Sustainability issues in the Brazilian automotive industry: electric cars and end-of-life vehicles

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Objective

- To present a view on how Brazilian Automotive industry will develop considering emerging sustainability issues: Electric Vehicles and End-of-Life Vehicles.
- To present questions and hypothesis related to these issues being researched at USP.
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**BACKGROUND**

- Radical change in the automotive industry may be required in order to respond to increasingly demanding environmental regulations worldwide.

- A central component of unsustainability in today’s car industry is the internal combustion engine (ICE), associated with emissions, fossil fuel use and noise. A transition to battery electric vehicles (BEVs) requires a radical and costly shift in automotive operations.

- The organizational field has also been substantially changed by the introduction of End of Life Vehicle regulations worldwide.
Electric Cars
Upcoming revolution in the Auto Industry:

- Growing markets at BRICS countries at rates never seen before in USA, Europe and Japan, and therefore, opening opportunities for the development of the local industry in those countries;
- Movement of the industry towards cleaner alternatives, specifically concerning energy and engine and driving systems at the vehicles.
The technological path of the electric car is yet undefined...

Dijk, 2010 (IJATM)
What will be the global scenario?

- **Diversity**: different solutions from different manufacturers may coexist along the globe

- **Progressiveness**: engine technology will evolve from ICE, to HEV, to BEV, to FCV…

- **Rupture**: rapid transition to electrification due to transition framework factors

Freyssenet, 2011 (IJATM)
What roles can Brazilian Automotive industry play in the future with electric cars?

- Importer
- Local Assembly
- Local Assembly with participation in product development
- Local Industry with local capital and technology
Consequences for Brazilian Auto Industry in each scenario:

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<th>Importer</th>
<th>Local Assembly</th>
<th>Local Assembly with participation in the development</th>
<th>Local Industry (capital and technology)</th>
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<td>Diversity</td>
<td>Lock in</td>
<td>Follow the ‘leader’</td>
<td>Co-Developer</td>
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Conclusion:

A set of competencies, regulation aspects, infrastructure and also the articulation among players in the segment (newcomers and existing) will be required.

Research mapping these elements is being carried out at our department and will be soon published at IJATM.
End of Life of Vehicles

Facts:

- Growing fleet, currently with 35 million vehicles, at +7% p.a.
- High average fleet age: 8.75 years;
- Informality in the End-of-Life;
- Estimations of ca. 1 million of vehicles scraped per year;
End of Life of Vehicles

What are the social, economic and regulatory aspects that enable the recycling process of End-of-Life vehicles in an area?
End of Life of Vehicles

Reverse logistics has been stretching out worldwide, involving all the stages of supply chains in various industrial sectors. A definition of this process is given by members of the European Research Network on Reverse Logistics (REVLOG) in 2003; where, reverse logistics is defined as ‘‘the process of planning, implementing and controlling backward flows of raw-materials, in process inventory, packaging and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal’’ (De Brito and Dekker, 2004).

In this context, reverse logistics issue diverse material flows along the chain and during the whole life cycle of products. Therefore, it distinguishes three main stages in which returns are generated, i.e. manufacturing, distribution and customer returns.

In the last decades, economic, legislative and social engaging incentives have driven industrial sectors and governments to become active in reverse logistics. Economic incentives, because the implementation of reverse logistics represents direct incomes from reduced consumption of raw-materials, from adding value to recovered material and from cost reduction on waste treatment and/or disposal. Legislative incentives, because the recent legislation addressing take-back responsibilities, recycling quotas and packaging regulations, that must be accomplished by companies (Sachs, 2006; Doran et al., 2003; Ferguson and Browne, 2001). The engagement of companies with society and environmental issues also can generate incentives to manage return flows in a supply chain. Moreover, marketing, competitiveness and strategic issues are other incentives for companies to become active in reverse logistics. All incentives are not mutually exclusive and might be present as a mixture in one industrial sector (De Brito and Dekker, 2004).

The recent growth on environmental policy, related to EoL products, has favored the development of reverse logistics processes in several industrial sectors, this growth has mainly taken place in the European Union (COM, 2003; Doran et al., 2003; EPE, 2002; Ferguson and Browne, 2001). However, it has triggered reactions in other countries, which have to accomplish product-related legislations in order to be competitive in international markets.

One of the sectors with more regulation is the automotive industry, their products are among the most complex and regulated in the international market, since not less than 80 EU directives and 117 United Nations Economic Commission for Europe (UNECE) pieces of legislation address motor vehicles (Reinhardt, 2005).

One policy directly related to reverse logistics processes in this sector, is the Directive 2000/53/EC, which aims at the prevention of waste from vehicles, the improvement of vehicle dismantling and recycling to make them more environmentally friendly, besides to set take-back obligations, quantified targets for reuse, recycling and recovery rates of vehicles and their components (see Fig. 2), and the promotion of improvements in the environmental performance of all operators involved in the chain (EC, 2000).

Reverse logistics processes in the automotive industry have been existed since the beginning of the industry itself; the returns generated by raw material surplus, quality-control returns, by-products of processes, product recalls, overstocks, and commercial, service, warranty and EoL returns, have required management in order to accomplish with economic, legislative or social engagement objectives.

End-of-Life Vehicles are returns generated at the product’s EoL stage. The management of EoL Vehicles or ELV has arisen as very important issue for car-manufacturers worldwide in the last decade. The main reason for that is the implementation of the mentioned Directive 2000/53/EC in the European Union. The nature of automotive markets has promoted the move of international automotive industry towards the accomplishment of provisions contained in that Directive; especially the industry in countries exporting vehicles to European markets, e.g. Korea, Japan and European car-manufacturers established abroad Europe.
Brazilian Scenario

- Existing laws for components take back (tyres and batteries) but with low effectiveness;
- Discussion of laws aiming at regulation of vehicle inspections, disassembly facilities and parts reuse;
- Design, assembly and supply practices attached to global strategies;
- Latent development of a sector of recycling of automotive components;
- Strong players in the steel and extraction industry;
- Lack of technology in recycling complex components and materials;
- Role of the manufacturers in defining the ‘rules’ of the game;
RESEARCH QUESTIONS

• What are the possible circuits of power that can define the implementation of a recycling industry for End-of-Life Vehicles in Brazil?

• What is the possible trajectories to achieve a successful implementation of such industry?

• What are the roles played by government, associations, manufactures, society, etc.