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The Potential for End-of-Life Vehicle Recycling in Cameroon

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Dissertation Summary

Driving from waste to resource, the recycling of end-of-life vehicles (ELVs) has been widely acknowledged as a means for the recovery of resources. The automotive industry has been growing over the years, consuming larger quantities of primary resources while generating more wastes. ELVs are increasingly being treated not only as wastes, but a means of resource recovery, including secondary raw materials for industrial use. By recycling ELVs, environmental pollution caused by ELVs is also reduced. Vehicles are indispensable products in our societies today and their demand have been on a rise. ELVs are vehicles that have come to the end of their useful life. Developed countries such as USA, Japan, Korea, etc., strive to recycle ELVs rather than dump them in waste landfills. In the EU, the directive for ELVs has promoted EU country initiatives on the management and recycling of ELVs.

The proper treatment of ELVs requires a collection stage, depollution stage, dismantling stage, and recycling stage. The importance of road transportation system has been acknowledged as a very important factor in the recycling flow of ELVs. ELVs are transported from the customers to the parts recycler (dismantler) where the parts which can be reused are removed. The hulk is then transported to the shredder or press, where it is sorted into various material types. The sorted materials are then transported to the relevant recycling facilities. Because the state of road transport in Cameroon is very poor, it can be assumed that this would have an impact on efforts to implement an effective recycling regimen for ELVs. The precise impacts of this poor road infrastructure, inefficient network, and lack of unsealed roads on the recycling of ELVs remains unclear. In addition, the number of ELVs in Cameroon are unknown given the absence of vehicle deregistration. In Cameroon, about 80% of vehicles have internal combustion engines which use gasoline or petrol. With the low energy supply, it could take decades for electric vehicles (EVs) to penetrate the market, unlike South Africa, Egypt, which have better economic conditions and projections of some EVs on the markets in 2022.

The main objective of this study is to determine the impacts of road transportation on the recycling of ELVs in Cameroon. The other objectives of this study are to examine the current condition of ELVs in Cameroon, the estimation of ELV quantities, the resource recovery including energy, the feasible locations for establishing

ELV recycling facilities in Cameroon, and a transport cost- effective analysis of these locations.

A SWOT analysis was conducted to examine the current treatment of ELVs in Cameroon. Results indicated significant strengths and opportunities, as well as considerable weaknesses and threats. The absence of vehicle deregistration renders ELV collection and enumeration, challenging. Summarily, the state of ELV treatment in Cameroon is very poor, resulting in more environmental impact and pollution, and there is lack of ELV policy given the little attention to ELV recycling by the governing authorities. Therefore, there is need for the formulation and implementation of an effective ELV policy.

A Population Balance Model was used to estimate the number of ELVs generated in Cameroon and various scenarios considering changes in the average lifespan of the vehicle were done to examine changes in ELV quantities. The results indicated an increasing trend for ELV quantities, with an S-shaped curve. The estimated ELV quantities are considerable, requiring appropriate recycling.

To achieve its goal of emergence (vision 2035) by addressing the rising energy crisis in the country, the system dynamics modeling is used to estimate the amount of energy recovered from ELVs considering the road transport. The road transport is also considered as an important element in the recycling flow of ELVs. The system dynamics modeling is used to estimate the amount of energy recovered from ELVs considering the road transport. Results suggested that the recycling of ELVs will provide a potential source of energy to promote economic activity in the country. Likewise, an increase in the paved road length would promote the recycling of ELVs and increase the energy recovered. However, an increase in the target total road length has a lesser impact. This would imply, the length of paved roads is important in the recycling of ELVs, although paved roads are a part of the total road length. Essentially, ELVs is a source of energy recovery and the state of road transport quality is important in the recycling of ELVs.

To determine the feasible locations for establishing ELV collection/dismantling and recycling facilities, the Suitability Modeling using the Geographic Information System (GIS) was adopted. The results indicate 4 major suitable areas/regions across the country for ELV collection and dismantling, and other secondary

centers, except the East and Adamawa regions. The results indicate five major feasible locations for establishing ELV recycling facilities, including the North West region, West region, Centre region, South West and Littoral regions. Considering the travel distance and fuel cost to the city of Douala in the Littoral region, where the major seaport is located (for export of resources recovered from ELVs such as scrap metals), the South West region is the most transport cost-effective location, while the Far North region is the least. The Centre region indicate highest amount of steel scrap generated from ELVs, hence highest revenue. This is followed by the Far North region. The South region has the lowest amount of steel scrap and revenue generated.

In conclusion, it is imperative to implement an effective ELV policy(ies) and to ensure adherence to standardized and environmentally friendly ELV recycling practices. The recycling of ELVs in Cameroon will not only curb the environmental pollution caused by these vehicles, but could also serve as a means to recover other resources, including energy.