

Study on Network System of Lead-Acid Battery Recovery Supply Chain Based on O2O Model-the Supply Chain Network System of Lead-Acid Battery Recycling Based O2O

Shudong Wang

*School of Economic Management, Huainan United University, Huainan 232100, China
Email: dongguawang1981@163.com.*

ABSTRACT. *Lead-acid batteries are widely used in transportation, communication and energy storage because of their high cost performance. At the same time that people and enterprises have access to lead-acid batteries for convenience, the problem of “small dislocations” in the recycling of used batteries has also been a major headache for enterprises and managers. From lead-acid battery consumption present situation, this paper briefly discusses the traditional lead-acid battery recycling process, the national policy, problems, etc., creatively put forward the use of the Internet to simplify the waste lead-acid battery recycling process, and solve the contradiction in the recycling of stakeholders, to today's environmental protection priority age puts forward a new scheme of waste recycling.*

KEYWORDS: *Lead-acid battery; Recycling supply chain network; O2O*

1. Introduction

Lead-acid batteries for cars drive in the field of transportation, electronic ignition and low-speed electric cars, but also in the field of communications and uninterrupted power supply (UPS) has a broad application field, although in recent years, other types of battery such as lithium battery, nickel metal hydride batteries emerge in endlessly, but still lead-acid battery with its high cost performance and battery type on top of the first. According to the service life, automobile and motorcycle batteries should also be replaced every two years. According to the statistics of China automobile industry association, the number of motor vehicles in China reached 137 million at the end of 2013, the number of electric (self-propelled) vehicles reached 160 million, and the number of motorcycles reached 181 million. The total number of scrapped lead-acid batteries in the field of transportation and communications in 2015 was about 528 million, weighing nearly 7 million tons.

In 2015, the theoretical scrap amount of batteries in China's transportation and communications field was calculated

With the enhancement of residents' awareness of environmental protection and the strengthening of national efforts to control air pollution, as well as the increasingly clear timetable for banning the sale of fuel vehicles, China's electric vehicle industry has achieved rapid development. Electric vehicles have transitioned from low-speed two-wheel electric vehicles to low-speed four-wheel electric vehicles and then to high-speed four-wheel electric vehicles. The use of lead-acid batteries has not decreased. As the number of electric vehicles in China continues to increase, the demand for lead-acid batteries has also increased correspondingly.

In nearly five years, China scrapped lead-acid battery an average of around 6 million tons, and has increased year by year, although the recovery rate is higher, but in the process of recycling, storage, disposal, use, there are still a lot of environmental pollution phenomenon, mainly due to China's “small scattered” phenomenon in the process of lead-acid battery recycling is still prominent.

Due to the consideration of industrial governance and environmental protection, relevant departments of the state have gradually made policy treatment and reversal on the recycling of lead-acid batteries and the pollution phenomenon, and gradually put the recycling of waste lead-acid batteries on the national key control agenda. In 2016, various provinces in China successively issued the pilot program of waste lead-acid battery collection and transfer management system. In January 2018, the interim measures for the administration of the recycling and utilization of new energy automobile power batteries shall be jointly issued by the ministry of industry and information technology,

the ministry of science and technology, the ministry of environmental protection, the ministry of communications and transportation, the ministry of commerce, the general administration of quality inspection and the bureau of energy, and shall come into force on August 1, 2018. Its main purpose is to strengthen the new energy vehicle power battery recycling management, standardize the industry development, promote the comprehensive utilization of resources, protect the environment and human health, and ensure safety. Released in July 2018, the ministry of industry and new energy vehicle power battery recycling traceability management provisional regulations (the regulations), to establish “new energy automobile national surveillance and power battery recycling resource integrated management platform”, the power battery production, sales, use, recycling process such as information acquisition, the main body of each link to recycle the implementation of monitoring. Effective from August 1, 2018. But “ideal is perfect, reality is very bone feeling”, one is the policy time is short, the result cannot be reflected, the other is the waste lead-acid battery recycling industry is in a long-term state of disorder, the reality and the system requirements are still large.

2. Current Domestic Lead-Acid Battery Recycling Status

The main raw material of lead-acid batteries is metal lead, but the production of lead ore in China is low, so we have to import lead every year to meet the demand of battery manufacturing. However, in fact, the developed countries have a large proportion of recycled lead in meeting domestic demand. Compared with other metals, it is much easier to recycle and recycle lead. Therefore, lead has the highest recycling rate of all metals. In the 1980s and 1990s, the world produced more recycled lead than primary lead. In some developed countries, including Japan and France, recycled lead accounts for 60% or even more than 90% of lead production. And according to our country promulgated by the ministry of industry and information technology, ministry of science and technology, ministry of finance in 2011, three ministries and commissions such as the printing of the renewable non-ferrous metal industry development promotion project target, the secondary lead in lead production accounted for in 2015 years or less than 40%, it still relatively low compared with the developed countries, there are huge development space.

Secondary lead is made by recycling waste lead raw materials (mainly lead-acid battery), through recycling and dismantling, smelting, processing, again lead the industrial process of the metal and secondary lead with high recovery rate, the characteristics of the production of low energy consumption, lower cost, resource acquisition potential (secondary lead recycling, resource acquisition ability with lead consumption growth increases), is conducive to environmental protection. According to comprehensive analysis and calculation, compared with the production of primary lead, each ton of recycled lead is equivalent to 659 kilograms of standard coal, 235 cubic meters of water saving, 128 tons of solid waste emission reduction, and 0.03 tons of sulfur dioxide emission reduction. Compared with the development and utilization of primary lead ore resources, in 2013 alone, China's renewable lead industry was equivalent to saving 989,000 tons of standard coal, saving 350 million cubic meters of water, reducing the emission of solid waste by 192 million tons, and reducing the emission of sulfur dioxide by 45,000 tons.

Although recycled lead is conducive to the development of social circulation economy and environmental protection, its production source must be supported by an effective lead-acid battery recycling system, which is not optimistic in China. According to the comprehensive prevention plan for heavy metal pollution in the battery industry (draft for consultation) issued by the ministry of industry and information technology in 2010, the organized recovery rate of lead-acid batteries in developed countries such as Europe, the United States and Japan has exceeded 90%, while the organized recovery rate in China is less than 30%. At present, there is no national and regional recycling network built by battery manufacturers or renewable lead manufacturers.

During the 2018 “two sessions”, state media interviewed zhang tianren, a member of the National People's Congress and chairman of zhejiang tianneng group. Zhang Tianren almost every year, submit a proposal about old lead-acid battery recycling, and according to his prepared submitted during the two sessions of National People's Congress, according to the proposal by the end of 2017, illegal recycling models are still account for the amount of waste lead acid storage battery recycling produces 80% of the total, long-term recycling market leading, leading to a legit recycling enterprise survival space more narrow, formed a “bad money after bad money”.

In general, the recycling of waste lead-acid batteries is still in a scattered and disorderly state, which makes it difficult for normal enterprises to recycle and dispose of waste lead-acid batteries, which affects the production and recycling management of lead-acid batteries. It not only causes waste of resources, but also causes the illegal dumping of most lead-containing waste sulfur-acid solutions, which seriously pollutes water quality and soil. Therefore, it is of great significance to China's lead industry and environmental protection industry to establish a complete recycling system for lead-acid batteries. Especially in the Internet developed today, it is high time to build an efficient and

traceable lead-acid battery recycling supply chain system based on the Internet.

A preliminary study on the network system of lead-acid battery recovery supply chain based on O2O.

2.1 Analysis of Recycling Process of Traditional Lead-Acid Battery Supply Chain

From the current recycling and manufacturing process of waste lead-acid batteries, a waste lead-acid battery has gone through the following steps: (See Figure 1)

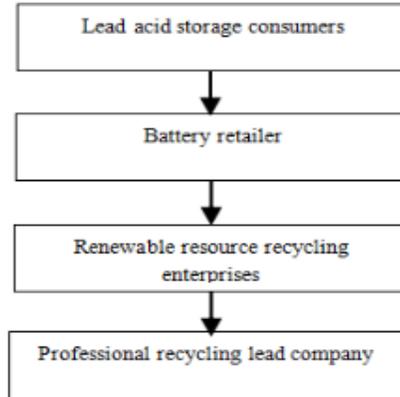


Figure.1 Traditional Recycling System of Lead-Acid Batteries

At present, the old lead-acid battery recycling and reproduce social recycling system is the key problem of large and low efficiency, less professional recycling companies and the market share is low, according to related statistics, the industry admittance threshold low, domestic waste lead-acid battery recycling network, the private collection spot (60%), battery retailers (17%), auto 4 s maintenance station (5%), battery manufacturers (8%), secondary lead and secondary lead professional collection points (10%) [7], there is no a company has a national recycling network throughout the country.

Although the reproduction of waste lead-acid batteries has been incorporated into the unified planning of recycling economy industrial parks in many places, the fact that the production process is rough, the production efficiency is low and the pollution is serious has not been fundamentally improved. In 2013, the ministry of industry and information technology, the ministry of environmental protection, the ministry of commerce, the development and reform commission, the ministry of finance and other five ministries and commissions issued the “opinions on promoting the standard development of lead-acid batteries and regenerated lead industry” (the joint section of the ministry of industry and information technology [2013] no. 92) Standardize recycling activities. We will regulate the recycling of waste lead-acid batteries by individual traders in accordance with the law, and severely crack down on illegal dismantling and smelting of lead by local law. We will improve the licensing system for the operation of hazardous waste products, encourage production enterprises to organize the recycling of waste lead-acid batteries through their retail networks, and support production enterprises, sales enterprises, professional recycling enterprises and recycling lead enterprises to jointly build a recycling network. We will strengthen supervision over the collection, storage and transportation of waste lead-acid batteries. We will support the construction of large-scale and standardized demonstration projects for recycling lead.

2.2 Analysis of Network System of Lead Acid Battery Recycling Supply Chain Based on O2O

At present, the key to remodel the lead-acid battery recycling supply chain with O2O is to solve the network problem of recycling enterprises. Although there are a large amount of waste lead-acid batteries at present, it is difficult to construct the network compared with small recyclers because formal enterprises need to build their own networks step by step. Second, conform to the secondary lead industry access conditions of the enterprise itself is relatively small,

approved in accordance with the conditions of enterprises in 2014 was only two, again in 2016 upgraded to the secondary lead industry standard conditions, the first through the enterprise only for four, threshold is high, but did not improve industry concentration, lead to secondary lead big big enterprise, small small, looking for their living space; Finally, different groups of stakeholders involved in the lead-acid battery recycling supply chain are highly dispersed and complex, and these organizations or groups have their own goals and interests, so it is difficult to organize and coordinate in a unified way, which also leads to the “difficult production” of the formal recycling supply chain system.

At present, O2O model is relatively mature in the service industry, namely, online and offline interactive integration, virtual and real interaction service system. Online platforms provide enterprises' products display, industry information dynamics, online payment and other services, and offline industrial parks provide products exhibition and sales, product research and development, storage and logistics services. Nowadays, Internet thinking has permeated all walks of life. It is not only feasible but also necessary to solve the problem of lead-acid battery recycling using O2O model. For example, the recycling O2O service platform of the mobile phone recycling industry not only greatly simplifies the mobile phone recycling process and brings convenience to customers, but also promotes the orderly development of mobile phone recycling, saves energy and reduces the secondary pollution of waste electronic products.

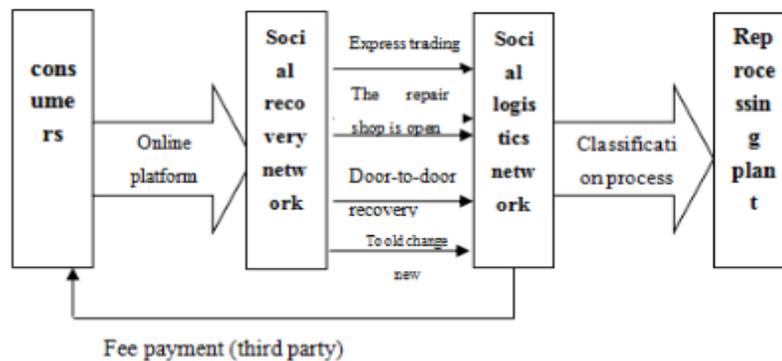


Figure.2 Diagram of Waste Lead-Acid Battery Recycling Supply Chain System Based on O2O Model

Old lead-acid battery recycling supply chain network system based on O2O (pictured above) is actually use the Internet to complete the recovery system of online communication and interested parties to the trading activities (recycling), and then reuse the social logistics system to complete the waste lead-acid battery logistics process, due to the social classification of logistics system is relatively complete, such as the logistics of dangerous goods to ensure that waste lead-acid battery will not cause pollution to the environment in the process of logistics, finally, according to manufacturer to evaluate the value of waste lead acid storage battery are given the corresponding commodity prices, and third-party payment institutions entrusted to pay, of course, Repair sites and other social recycling systems will also find their place and get their reward. In this way, the problem of front-end reverse supply chain which is the most difficult to solve in the network system of waste lead-acid battery recycling supply chain is solved.

3. Conclusion

Due to China's national conditions, lead-acid batteries will also play a major role in energy storage in transportation, communications and other fields for a considerable period of time. In order to avoid environmental pollution caused by improper disposal, it is necessary to standardize the recycling and utilization system of lead-acid batteries. Based on the comprehensive research data and all aspects of the present stage based on the analysis of the domestic lead battery recycling policy, puts forward the advantage of the Internet technology and social logistics system to improve and standardize the current recycling system of waste lead acid storage battery in our country, in order to cause the parties concerned, jointly promote the lead-acid battery reverse supply chain system benign operation and health and sustainable development.

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