

Challenges of Battery Circular Economy under Rapid Urbanization

-A Comparative Study on Acid Battery Recycle between Japan and Cote d'Ivoire –

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Abstract:

Local governments in Cote d'Ivoire are trying to improve their environmental services and the latest agenda is how to reduce industrial wastes. We identified strong needs of local environmental protection, especially in the field of acid battery. The local economy in big cities like Abidjan is expanding with rapid motorization. About 60% of acid battery comes from motorization. Various local and international scientists identified that unsound acid battery recycling not only causes severe pollution but has a serious impact on health. New markets for recycled batteries are driven by people's awareness.

In Abidjan, we can observe illegal dumping of battery, informal dealer and non-educated workers. Local governments are trying to establish recycling society with community empowerment. Training programs, not only for acid battery but also all the industrial wastes were provided. In addition, new ideas to use re-used battery encouraged more recycling. In Japan, we have established well management systems, but recycled battery markets were not well recognized. By conducting a comparative study, we have found that battery recycling can be effectively done by encouraging community. Educational trainings focused on both environmental risks and discussions for full use of re-used battery can bring sustainable society.

Keywords: Rapid motorization, Illegal dumping, Battery re-use, Informal recycling

JEL classifications: Q56,

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I. Introduction

1.1 Background

Local governments in Cote d'Ivoire are trying to improve their environmental services to the citizen. This is never ending challenge and the latest agenda is how to fully reduce industrial wastes. We identified strong needs of local environmental protection, especially in the field of acid battery. This paper aims to investigate the role of the local government by comparing the management system between Japan and the Cote d'Ivoire. It looks like no similarities between these two countries. But we found that there were several similarities between these two countries including lack of awareness for battery maintenance, disposals and recycling.

In this study, we focused our survey on the roles of private sector and management issues of the local government.

1.2 Problem statements

We have identified several problems including technical, legal and management issues. However, there is a strong demand for acid battery in developing countries. "In developing countries where power supplies are unreliable, lead-acid batteries are used domestically for lighting and electrical appliances." [7]

The local economy in big city like Abidjan is expanding with rapid motorization. About 60% of acid battery comes from motorization in the world. Acid battery is cost-effective for automobiles, electrical vehicles, forklifts, and uninterruptible power supplies (UPS). Various local and international scientists identified that unsound lead-acid battery recycling not only causes severe pollution but has a serious impact on health in many metropolitan areas in Africa.

New markets for energy storage in rechargeable batteries are driven by growth in renewable energy, the need for reduced transport emissions and the rapid increase in communications technologies. According to Concordia University 2016, the main hazards associated with lead acid batteries are:

1) Chemical (corrosive) hazards, 2) Risk of fire or explosion, 3) Electrical shocks, 4) Ergonomic hazards related to their heavy weight, 5) Transportation hazards.

In Abidjan, we can observe illegal dumping of acid battery, informal dealer and non-educated workers for automobile battery. Local governments are trying to establish recycling society with

community empowerment. Training programs, not only for acid battery but also all the industrial wastes encouraged. In addition, new ideas to use re-used battery encouraged more recycling. In Japan, we have authorized specialists and established well management systems, but recycled re-used markets were not well recognized.

1.3 Significance of the study

Why can we observe expanded illegal dumping and improper treatment? It will bring bad influence on Environment and will increase people's fear on industrial waste. In Japan, we understand that waste management is the responsibility of the local government. But by conducting this study, we recognized several new roles of private sector and community. The findings can be effective both two countries and other country as well. By conducting a comparative study, we have found that acid battery recycling can be effectively done by encouraging community capacity. Educational trainings focused on both environmental risk education and discussions for full use of re-used battery were encouraging sustainable recycling society.

1.4 Research objectives

We identified the following facts via a series of discussions with stakeholders both Cote d'Ivoire and Japan. The objectives of this study are;

- i) to identify the role of private company in the field of waste management including opportunities and challenges,
- ii) to understand the incentives for private company in waste management in the field of Lead Battery
- iii) The contributions and impacts will differ depending on sectors, type of actor and size ranging from large Multinational Corporations (MNCs), to Small and Medium Enterprises (SMEs) and to micro-enterprises. MNCs are using Facebook to is expanding their business of their latest industrial waste recycling information to the community
- iv) Local universities are closely working with local community and local government, but how they must work for the recycling of acid battery?
- v) Battery can be perfectly recycled if community can understand the value and risks of the lead. And how we can provide those knowledges to the community?

II. Previous studies

2.1 Industrial waste management systems

According to our government, "Waste can be defined as material of nonuse and no commercial value for their property owner. The final decision is under the circumstances such as production process, handling manner and willingness of the owner." [6] Why illegal dumping happen? It can reduce the transaction costs and many companies prefer to cheaper company for

waste handlings rather than quality waste companies. “Managing municipal solid waste is an intensive service. Municipalities need capacities in procurement, management, professional and often unionized labor management, and ongoing expertise in capital and operating budgeting and finance.” [1]

We have been conducting field surveys in urban area including Osaka, Tokyo, Yokohama, Chiba and rural area Shiga Prefecture Japan since 2013. The basic common problem is the gap of recycling system between urban and rural area. For Shiga prefecture, we conducted several field studies in Nagahama, Takashima, Otsu and Kusatsu City, Shiga prefecture since our campus is in Shiga Prefecture and those cities are facing Lake Biwa and must keep the environment. Ritsumeikan University has long history to work with the local governments and people around the campus. This is a part of what we call citizenship study program for students.

There are so many measurements to reduce the illegal risks of industrial waste such as contraction of dikes and protection of river banks, however, we focus on the role of the local governments since it is the most effective way to reduce the risks. We have developed the awareness programs for communities in flood prone areas.

By comparing the two different actions between Japan and Cote d’Ivoire, we found the unique characteristics and similarities of each area. The impact of the acid battery recycling is heavily depending upon the awareness of the community. And the relationship between people and the governments is another main cause of damages. Historically, waste management was a part of their life. But, because of the rapid modernizations and motorization, new management standards were identified. However, we found that the rapid urbanization around Abidjan and Biwa Lake brought rapid change of life style. This comparative study encourages collaborations between the two local governments as well.

2.2 Acid Battery markets in the world

Many organizations including WHO, ENEP and JICA identified specific risks of acid battery recycling and rapid use of them as well.

“Global use sectors include Automotive: Starting, Lighting, Ignition (SLI) (248 million units 2015, 60%), Motive, including for example forklift trucks (102 million units 2015, 25%) and Stationary (or ‘Industrial’) for telecoms, Power supply backup (UPS) and similar (61 million units 2015, 15%).” [9]

2.3 Organizations, acts and responsibility of local governments

In Japan, all the measures are based upon “Sustainable Recycling Promotion Act”, and specific rules and regulations, we can understand those details from Packaging recycle act, Electric appliance recycling act, Construction material recycling act, Food recycling act, Bicycle recycling, Small electric device recycling act. All the local governments including prefecture and city government are responsible to manage the waste management under those acts.

III. A comparative study (Methodology)

We conducted our study by looking at available secondary data and have ensured the credibility of our study by evaluating various sources regarding the information required to answer our research questions. And we have identified many similarities in terms of community involvement for the waste management system. Those targets were mainly infrastructure for recycling including collections and disposal system. We reviewed those challenges and previous findings as well. As we have visited several local government organizations in Japan and Cote d'Ivoire, we have conducted interview surveys in those target areas. In this study, we focused on the communication problems between the community and the local governments.

3.1 Role of local governments and private companies in the Cote d'Ivoire and Japan

Japan holds abundant experience and technology gained from past waste management problems, having coped with natural disasters over years. With these experience and technology, Japan has contributed to improvement of waste management measures in developing countries.

However, for the communication technology, used for the community and local governments, we have many things to learn from the Cote d'Ivoire. In this chapter, we will examine the lessons learned from Cote d'Ivoire on the informal operations of acid battery recycling and the new role of local governments and regional university.

3.2 Information management and the role of the governments in the Cote d'Ivoire

For small governments, it is not easy to manage all the aspects of the industrial waste. The General Directorate of Decentralization and Local Development (DGDDL) and the Abobo city government have several research projects in the field of waste management in the Cote d'Ivoire. Since the 2006, significant efforts have been made to address waste management issues in Abidjan. In 2006, a contract was signed between China and Côte d'Ivoire: a Chinese company handling urban waste and industrial plans to treat all waste district this transformation also creates daily cleaning.

Their targets were to;

- 1) reduce the waste; 2) decrease areas vulnerable to illegal dumping; and 3) minimize environmental damages.

These projects indicated the importance of both community involvement and waste management. Community involvement and information transparency is crucial for the continuation of the projects. Continuous dialogue with the affected communities is expected to occur directly and indirectly including Facebook and other SNS as well while the projects are implemented.

IV. Findings

4.1 A comparison between Japan and the Cote d'Ivoire

Our study area has many similarities including geographical conditions, environmental problems and the differences on the challenges on the community. (See table-1)

Table-1: A Comparison of local governments between Cote d'Ivoire and in Japan

	City of Abidjan	Shiga Prefecture
Area	2,119 km ²	4,017km ²
Population	4.7 million	1.4 million
Social challenge	Rapid urbanization,	Depopulated village
Environmental problem,	Bad waste management such as limited collection system and dumping posts, untreated discharge	Illegal dumping in rural area along the river systems and lake Biwa.
Land use problems	Limited, such as illegal settlers, Low land evacuation center, Limited space capacity, Security	Limited, such as dementia elderly home, single elderly households, Slow reactions caused by elderly
Information delivery to the community	Printed newsletters, Facebook, Transceiver (140Mhz band) among community leaders	e-mail, Loud speaker (Limited usage of SNS such as Facebook, Twitter and special application for smartphone)
Community link	Traditional village based	Residents' association
Role of Local University	Research, Trainings and seminar with students and specialists	Participate in the waste management committee as a specialist

(Source: Adopted by the author from the web sites of World Bank, Abobo city, Shiga Prefectural government, Kusatsu, Nagahama city government, Lake Biwa Environmental Research Institute etc.)

Because of the recent problems caused by bad waste management in both countries, the responsibilities of the local governments are increasing dramatically. Especially, how to encourage SMEs to work for the community and how to mobilize the local community is the most challenging for the countries.

4.2 Summary of the findings

Despite the similarities between the two regional challenges for the waste management, we found many uniqueness, those can be very useful to each other. From Cote d'Ivoire, we can learn how each officer of community can contribute the quick delivery of the information. And to upgrade the local government capacity, local university must work together.

V. Conclusions and further studies

We are first interested in studying the similarity of the reaction of the community on the acid battery risks. According to the local government authorities both Cote d'Ivoire and Japan, the reaction of the community was quite limited and should be investigated clearly.

Several interesting insights were discovered during our study. In general, Japan can learn the new role of the local governments and private companies including usage of SNS. For the

illegal dumping, the good management of the information can reduce economic damages and loss of property and even life. But it is not perfect still needs some improvement to activate people's awareness to the information management. All the donors are trying to introduce new sophisticated technologies to improve waste management system, especially remote monitoring system. However, it takes much costs and is unable to reduce consecutive risks. Bad waste management risk communication must be practiced regularly, so that people are able to better understand the possible potential risks. Consultations between community, local university and local government representatives could assure complementarities and synergies across roles and activities.

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