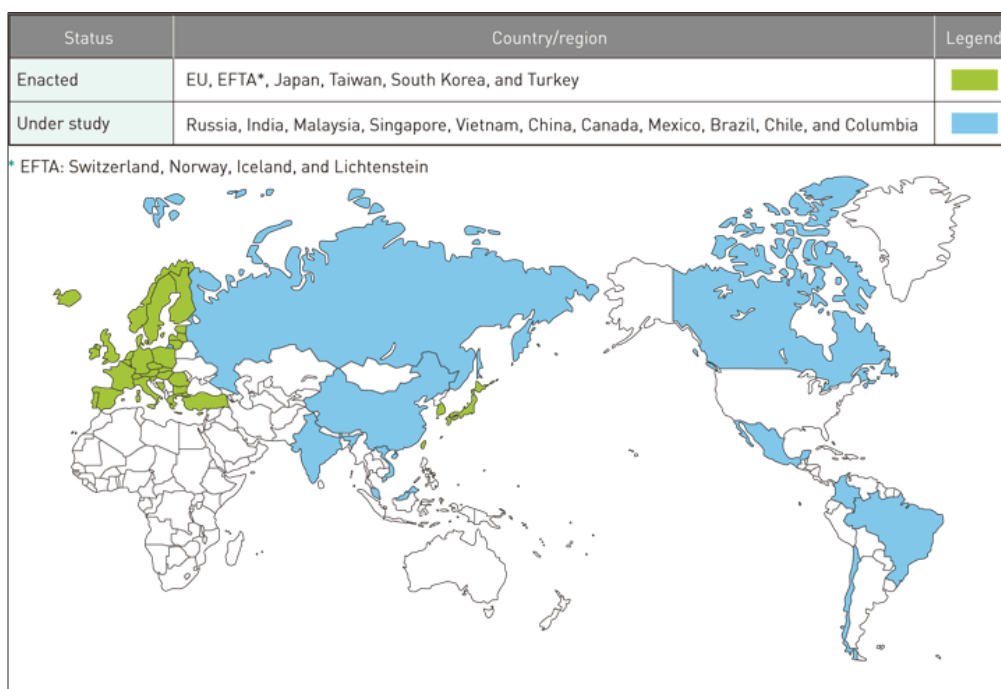
The generation of ELVs was estimated at 40 million, which accounts for 4% of total automobile ownership⁸.

Governments around the globe have started supporting circular business models. The global economic crisis of 2008, soaring commodity prices and growing awareness of the human impact of environmental degradation have pushed the circular economy agenda into the mainstream policy debate. The key drivers towards 'Green Initiatives' in the automobile industry are *environmental* (reduction in resource consumption, emissions, waste generation and disposal), *social* (improved living conditions of community) and *economic* (reduced costs, environmental liabilities and enhanced access to markets). Dedicated ELV legislative frameworks exist in the EU, Japan, Korea and China, while in the US, ELV recycling is managed under existing laws on environmental protection. The EU has been the standard setter with regard to circular economy regulation, passing legislation from the year 2000, followed by Japan's Law on Re-utilization of End of Life Automobiles in 2002.

6 An international comparative study of end-of-life vehicle (ELV) recycling systems, Sakai Shin-ichi et. al (2013)

7 *Vehicle Ownership and Income Growth, Worldwide: 1960-2030*, Joyce Dargay, Dermot Gately and Martin Sommer, *Energy Journal*, 2007, Vol. 28, No. 4

8 An international comparative study of end-of-life vehicle (ELV) recycling systems, Sakai Shin-ichi et. al (2013)



Reference: Toyota Global recycling initiatives http://www.toyota-global.com/sustainability/environment/recycling_based/2013_activities_07/ accessed on 04th February 2015

Dismantling Process

Currently, 75% to 80% of each ELV is recycled or re-used in Europe, mostly for ferrous metal⁹. Some European countries have already achieved even higher standards (Germany, Belgium), while other are far from reaching the prescribed targets (Italy in particular)¹⁰. In order to meet European ELV targets, technological innovation has gone in two directions, upstream or downstream. Upstream efforts have seen changes in car designs to facilitate the ELV processes. A number of car companies globally have made agreements with dismantlers directly. Upstream efforts have a delayed, long-term impact. Downstream efforts instead focus on modifying the recycling operations by developing new techniques and processes. In this respect, efforts need to focus on materials that are not being currently recycled (fluids, polymers, rubber, glass and electronic parts). Once processes are standardized and technology developed, bigger and more efficient recycling plants will be able to handle wastes coming from different

- 9 Gerrard, J., Kandlikar, M.: Is European end-of-life vehicle legislation living up to expectation? Assessing the impact of the ELV Directive on 'green' innovation and vehicle recovery. *Journal of Cleaner Production*. 15, 17–27 (2007)
- 10 EUROSTAT, Environmental Data Centre on Waste, ELVs - Key Statistics and Data <http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/data/wastestreams/elvs> (2009)

industrial fields not just the ELVs, with large use of automation. An example of large automated dismantling system is represented by CRS (Car Recycling System)¹¹ in the Netherlands. Small-specialized companies could also contribute by focusing on non-recycled components.

The recycling process starts with collection, segregation and dismantling. The components containing hazardous substances like lead, oil and refrigerant gases are removed first and only then the material that can be reused or recycled can be extracted with high economic returns. Dismantling processes adapt to a country's legislation: in Japan, for example, the collection of refrigerant gases and air bags is legally mandated, and in the US components containing mercury (like switches) are removed first. The weight of an ELV after dismantling is reduced to 55-70% of the original weight in EU and Japan. This helps in reducing the amount of automobile shredder residue (ASR) and avoids hazardous material contamination in ASR. After the dismantling and removal of hazardous and recyclable materials, the hulks of car are typically put into shredders. The ferrous and non-ferrous metals are separated with magnetic separators. The percentages of iron and non-ferrous metals in a vehicle mass are 36-70% in the EU, and 50-55% in Japan, respectively. The amounts of ASR (light & heavy) are reported to be 12-32% in the EU, and 17% in Japan. In the EU, ASR in many cases is disposed off in landfills. It was a similar situation in Japan prior to the enactment of the Law for the Recycling of End-of-Life Vehicles. However, after the enforcement of this legislation, which mandates the recycling of ASR, material separation of secondary resources, collection of slags by melting furnaces, and energy recovery have become a common practice.

Prevalent Policies and Practice in Significant Economies of the World

European Union (EU)

In the EU, the EU-Directive 2000/53/EC on ELVs was enacted in 2000. The main objectives include a) to make vehicle dismantling and recycling more environmentally friendly, b) to set clear quantified targets for reuse, recycling and recovery of vehicles and their components and c) to encourage producers to manufacture new vehicles also with a view to their recyclability. The Directive is based on the subsidiary principle and the extended producer responsibility principle. According to the subsidiary principle, EU member states must establish their national legislations on the ELV recycling system, while the Directive sets recycling targets for different phases.

Member states are required to meet these targets, while car manufacturers and importers shoulder the expense of recycling under an extended producer responsibility

11 Car recycling Systems BV. <http://carrecyclingsystems.com/> (2009)

provision. The targets that member states must meet for “reuse and recovery” and “reuse and recycling” rates, were respectively 85 and 80% by 2006 and then 95 and 85%, respectively, by 2015.

According to data published by Eurostat in 2008, 20 Member States achieved the reuse/recycling target of 80% (of the average ELV weight), and sixteen Member States met the 85% reuse/recovery target.

The challenge of deregistration of vehicles is significant in the EU. In most Member States the number of ELVs represents more than 50% of the amount of de-registered passenger cars (e.g. Belgium, Italy, Spain and the Netherlands). Thus, for those countries the gap between the number of de-registered cars and ELVs is lower than 50%. In other Member States (e.g. Austria, Denmark, Finland, Sweden) the gap is higher, and there is no detailed information available on the further use of more than 50% of the de-registered cars.

There are different approaches to de-registering vehicles across European Member States. In some countries (e.g. in Austria) a vehicle is de-registered automatically with the change of ownership of a car. In other countries (e.g. in the UK) vehicles are not deregistered when ownership changes, but, de-registration generally takes place when the car owner wants to dispose of the vehicle.

Japan

The Automobile Recycling Law that came into effect in January 2005 mandates an appropriate division of roles between automakers and other involved parties, to promote the recycling and appropriate processing of end-of-life vehicles. The act specifies components/materials to be recycled, stakeholders that will shoulder recycling costs, as well as the development of an information management system.

Recycling targets are separately determined for airbags, refrigerant gas and ASR, and not for the whole ELV. Furthermore, an environmentally sound treatment of fluorocarbons is mandated by law. The recycling rates for airbags and ASR from 2015 are 80 and 85%, respectively. With regards to the recycling of ASR, thermal recovery is acceptable but no provision was set regarding its recovery rate.

A flow chart depicting the system for collection and recycling under the Japan Automotive recycling law is as follows:



mandated. When the ELV recycling cost exceeds the price of the ELV, manufacturers and importers cover the excess cost. The act also requires submission of performance data with regard to recycling to Korea Environment Corporation (KECO).

Under the Korean ELV recycling framework, recyclers assume the responsibility of carrying out recycling if the ELV is economically valuable. On the contrary, manufacturers assume such responsibility if the recycling presents an overall cost. This split responsibility makes unclear whose responsibility it is to achieve the target. In addition, less valued or costly materials are likely to be avoided during the dismantling process, since those components that are of higher value are preferentially separated. Overall, the framework indirectly incentivises lower recycling rates.

China

Since 2006, the Automotive Products Recycling Technology Policy identifies the responsibilities of manufacturers and importers to promote ELV recycling, and lists the substances used in car manufacturing that must be controlled and prohibited in consideration of broader environmental protection goals.

The policy sets the following recycling targets for ELV: about 85% (or at least 80% material recycling) by the year 2010; about 90% (or at least 80% material recycling) by the year 2012; and about 95% (or at least 85% material recycling) by the year 2017. In 2008, the Regulations of Remanufacturing Pilot of Automotive Parts was issued with the aim of carrying out a trial program for the production of secondary products from used components. This effort contributed to improve the recycling rate at the dismantling stage.

In China, several problems on ELV recycling are however frequently reported: ELVs end up in the used car market and are used illegally; improper recycling processes causes serious environmental pollution at the facilities; and illegal remanufacturing. The reason for these is attributed to the absence of a comprehensive management system

United States of America (USA)

The US presents a different case in terms of legislation. In the US, ELV recycling operates autonomously based purely on market mechanisms. The Automotive Recyclers Association (ARA) has promoted ELV recycling, but there is no mandatory recycling target, and the rate of material recycling is reported to be at 80%. A strong emphasis is placed on the promotion of environmentally sound management at the dismantling or recycling facilities. In particular, dioxins, furans, polycyclic aromatic hydrocarbons (PAHs) and greenhouse gases are constantly monitored.

The ELV recycling program in the US is therefore the object of strict monitoring under environmental laws and agencies. Among the relevant regulations are the Resource

Conservation and Recovery Act (RCRA), the Clean Air Act (CAA), and the Clean Water Act (CWA). In addition to federal laws, state governments also define additional regulations. The ARA disseminates regularly information to ELV recyclers regarding the latest environmental regulations from other states, and builds an electronic database. In most states, ASR is classified as a non-hazardous waste and ends up in a landfill. However, its environmental impact is currently being looked into with major concern.

Status of the Major Manufacturers

Major OEMs have also initiated their own programs for proper disposal and recycling of ELVs, either by their own initiative or to comply with the country's rules and regulations. Some of the practices of major corporates are discussed in the following section.

BMW

In the early 90s, long before statutory EU regulations, the BMW Group had already started to establish a widespread network of centres in the EU for vehicles take back. BMW ELVs returned through these centres are processed in an authorised treatment facility.

The BMW Group also asserts its responsibility for taking care of used parts, operating filter and sales packaging. These are collected according to country-specific programs.

As part of its goal to reach a circular material model, the BMW Groups uses recycled materials in new vehicles. Currently, 15% of plastic parts approved for BMW Group production vehicles are made of recycled materials, and they are used for example in under-body panelling, rear shelves, fuel tanks and wheel housings.

Renault

Renault offers free take back for all vehicles regardless of their age as from the 1st January 2007. As defined in the law in the EU, free take back is offered provided that:

- The vehicle is delivered to a Renault appointed take back facility;
- The vehicle contains all its essential components, in particular the engine, transmission, coachwork, wheels or catalytic converter (if originally fitted);
- That no waste has been added to the vehicle (for example: household and garden waste, extra tyres etc.)

In the UK, Renault Trucks has selected Cartakeback.com to provide free take back of vehicles falling under the relevant legislation. The Cartakeback Network covers all regions of the UK. All take back and treatment facilities operate in conformity with the Department for Environment Food & Rural Affairs (DEFRA) requirements. Vehicles are

treated to meet the recycling and recovery target of 85% by weight from 2006, as set by the End of Life Vehicle EU Directive.

Toyota

Toyota has been working with dismantling and recycling companies to ensure compliance with the Japanese End-of-life Vehicle (ELV) Recycling Law that came into effect in January 2005. Toyota collects and treats CFCs/HFCs, recycles/recovers airbags and automobile shredder residue (ASR) from end-of-life vehicles. In 2013, the ASR recycling rate was 96%, and the vehicle-recycling rate, converted into a per-vehicle value, reached 99%, exceeding the Toyota Recycling Vision goal of 95%.

Toyota Motor Europe (TME) completed the construction of ELV collection networks in 28 EU member states.

In China, the Recycling Working Group, under the Toyota China Environment Committee, is working closely with local affiliates to promote compliance activities with local automobile recycling laws through measures such as ascertaining regulatory trends and auditing local infrastructure. At the end of February 2014, a plant that received 32% of its capital from Toyota Tsusho Group opened in Beijing, with the goal of becoming a model ELV dismantling plant in China.

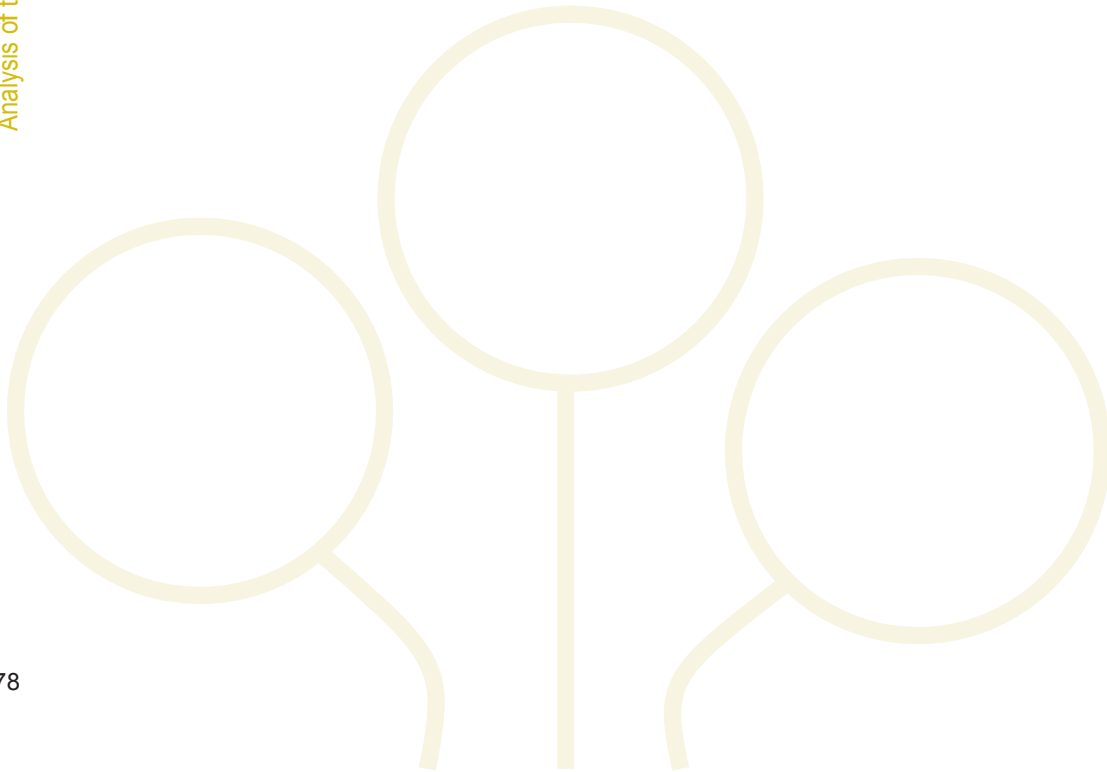
Examples from Other Countries

At EU level, three Directives introduce EPR as a policy approach: the ELV Directive 2000/53/EC, the new WEEE Directive 2012/19/EU and the Batteries Directive 2006/66/EC. EPR is also widely used in support of the implementation of the Packaging and Packaging Waste Directive (94/62/EC), although the Directive itself does not impose the principle. In addition, article 8 of the Waste Framework Directive 2008/98 sets some principles regarding the implementation of EPR by the European Member States.

The ELV system introduced in Sweden is a good example of individual financial responsibility without duplication of infrastructures for dismantling and recycling. Car manufacturers in Sweden, and importers, have decided to take advantage of the well-functioning part of the established dismantling and recycling companies and have consequently signed contracts with these actors. This means that a specific dismantler may serve many, maybe all, manufacturers, but having an individual contract with each of them.

The ELV management system that started in January 2005 in Japan is also based on individual financial responsibility. All manufacturers and importers must announce the end-of-life management fees of their products. The fees announced in mid-2004 ranged from ¥7,000 to ¥18,000, varying not only between brands and sizes but also between models of the same brand (Automotive Department, METI, 2004; Oonishi, 2004).

Unlike the system for four large appliances, an advance disposal fee system has been chosen. Car producers in Japan are responsible — logistically and financially — for the management of auto-shredder residues, ozone depleting CFCs and airbags, and must achieve recycling and recovery targets for auto-shredder residues, which gradually become more stringent. Similar to the development of the four large appliances, the car producers established two groups to organize their take-back and recycling responsibilities. However, out of 27 recycling facilities, 18 have contracts with both the groups (Tanaka & Oonishi, 2005).



8. Policy Recommendations

Shared Responsibility for Effective Management of End of Life Vehicles

Globally, the automobile industry has integrated environmental concerns into the design of the complete lifecycle of its product — adapting its designs, modifying vehicle use and managing end of life. EU Directives, for example, require that the automobile industry reach 85% reuse and recycling¹² and 95% reuse and recovery rates¹³ by an average weight per vehicle per year. Indeed, no other consumer product has a recycling rate as high as an automobile. Resource efficiency is key in this industry to minimizing costs and resources, pushing up profits over the long run. On average, a vehicle is made for 75% of metals, which is recyclable, and for 25% of plastic composites, glass, rubber, textile etc.¹⁴. About 25% of the waste material coming from an ELV poses a potential environmental threat, due to presence of heavy metals, waste oils, coolants, ozone depleting substances, etc.

Given the existence of efforts on both sides, the key question remains how to make ELV regulations and the voluntary standards of the automobile industry converge towards guaranteeing an environmentally sound management of the ELVs. The EU regulation on ELVs, emphasizes the responsibility of producers, as per the principle of 'Extended Producer Responsibility (EPR)'. The overall objective of EPR is to spur innovation in the industry and improve the recycling infrastructure, develop closed material loops, decrease waste from automobiles and set up mechanisms for ELV take back¹⁵. ELVs'

12 *"Reuse and Recycling"* includes reuse of ELV components together with material recycling, i.e. extracting secondary raw materials

13 *"reuse and recovery"* includes the above plus energy recovery

14 Svetlana Gross, 2008, End-of-life vehicles management in Europe: driving the change. Cases of Sweden and Germany. IIIIEE thesis, Lund University, Sweden.

15 Reid Lifset, Thomas Lindqvist (2008), Producer responsibility at a turning point? Journal of Industrial Ecology, Vol.12, Issue 2.

nature as post-consumer waste calls for holistic environmental policy efforts that identify the responsibility and degree of participation by all stakeholders — consumers, producers, recyclers, dealers all have a role to play in guaranteeing the safe take back and disposal of ELVs.

The Policy framework in India should urgently take stock of the experiences of other countries, and draw from their learning a sound mechanism for minimizing the environmental impact of ELVs. In particular, the Indian legislator should identify the drivers for this change without disregarding the reality and dynamism of the national recycling industry. An ideal ELV management system would have as key moments the following: (1) a legislative framework for shared responsibility inclusive of all key stakeholders, (2) a functional recycling infrastructure, including by upgrading existing value chains (3) incentive structures to salvage reusable ELV parts and (4) effective collection and channelization mechanism that leverage the knowledge and network so far developed in the informal sector. These elements, under the overall objective to protect the 'wholesomeness of the environment' (as per the Environment Protection Act, 1986), have as a premise to identify and engage key actors, defining their roles and responsibilities, and improving the effectiveness of ELV management in India.

Key Stakeholders

The 'Shared Responsibility' model envisions the creation of common understanding amongst the manufacturers, dismantlers, recyclers and consumers of their respective stakes and responsibilities. This will be vital for strengthening and structuring a material flow and environmental and economic performance standards that deliver better reuse, recycling and recovery rates. ELV management involves a number of actors — from producers, recyclers and dismantlers (both formal and informal), to government authorities, and consumers — both private and commercial -, dealers/intermediaries and insurers included.

Government

Governmental authorities will play a key role in setting framework goals and regulating processes each other actors would follow, by the means of legislation and harmonization of existing frameworks, licensing, implementation of regulations, monitoring and compliance reporting. Public authorities with a stake in the sector are however multiple. The de-registration process of ELVs is governed by the Ministry of Road Transport and Highways, while automobile industrial policies fall under the Ministry of Heavy Industries. Environmental protection measures like, waste oil recovery, hazardous waste handling etc. is regulated by the Ministry of Environment and Forests, with Central and State Pollution Control Boards as implementation and monitoring agencies. There is an urgent need to clarify the role of each agency and developing inclusive guidelines to 'govern' the complete ELV process in India.

Such ELV guidelines should identify the overall responsibility for ELVs processing licensing, authorization mechanisms and monitoring processes, take back mechanism and vehicle registration and de-registration procedures. The regulator needs to set up an enabling framework for the producers and recyclers to take up effectively their responsibilities. State and the national governments can also use administrative, economic and data management instruments to support the effective implementation and the environment friendly disposal of ELVs.

In December 2014, the National Green Tribunal (NGT) announced the ban of the vehicles older than 15 years on the roads of Delhi, to reduce the air pollution loads in the city. The industry welcomed the entire ban as a significant step towards fleet modernization. However the Ministry of Road Transport and Highways challenged the decision with fitness and road worthiness as criteria's towards permanent solution than age limit.

An illustrative list of such instruments is given in the table below.

Administrative Instruments	Collection and/or take-back of ELVs, substance restrictions, achievement of collection, re-use and recycling targets, environmentally sound treatment standards, treatment and disposal restrictions, minimum recycled material content standards, product standard.
Economic instruments	Material/product taxes, subsidies, advance recycling fee, upstream combined tax/subsidies, tradable recycling credits.
Informative /Awareness generation Instruments	Reporting to authorities, marking/labeling of products and components, local collection network, information provision to consumers about the right disposal of ELVs

Source: Adopted from Lifset (1992)¹⁶, OECD (2001)¹⁷, Stevens (2004)¹⁸, Walls (2004)¹⁹.

16 Lifset, Reid. (1992). Extended Producer Responsibility: Rationales and Practices in North America. In T. Lindqvist, Extended Producer Responsibility as a Strategy to Promote Cleaner Products. (33-49). Lund: Department of Industrial Environmental Economics, Lund University.

17 OECD. (2001). Extended Producer Responsibility. A Guidance Manual for Governments. Paris: OECD

18 Stevens, Candice. (2004). Extended Producer Responsibility and Innovation. In OECD, Economic Aspects of Extended Producer Responsibility. (199-217). Paris: OECD.

19 Walls, Margaret. (2004) EPR Policy Goals and Policy Choices: What does Economics Tell Us? In OECD, Economic Aspects of Extended Producer Responsibility. (21-49). Paris: OECD.

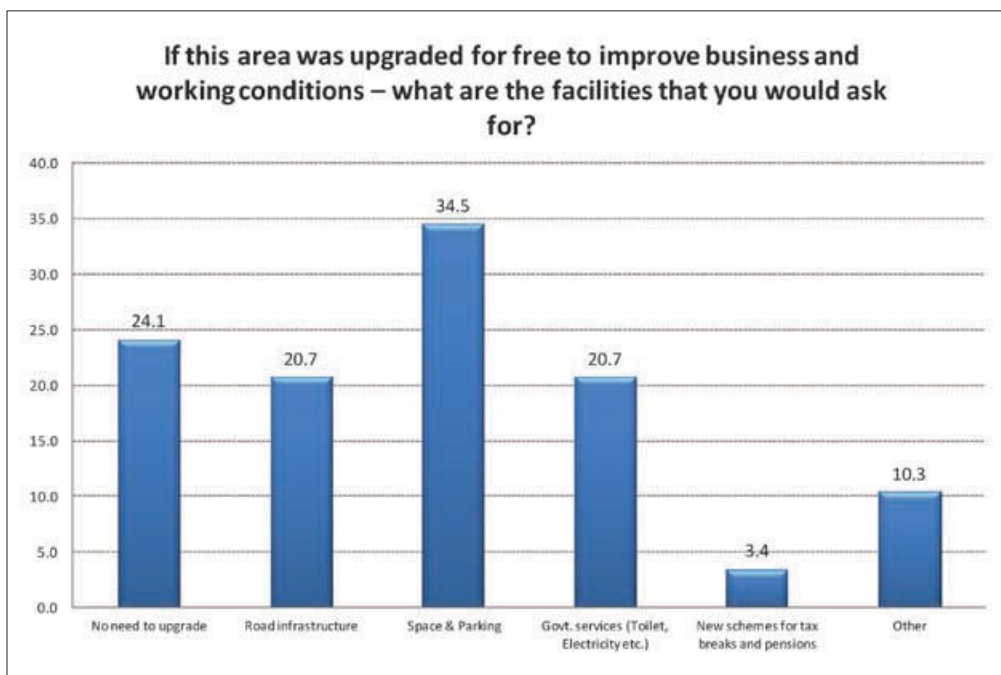


Figure 49: When asked how business and working conditions could be improved, 35% of the respondents stated that they look forward to more space for improved trading and dismantling. 21% felt that better road infrastructure will help customers to access them easily and hence their business will grow. When asked if specific skills were required for traders to help them do their job better, a large number of them requested computer literacy courses. Management of data is a critical element that they believe they will be able to do with computer training.

Dismantlers and Recyclers—Formal and Informal

Recyclers include traders, scrap dealers, dismantlers, waste management companies, metal and other recyclers. Overall, these are actors interested in the trading, refurbishment, recycling and treatment of ELV parts for the extraction of metals. From primary surveys and field research, it has been observed that recycling of ELVs is a space-demanding activity. The existing informal markets have been operating from 40 to 50 years. What used to be markets on the outskirts of the city are now an integral part of a fast expanding urban fabric, and increasingly surrounded by residential areas — with obvious implications in terms of space available for ELV operations. The presence of communities living in the vicinity of the markets also increases environmental objections & risks linked to the sector.

It is expected that like other urban waste management projects, the required land for recycling would be made available by local government when planning urban landscapes. The Central Government should also relax the duty on the imported equipment to make the project financially attractive to developers, and even government agencies in Public

For Private Partnership models, several major industrialist expressed interest in supporting the relocation and upgradation of informal sector dismantlers and recyclers for their inclusion in future formal ELV material chain.

Regarding the formal sector, one demonstration unit (NATRIP) was set up in Chennai by the Ministry of Heavy Industries, as a pilot dismantling facility. Besides two entrepreneurs attempted to establish formal recycling & dismantling facilities in the Southern part of India .

Finally, a new model implies leveraging the existing trade channels to structure a network of dismantling and recycling stations across the country, with receiving stations recognized by the industry. Dismantlers could keep their role as a platform for the trade of ELV spare markets, in support of an ever circular economy.

Manufacturers (Including Original Automotive Manufacturers, Importers, Assemblers, Component Manufacturers)

Manufacturers play a key role not only at the end of life stage but from the earliest stages of the design, a defining moment for the reduction of hazardous substances that are at risk of being dispersed during dismantling and recycling. In this context, Extended Producer Responsibility ought to give producers the leeway needed to innovate by choosing materials and structures that aim to make also the dismantling and recycling easier and safer.²⁰ Producers also need to set up mechanisms for product take back, with infrastructural and financial responsibility for its effective implementation nation-wide. In order to finance the collection and recycling system, producers (manufacturers and importers) could for example bear the financial responsibility to upgrade their network of dealers and insurers to support such centers. They should also existing competences and leverage the informal sector for collection and dismantling operations. After the collection and initial dismantling, the formal sector can pitch in for recovery of secondary resources from the ELVs.

The issue of access to technology and research and development in the area of recycling also needs to be taken up by the formal players involved in the ELV business. The producers will also have to play a major role in strengthening the capacities of the informal sector in this regard, in light of their superior means. One of the major issue that came up during the interactions with operators in the informal sector was the spiraling pace of model innovation by the automobile manufacturers. The informal sector would benefits from support in catching up with the latest technological breakthroughs, something for which their existing business model does obviously not allow resources. The automobile manufacturers could frame the Standard Operating

²⁰ Thomas Lindqvist (2001) Extended Producer Responsibility for End-of-Life Vehicles in Sweden - analysis of effectiveness and socio-economic consequences, IIIIEE Reports, Lund University, Sweden

Procedures (SOPs) for dismantling every model and type of vehicle. The SOPs could be shared with the informal sector in vernacular languages.

Consumers

Consumers play a key role in the safe management of ELVs. Both private and commercial vehicles need to be tested regularly for fitness. For private consumers, incentive mechanisms should be devised to support the disposal of ELVs at the right time. Consumers also need to be informed regarding the right disposal practices for ELVs, and to the risks posed by the non-metallic ELV components.

Dealers and Insurers

To set up effective collection mechanism, the dealers will be an important link between consumers and manufacturers or consumers and dismantlers. The administrative procedures like deregistration could be managed directly by dealers, as they are already enabled to offer this service at the moment of the purchase. Since reuse²¹ and prevention of waste is the primary objective of this ELV management framework, the second hand market needs to be supported. Spare parts usage is much more environmentally friendly than recycling and insurance companies can play a major role in growing this demand. For instance in Sweden, the Folksam Auto AB (folksamauto.com) is a subsidiary of the Folksam Insurance company which acquired a large car workshop with the objective to support the repair of old spares and increase use of spare parts to bring down the costs of new original-enterprise (OE) parts.²²

There is a strong need for creating awareness amongst consumers and industrial operators (like repairers) for channelizing ELVs and minimising waste through a thriving quality spare parts market. Recyclers and manufacturers need to cooperate to fulfill their shared environmental responsibilities.

Examples from Other Countries

At EU level, three Directives introduce EPR as a policy approach: the ELV Directive 2000/53/EC²³, the new WEEE Directive 2012/19/EU and the Batteries Directive 2006/66/EC. EPR is also widely used in support of the implementation of the Packaging and Packaging Waste Directive (94/62/EC), although the Directive itself does not impose the principle. In addition, article 8 of the Waste Framework Directive 2008/98 sets some principles regarding the implementation of EPR by the European Member States.

21 *Reuse* means dismantling and reselling used parts of the vehicle, be it large components such as engines and chassis, or hulk parts, or smaller parts up to light bulbs and power cables.

22 Rainer Lukas, 2001, End of Life Vehicle Regulation in Germany and Europe – problems and perspectives. No.113, Wuppertal papers.

23 Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end of life vehicles, Official Journal of the European Union.

The ELV system introduced in Sweden is a good example of individual financial responsibility without duplication of infrastructures for dismantling and recycling. Car manufacturers in Sweden, and importers, have decided to take advantage of the well-functioning part of the established dismantling and recycling companies and have consequently signed contracts with these actors. This means that a specific dismantler may serve many, maybe all, manufacturers, but having an individual contract with each of them.

The ELV management system which started in January 2005 in Japan is also based on individual financial responsibility. If all manufacturers and importers announce the end-of-life management fees of their products. For example, the car producers in Japan are responsible

— logistically and financially — for the management of auto-shredder residues, ozone depleting CFCs and airbags, and must achieve recycling and recovery targets for auto-shredder residues which gradually become more stringent. Similar to the development of the four large appliances, the car producers established two groups to organize their take-back and recycling responsibilities. However, out of 27 recycling facilities, 18 have contracts with both the groups.²⁴

Conclusion

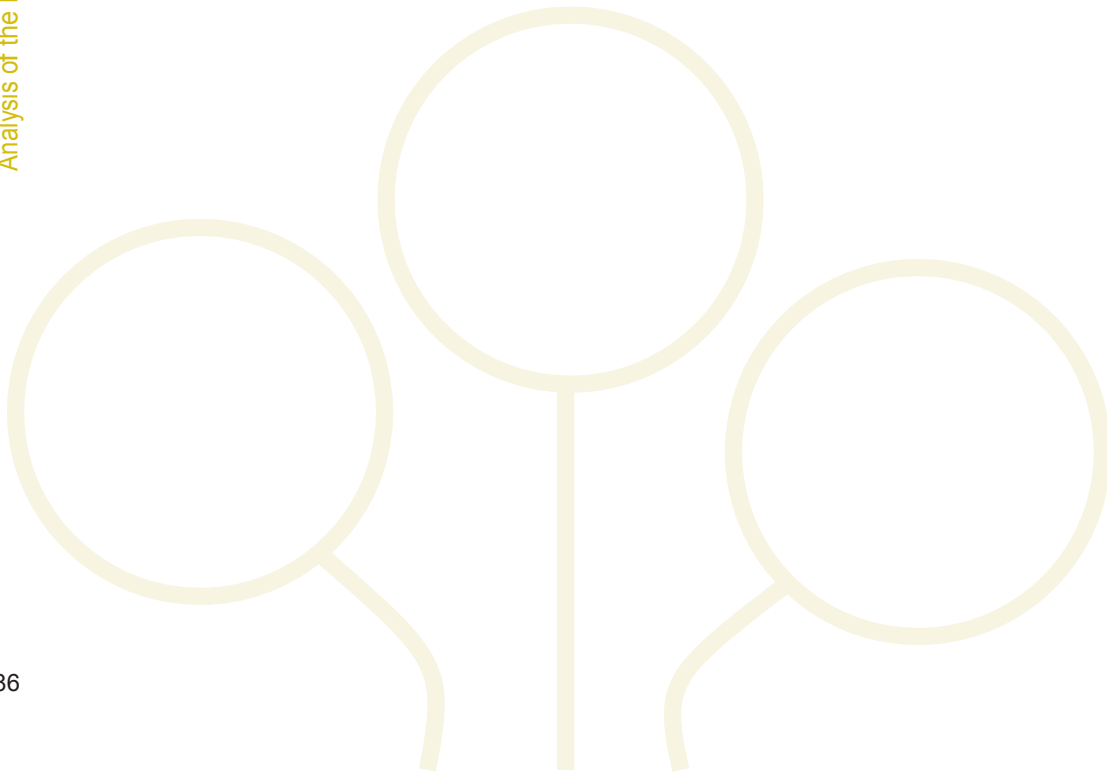
The assessment study of ELV generation and handling in India reveals that the materials efficiency of the automotive sector is ultimately embedded in the informal or semi-formal sector. A second generation of ELV entrepreneurs across India are investing in expanding their businesses. Their work is inventive, but it must embrace environmental safeguards to prevent negative externalities like pollution and occupational hazards. Some vehicle parts will require special handling procedures and dedicated channels to be managed, in light of their toxicity. This is a new terrain for India, and requires shared responsibility from the OEMs, auto part manufacturers, governmental actors and, indeed, ELV entrepreneurs themselves.

Smart Cities in India are likely to offer their residents improved public transportation in the next decades. The network of roads and highways is also expanding. All this will naturally result in more and more vehicles on the roads and more ELVs off the roads tomorrow. However, as the data presented in this report points out, if nothing changes the informal sector will be unable to cope with the projected increase in ELVs over the next decade. The informal ELV sector needs to be made part of a concerted plan for regulating, formalizing and strengthening national ELV processing capacities.

This study urges for three key steps forward. Firstly, training for existing ELV entrepreneurs, particularly to prevent environmental contamination and safeguard

24 Tanaka, T & Onishi, T (2005). Mega Competition Age of Automobile Recycling. Nikkei Ecology. 67.

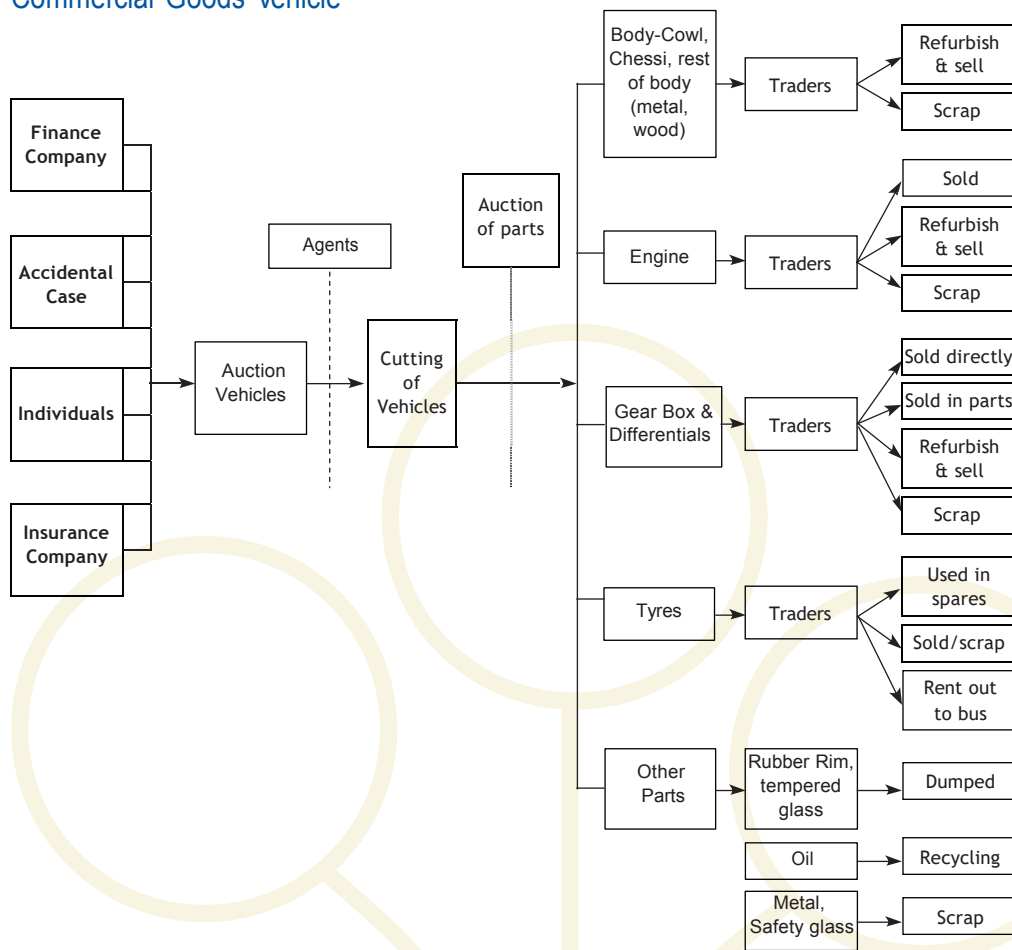
occupational health and safety. Second, delineating space for ELV handling in master plans and zonal plans — very little will be possible without land. And third, processes related to de-registration of vehicles must be streamlined, moved online, centralized and made accessible to everyone, across the country. The various arms of the central and state government will be key to bringing about these shifts, and so will be the active participation and shared commitment to drive materials efficiency in India.



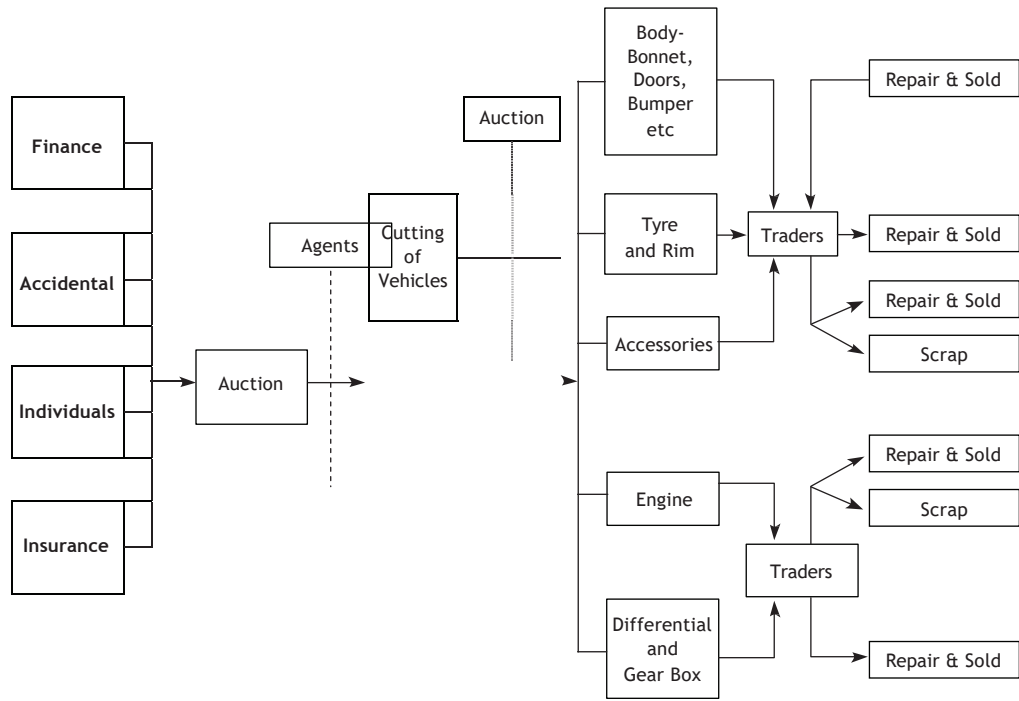
Annexure I

Process and Movement of Materials Across Commercial Goods Vehicles And Four Wheelers

Commercial Goods Vehicle



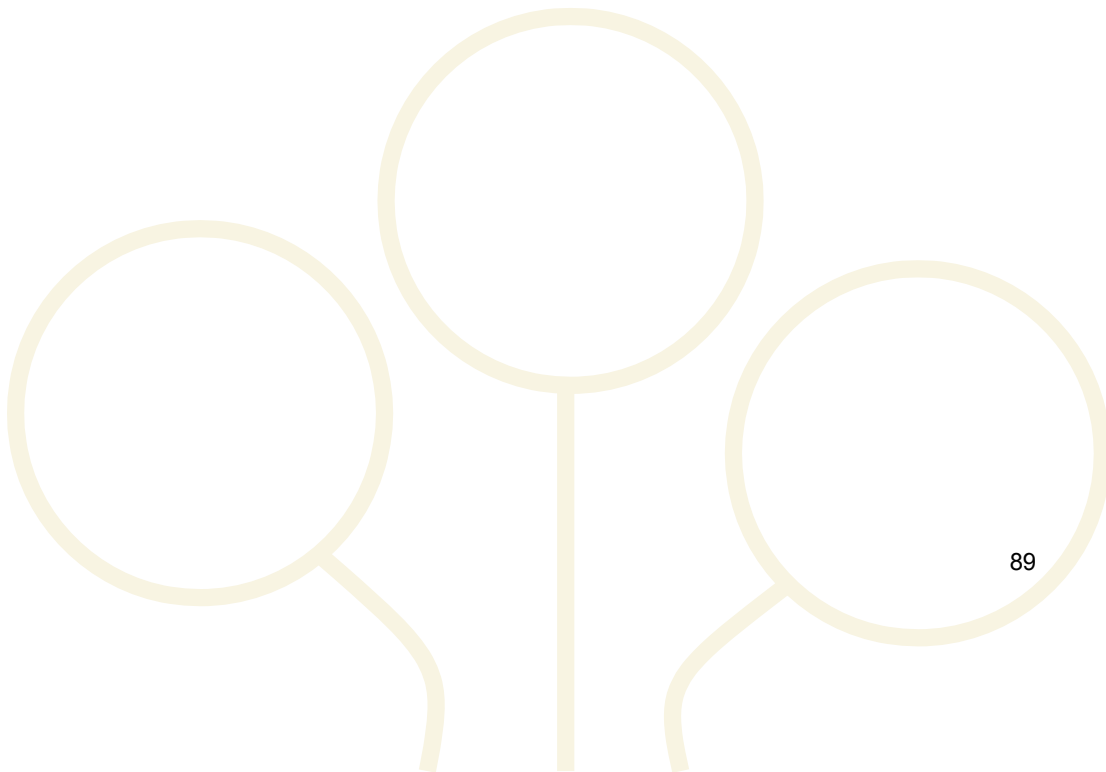
Commercial Passenger Vehicle/Private Cars



Annexure II

Story of a Dying Car in India – Understanding the Economic and Materials Flow of End-of-Live Vehicles (2012)

This Annexure contains only executive summary & methodology of the previous study. The detailed report may be referred at www.chintan-india.org/documents/research_and.../ELV-Report.pdf



About this Study

This report summarizes the results of two surveys and a number of field-based research missions carried out in the End-of-Life Vehicles (ELV) industry in Northern India. The research aims to present a clear picture of what happens to a vehicle in India at the end of its life-cycle. As a first step, a schematic materials flow has been developed through a participatory process with users, dismantlers, and recyclers. The study shows that the ELV industry consists of many different participants, who constantly interact with each other in a complex, interdependent process. The study provides a better understanding of the economics of the recycling of ELVs in India, as well as an insight into the attitudes, knowledge, and practices of the ELV handlers. The major focus of the study is the economic, environmental, and social challenges that emanate from a change in status quo. For the environmental issues, the report identifies a number of different individual vehicle parts as either waste (i.e., cannot be reused or recycled) or posing environmental danger (i.e., toxic to either humans or wildlife), according to the way they are currently treated by the informal sector. The report ends by presenting a series of recommendations on how to improve the resource efficiency of the ELV industry in India. It proposes a system to recognize and formalize the work of a currently largely informal sector, and ways for vehicle manufacturers to take responsibility for the products they release in the market.

Executive Summary

This report summarizes the results of two surveys and a number of field-based research missions carried out in the End-of-Life Vehicles (ELV) industry in Northern India. The research aims to present a clear picture of what happens to a vehicle in India at the end of its life-cycle. As a first step, a schematic materials flowchart has been developed through a participatory process with users, dismantlers, and recyclers. The study shows that the ELV industry consists of many different participants, who constantly interact with each other in a complex, interdependent process. The study provides a better understanding of the economics of the recycling of ELVs in India, as well as an insight into the attitudes, knowledge, and practices of the ELV handlers. The major focus of the study is the economic, environmental, and social challenges that emanate from a change in status quo.

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The Methodology at Work

Identifying a dismantling platform

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 standardised 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.



Figure 3: Cities in which the ELV Survey was conducted

Delhi Survey Areas

The Delhi survey involved sampling in eight different areas (see Figure 4), with details on their size in Table 1

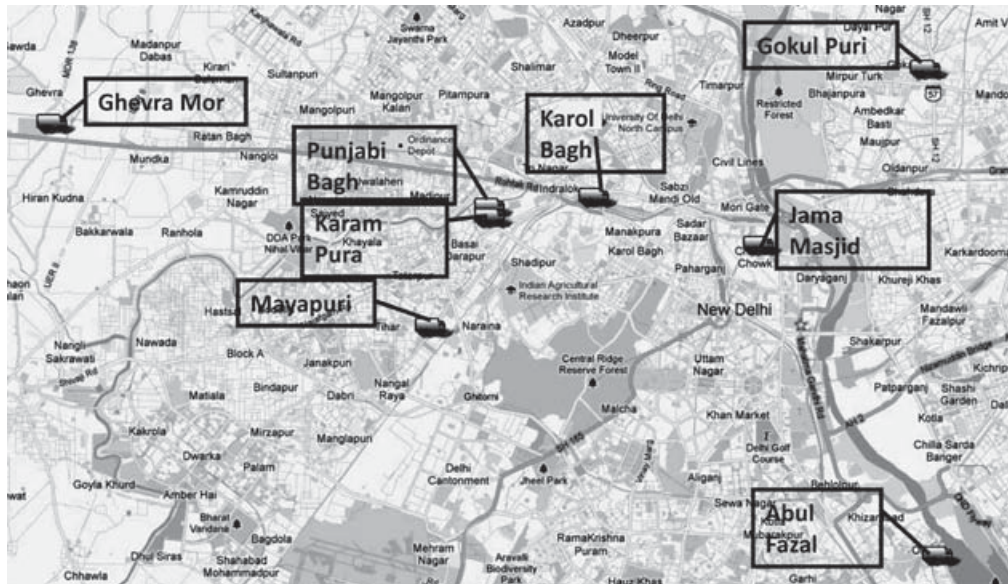


Figure 4: Delhi Survey Areas

Table 1 Survey Area Details

City	Survey Area	Number of Units Operating in the ELV Industry
Delhi	Mayapuri	3000
	Gokul Puri	90
	Jama Masjid	68
	Abul Fazal	6
	Punjabi Bagh	5
	Karam Pura	4
	Karol Bagh	3
	Gehvra Mor	2
Meerut	Chatriwala Peer	15
	Soti Ganj	55
Kolkata	Phool Bagan	1000
Nazibabad	Kabari Bazaar	150
Moradabad	Landgey ki Puliya	100
	Nawabpura	Only informal Discussions
	Karaula	Only informal Discussions
	Transport Nagar	Only informal Discussions

Source: Chintan fact-finding mission, part of a Delhi Pollution Control Board assignment, 2011.

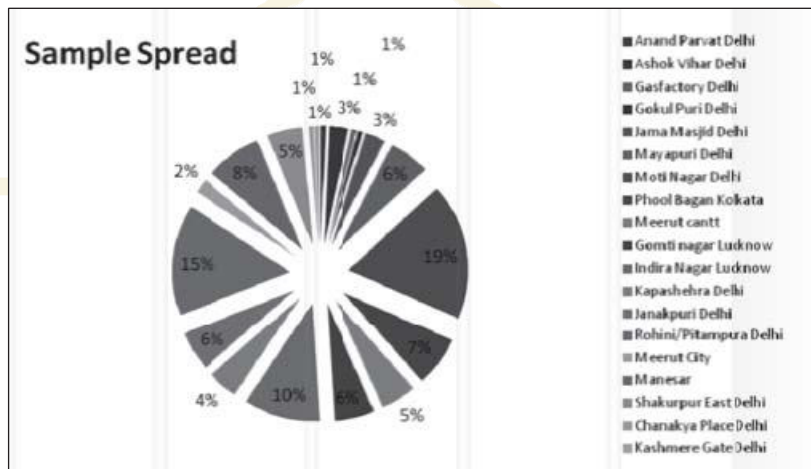
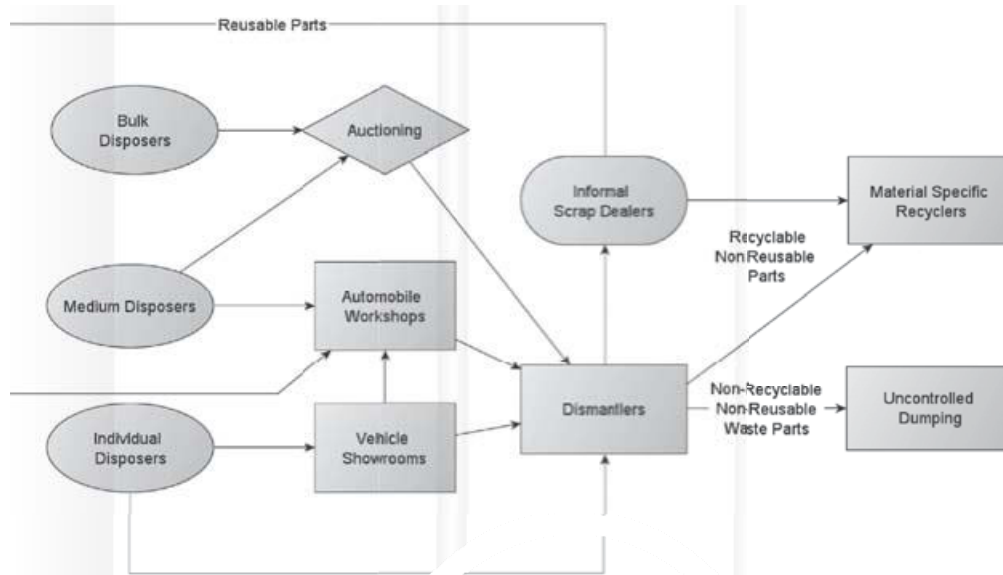


Figure 5: Trader survey samples: Geographical spread

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



Note: Field surveys showed there was a distinction between certain disposers who would always sell all their ELVs at auction and others who would sometimes need to sell only one ELV to a workshop. The distinction was based on size, but it was not possible to put a number on it.

The figure above shows the interaction between the different participants in the disposal of End-of-Life Vehicles. It has been created based on information collected during the field research as described in the methodology chapter.

The process map shows a diverse interaction between participants within the industry. First, disposers can be categorised 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 realise, 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.

Vehicle Sourcing

In the flow chart the main participants surveyed, who provide valuable data, are marked “dismantlers”. The results show that they, like other parts of the flowchart, have a complex interaction schedule with other participants. Most individual dismantlers, for example, source their vehicles from more than one of the possible sources described in the chart. It seems, however, that the largest source of vehicles for these dismantlers is individual disposers who contact them directly. Indeed, 89 percent of dismantlers claimed that people come straight to them to dispose of their ELV. Forty-two percent claim they also buy vehicles by independently approaching mechanics, showrooms, and workshops. In addition, only 15 percent claim to go to vehicle auctions. Obviously, these percentages do not add up to 100, as respondents were encouraged to give more than one answer when applicable.

The data shows that most participants in the market, including disposers, are aware of the value of their ELVs and know where they can take them in order to extract their full value.

Dismantled Parts Use

The data shows that dismantlers seem to naturally follow some major parts of the waste hierarchy, whereby waste reduction is given priority over reuse, and reuse is given priority over recycling. When asked what the respondents did with a purchased vehicle, 39 percent claimed they simply fix or replace various parts and resell it as a working vehicle. This segment of respondents says they source the parts they use in these refurbished vehicles from other ELVs which they dismantle themselves. This practice is possibly enhanced by the behavior of disposers, as described in the following chapter on Perspectives, where a large percentage have decided to dispose of their vehicles simply through a consumer desire for a newer version, rather than any specific technical issue with the vehicle. Consumers are, therefore, buying two or more identical or similar vehicles, using parts from one to fix others, selling refurbished, operable vehicles, then recycling the unusable parts from each vehicle.

Another 22 percent of the respondents say they are able to sell damaged parts to specialized refurbishers. This practice allows for resources to be efficiently utilized, with very little waste being generated. Indeed, only 13 percent of respondents claim there were certain parts of a vehicle for which they could find no resale value.

The survey shed light on another interesting component of the geographical nature of the ELV dismantling and recycling demographic. Certain cities have specialized in the appropriate treatment and recycling of particular parts and materials. This is the case, for example, of all oil recycling in Meerut, whereas all the steel parts are sent to Muzaffar Nagar for further treatment. In fact, the only system closely resembling a closed loop system was discovered during the survey of the Uttar Pradesh Roadways system for government vehicles. This system was on enough of a large scale to incorporate all the elements of the recycling and treatment process, without having to resort to further treatment outside their area. All parts were bought, traded, and reused locally by local traders and mechanics. The large quantity of ELV waste from the UP Roadways allowed for a comprehensive ecosystem to exist in one area.

**Box 1: Medium and Bulk
Disposers: A Case Study in
Moradabad**

Three neighbourhoods were surveyed in this city: *Langdey ki Pulliya*, *Darshimhal Ghat*, and *Karaula*. It quickly became apparent that the informal sector has a highly-strained relationship with the police in Moradabad, highlighted by a recent incident involving some stolen cars.

Overall, in the three areas, there is a clear distinction between large-scale dealers, organised into a more formal association, and small-scale dealers, who struggle to manage the bureaucratic process. The small dealers have to often struggle with proof of ownership of the cars they bought, regular police crackdowns, and the need to have greater organisational structures so they can develop and evolve into more recognised groups.

Langdey ki Pulliya is a center for dismantlers. The vehicles are procured in large part through auctions involving bulk dealers. Reusable parts are then be removed and sold directly to scrap dealers.

Non-reusable parts are sold on to small family units in *Darshimhal Ghat* and *Karaula*. Each of these units tends to specialise in the recycling or extraction of one particular part or unit. Many of these processes involve dangerously caustic materials and generally unhealthy working conditions.

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 non-toxic, more valuable parts was studied in order to understand the major source of revenue generation for dismantlers.

Fluids

The fluids used in the operation of a vehicle are inherently toxic and are, therefore, chosen as a subject of more detailed study in this report. From basic engine oil to brake fluids and hydraulic fluids, through AC gas and battery acid, there are a multitude of environmental hazards involved in the removal and recovery of these liquids. **Table 2** presents the results of the fact-finding missions concerning the fate of these liquids.

Table 2: Fluid Parts of an ELV and their Disposal Method

Fluid	Disposal Method
Engine Oil	Drained or sold to the vendors. Oils are sold at Rs. 25/L. The collected oils are either sold to furnaces or small informal refineries. The vendors sell them on to informal refinery units. The refined oil is either packed and resold into the market, or sold loose and adulterated. The unrefined oil is sold for application on cog wheels in machines, such as crushers or bucket wheels, for lubricating crane wires, and also burned in furnaces or boiler for generation of heat.
Transmission	All of these oils are mixed together and "refined" by heating. They are then mixed with a viscosity amending chemical which allows the solidified mix to be used for the lubrication of cogs. There are some traders who do not have the necessary scale to produce this lubricant themselves so sell it on, or alternatively, in rare cases, drain it to the ground.
Coolant Fluid	
Power Steering Fluid	
Brake Fluid	
Hydraulic Fluid	
Gear Oil	
Battery Acid	Drained
A.C. -Gas	Released into the air

These are toxic and require careful handling, and can cause soil and groundwater contamination if improperly disposed⁵

⁴ <http://www.nrdc.org/water/pollution/gsteps.asp>

Solids

As stated above, an ELV can be dismantled into an almost endless list of individual parts. The selection in **Table 3** is chosen based on the hazardous nature of the embedded chemical components or the process involved in their extraction.

Table 3: Solid parts of an ELV containing hazardous compounds and their disposal and recycling methods

Solid Part	Disposal and Recycling Method
Air Filter	If the air filter cannot be reused directly, the ferrous parts are sold to kabaris for Rs. 15 - 18 per Kg and the foams are burned or dumped. Key Toxicity: Foams are made up of polyurethane which release potentially hazardous dioxins when burned.
Oil Filter	Non-working oil filters are sold to scrap dealers. First, paper from the filter is removed - dumped or burned. Metallic parts are sold to kabaris for Rs. 15-22 per Kg, which is then sent to the recyclers for Rs. 25 per Kg. Key Toxicity: Residue oil and toxic particles released to ground and air from dumping and burning the filter paper.
Brake Shoe	Brake shoes often contain asbestos traces, sometimes equivalent to 20 percent of the weight of the shoe. The asbestos is removed and dumped, while the metallic part is sold to kabaris, which is then sent for recycling. Scrap dealers sell these metal brake parts to recyclers. The ferrous brakes are sold for Rs. 23-30 per Kg, while aluminium brakes are sold for Rs. 70-90 per Kg. The metal recycling sites in Delhi are Mandoli, Sahadara, Samaypur Badali, and Anand Parbat. Key Toxicity: Asbestos filter cause asbestosis, various other lung disorders, and even lung cancer.
Battery Terminal	Metal parts of battery terminals are sent for recycling and sold to scrap dealers for Rs. 20-25 per Kg. The ferrous metals are sold at Rs. 23-28 per Kg and brass or copper is sold for approximately Rs. 100-200 per Kg. Key Toxicity: Copper is extracted using acid, which causes pollution and affects the respiratory and dermal system of workers and others living nearby.
Switch	Non-functional switches are dumped by automobile parts dealers. They are picked up by street waste pickers who usually break them to recover the metal parts. Brass or Copper is sold for Rs. 100-200 per Kg. whereas ferrous parts are sold at Rs. 23-25 per Kg. Key Toxicity: Switches contain toxic mercury which is released into the environment.

Rubber	<p>Most of the rubber parts are dumped and some of them are picked up by street waste-pickers and sent for recycling. They are then sold to big recyclers at Rs. 2-5 per Kg.</p> <p>Key Toxicity: Rubber is used in furnaces, emitting several pollutants.</p>
Clutch Discs	<p>Clutch-discs can often be repaired and reused. Non-functioning clutch discs are broken to remove the asbestos layer which is dumped. Ferrous parts are sold at 23-28 per Kg to kabaris, which are then sold to recyclers through big scrap traders.</p> <p>Key Toxicity: Asbestos is dumped on the ground, or at best, in municipal dumps, exposing the public at large to this highly toxic material which causes asbestosis, various lung disorders, and even lung cancer.</p>
Electronic Parts	<p>Electronic parts, such as circuits, are sold to e-waste collectors, where they are tested for reuse. Parts, including PCB, are sold for Rs. 40 per Kg. Working parts are taken out and sold to refurbishers, and price variation depends on the working components that can be as expensive as Rs. 200 per Kg. Waste components are sold to e-waste dismantlers and recyclers.</p> <p>Key Toxicity: Extraction of precious metals is typically not done in an environmentally-safe manner.</p>

Wasted Parts

The following histogram shows specific parts of an ELV that are called problem parts by most dismantlers. These parts are of particular interest, as they are currently being disposed of and are, therefore, entering a waste stream, thereby representing resource inefficiency. Depending on the geographical area in which these parts are disposed of, and the quality of the waste collection systems in those areas, they may reach a landfill, a waste-to-energy plant, or they may remain in the environment.

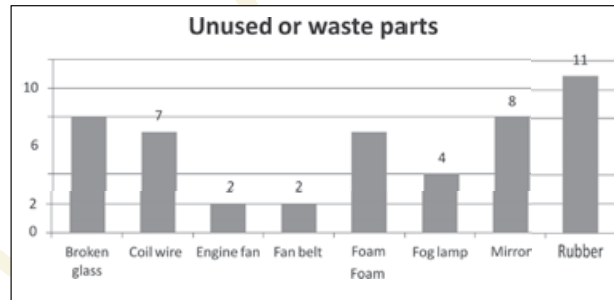


Figure 6: Unused or Wasted Parts of an End-of-Life Vehicle

Economic Aspects

Table 4 shows the economics of various parts that most dismantlers have to deal with. It is important to realise 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,

those with a greater number of data points, such as the piston, show that opportunities of up to 150% margins are possible.

Table 4: The Economics of Various Valuable Parts

Part Name	Cost of Recyclin	Selling Price	Margin	Margin of Recycling
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%

Entries marked with an asterisk (*) represent parts for which five or fewer recyclers volunteered their prices.

Economics of the ELV Business

The surveys show that the ELV industry is dominated by small businesses operating on limited capital. **Figure 7** 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.

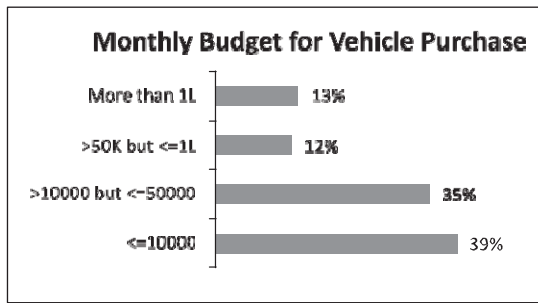


Figure 7: Monthly Budget for Vehicle Purchase

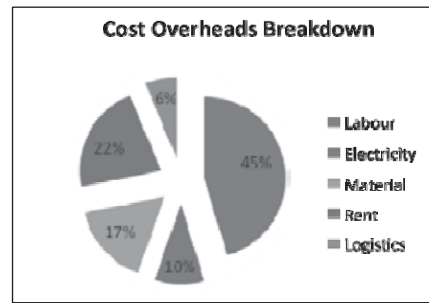


Figure 8: Average Cost Breakdown of Surveyed Dismantlers

Figure 8 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 2011, this comprises 9,600 jobs, including the labourers 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.



About this Study

Following the phenomenal expansion of the Indian automobile market over the last two decades, the end-of-life management of vehicles must gain new centrality in debates about the environment, material efficiency and the labour and social dimensions of circular economies.

While the informality of the end-of-life vehicle (ELV) sector in India is judged to be inadequate to meet the challenges of the next decades, very little is known about how this sector currently operates. This poses a fundamental obstacle in devising effective policies, and reinforces the stigma attached to informal economies of material recovery as inefficient, undignified and polluting, in spite of their significant (if imperfect) contribution to national welfare.

This study follows up a previous 2012 publication by GIZ and Chintan (Annexure 2) that delved into ELV management in and around Delhi. The present effort draws a broader and more systematic picture of the ELV sector in India, by looking at five other major automotive production hubs, and the thriving ELV markets that developed around them: Kolkata, Chennai, Pune, Jamshedpur and Indore. By highlighting systemic links and nation-wide challenges, the report offers insights that will be strategic to design a regulatory and legal framework that reflects accurately the economic, social and environmental reality of the Indian ELV landscape.



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