

Comparative prices of dry-cell portable batteries of Carbon Zinc (environmental unsound) and Alkaline Manganese (environmental sound) chemical systems in a developing country: case of Yaoundé, Cameroon, Africa

Samuel Tetsopgang^{1,2,*}

¹Research and Education Center for Development (CREPD), P.O. Box 31314 Yaoundé, Cameroon

² ENS Bamenda, Higher Teacher Training College, The University of Bamenda, P.O. Box Bamenda, Cameroon

*tetsopgang@yahoo.com

Abstract

Dry-cell portable batteries of different chemicals systems such as Carbon Zinc, Alkaline Manganese, Lithium, and NiMH to power small cordless instruments are present on the market in Yaoundé, Cameroon. These batteries of carbon zinc system are the alternative of those of Alkaline Manganese chemical system. The former is environmental unsound and the latter environmental sound. Comparative prices showed that a unit of carbon zinc batteries costs almost 3, 8 and even tough 20 to 24 times more expensive than the unit of that of alkaline system, depending on the trademarks and the country of origin. Then, in a developing country such as Cameroon where most consumers have very low income, cheap environmental unsound batteries, prone to release heavy metals directly to the environment at their end-of-life, are more present compared to the very expensive environmental sound batteries.

1. Introduction

Cameroon is a developing country with a population of about 19.5 million inhabitants according to the recent population census [2]. This population lives mostly in cities as common in most Sub-Sahara African countries. Douala and Yaoundé are the main cities separate each other with a distance of approximately 270 kilometres and comprise a population of more than 2 million each. These cities host respectively the main seaport and the political capital of Cameroon.

Both cities do have a municipal waste collection system. But it is poor not covering the entire city and inefficient regarding the collection and separation of hazardous waste such as exhausted portable dry-cell batteries. These wastes in addition to hazardous plastics are littered over streets of main cities such as Yaoundé. They are composed mostly of environmental unsound types which are suspected to contain added heavy metals such as mercury and cadmium [1].

In the developed countries, portable dry-cell batteries of Carbon Zinc chemical system which are environmental unsound since containing added heavy

metals, have been substituted by the Alkaline Manganese dry-cell portable batteries. These batteries are suspected to be free from heavy metals and considered as environmental friendly.

However, in the developing countries, heavy metals added dry-cell portable batteries (those with Carbon Zinc chemical system) are common and still in use to power cordless apparatus such as radios, toys, remote controls, torches and some watches. Regrettably, there is a poor management of these batteries at their end-of-life with no separate collection and no recycling. Then, these hazardous wastes will find their repository frequently in the open burning site releasing their toxics directly into the environment. These substances have hazardous properties on the health and environment with regional and even though global impacts beyond the local scale of releasing [4].

However, in the absence of any legislation to prohibit or restrict these hazardous products in a developing country such as Cameroon, their importation and domestic production coupled with trade will depend mostly on the consumers' choice. Then, a survey was carried out during the month of January 2011 in Yaoundé, on dry-cell portable batteries to shed more light on prices per unit in addition to their characterization in terms of chemical systems and countries of origin.

2. Characterization and Prices of dry-cell portable batteries in Yaoundé

A survey was carried out in down town of the city of Yaoundé, where are located most of the retailers of dry-cell portable batteries. Then, the investigation took place in 10 representative retailer shops selling dry-cell portable batteries.

2.1. Characterization

Then, , non-rechargeable portable dry-cell batteries commonly sold in the city of Yaoundé, are made up of type D, type AA and type AAA with minor presence of type C, type CR123 and type 9-volt (Tab. 1 and Tab. 2). The rechargeable batteries encountered are mostly composed of type AA (Tab. 3). The description of these different types of dry-cell portable batteries with their shape, weight, length and width was done by Tetsopgang and Kuepou (2008) [1].

These batteries are labelled as made by a total of 19 trademarks coming from 07 different countries, namely, China, Japan, USA, Belgium, Germany, Netherland and Indonesia in addition to a sole domestic manufacturer and 01 Economic Community (EU). These batteries belong to the following chemical systems: Carbon Zinc, Alkaline Manganese, NiMH and Lithium (Tab. 1, Tab.2 and Tab. 3).

2.2. Prices of dry-cell portable batteries in Yaoundé

The prices of these batteries are subdivided according to the chemical systems which are Carbon Zinc, Alkaline Manganese, NiMH and Lithium.

2.2.1. Prices for Carbon Zinc Chemical system (Tab. 1)

Trademarks from China with almost 56 % of all manufacturers dominate the market of these batteries.

The prices for batteries of type D from China are 125 and 150 CFA F (656 CFA F \approx 1 Euro) little bit cheaper than 150 CFA F for the trademark from Indonesia and the domestic manufacturer.

For the batteries of type AA, prices are 25 and 75 CFA F for the Chinese manufacturers. This price is 75 CFA F for domestic manufacturer and 250 CFA F for an unknown producer.

For the batteries of type AAA, prices are 25 and 75 for the Chinese trademarks, 50 CFA F for the local trademark and 75 for an unknown trademark.

Tab. 1: Prices and countries of origin of Carbon zinc portable batteries sold in Yaoundé, Cameroon

N°	Country of origin	Trademarks	Type	Price/Unit	Voltage	
1	Domestic (CAMEROON)	HELLESENS	D	150	1.5	
2			AA	75	1.5	
3			AAA	50	1.5	
4	CHINA	GOLSDTON	D	125	1.5	
5		SONY		150	1.5	
6		KING-TIGER		150	1.5	
7		ROYAL	AA	25	1.5	
8		KING-TIGER		75	1.5	
9		GOLDSTON		25	1.5	
10		ROYAL	AAA	25	1.5	
11		DIU WEI		75	1.5	
13		INDONESIA	PANASONIC	D	150	1.5
14		UNKNOWN	ZAIBA SUPER	AA	250	1.5
15	TOCEBA		AAA	75	1.5	

2.2.2. Prices for Alkaline Manganese Chemical system (Tab. 2)

Trademarks from China are still present but do not dominate the market. There is no local trademark labelled on these types of batteries.

For batteries of type AA, the cheapest is for a trademark from Netherland with a price of 165 CFA F followed by 250 CFA F for a trademark from Germany and the one from USA, 300 CFA F for trademark from China and 600 for a trademark from EU.

In this chemical system, batteries of type AAA have prices of 450 and 500 CFA F, respectively for trademarks from EU and Belgium. An unknown trademark shows prices of 75 and 400 CFA F for batteries of type AAA and type AA. The former seems to be not true.

Tab. 2: Prices and countries of origin of Alkaline manganese portable batteries sold in Yaoundé, Cameroon

N°	Country of Origin	Trademarks	Type	Price / Unit	Voltage
1	CHINA	GP ULTRA	23AE	500	1.2
2		VINIC	4LR44	250	6
3		AG3	AA	300	1.5
4	EU	DURACELL	/	1500	9
5			AAA	450	1.5
6			AA	600	/
7	USA	SANYO	AA	250	/
8	BELGUIM	KODAK	AAA	500	1.5
9	NETHERLAND	GP ULTRA	AA	165	1.5
10	GERMANY	VARTA LONG L.	AA	250	1.5
11	UNKNOWN	TOCEBA	AAA	75	1.5
12		GP HIGH V.	AA	400	6

2.2.3. Prices for NiMH and Lithium chemical system

All batteries of NiMH chemical system belong to trademarks labelled as coming from China. Here, only the batteries of type AA are reported. The prices per unit are 375, 500 and 875 CFA F for similar voltage which is 1.2 Volt.

The batteries of Lithium chemical system are dominated by trademarks from Japan with almost 50 % of the market share with type C, CR123, CR2 or 2CR5. No trademark from China is present. Prices for batteries with similar voltage (3 Volt) go from 300, 500, 800 and 900 CFA F for the trademarks from Japan to 1500 CFA F for the trademark from USA.

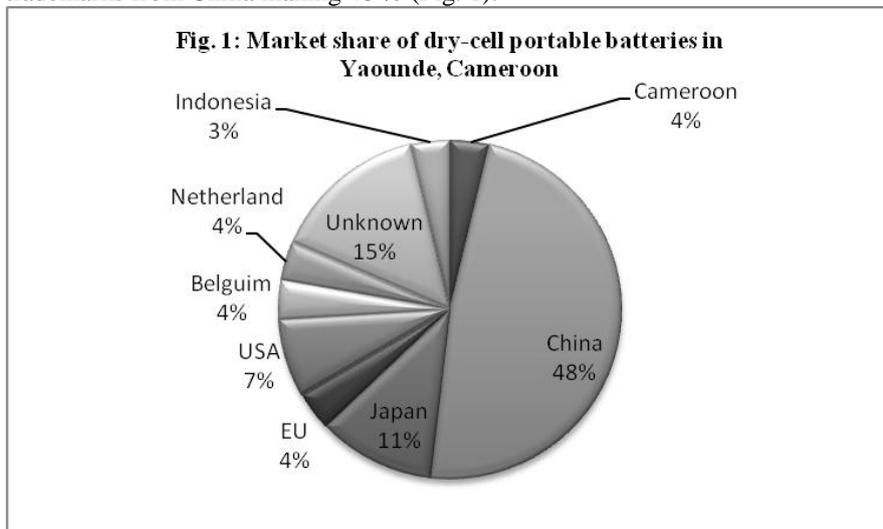
Tab. 3: Prices and countries of origin of Rechargeable (NiMH) and Lithium portable batteries sold in Yaoundé, Cameroon

N°	Country of Origin	Trademarks	Type	Price/Unit	Voltage	Chemical system
1	CHINA	SONY	AA	375	1.2	NiMH
2			AA	500	1.2	
3			AA	875	1.2	
4	JAPAN	SONY	CR123A	800	3	Lithium
5		CR12 16	C	900		
6		PANASONIC	/	300		
8			/	500		
10	USA	KODAK	CR2	1500	3	
11	Unknown	Hi-Watt	/	600	9	
12			2CR5	1000	/	
13			CR2	800	3	

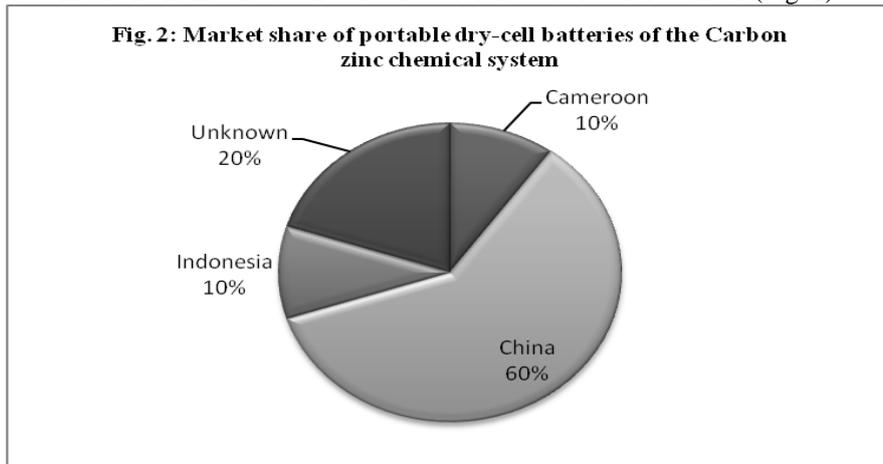
3. Interpretation and Conclusion

The environmental unsound batteries of Carbon Zinc chemical dominates exhausted waste batteries from the uncontrolled dumping in the city of Yaoundé, Cameroon. These wastes are composed of Carbon Zinc, Alkaline Manganese, NiMH and Lithium chemical systems with 98.12%, 1.00%, 0.53% and 0.35%, respectively [1]. These exhausted batteries of Carbon Zinc chemical system are labelled as coming from China (66 %) and 26 % from the local trademark [1].

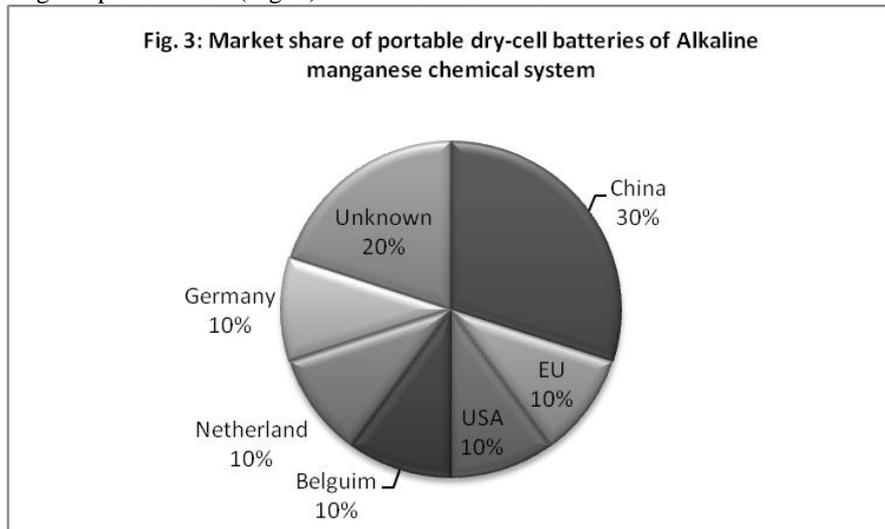
This survey in the battery retailer shops confirmed that the market share of dry-cell portable batteries in Cameroon is dominated by the presence of trademarks from China making 48 % (Fig. 1).



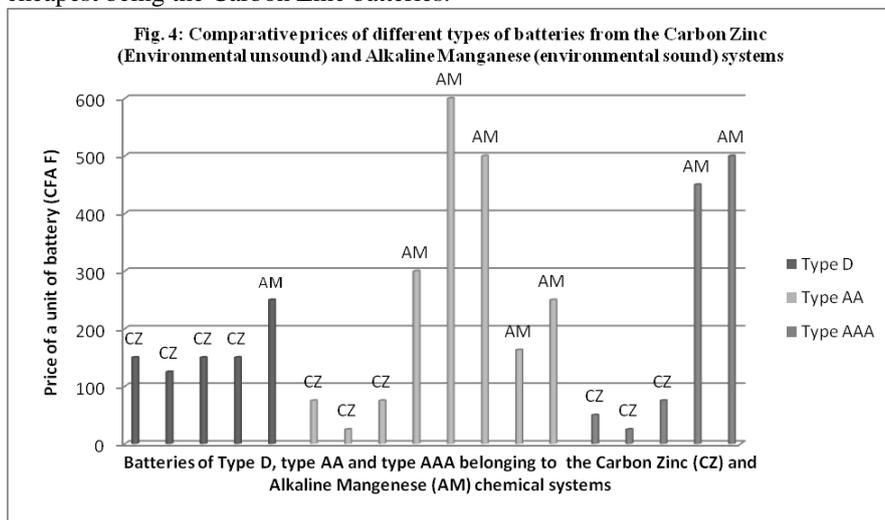
The market share of batteries of the Carbon Zinc chemical system is also dominated by trademarks from China with 60% associated to 10% from trademarks from Indonesia and also 10% for the sole local trademark (Fig. 2).



For the market share of Alkaline Manganese dry-cell batteries, trademarks from China represent 30%, 10% for EU, 10% for Germany, 10% for Netherland, 10% for Belgium and 10% for USA. Trademarks with unknown countries of origin represent 20% (Fig. 3) with no domestic trademark.



The comparative prices (Fig. 4) show that the chemical systems determine the cost of dry-cell portable batteries with Lithium and NiMH batteries showing highest prices followed by the Alkaline Manganese batteries and the cheapest being the Carbon Zinc batteries.



For example, the price of type D batteries for the Alkaline Manganese (AM) chemical system is twofold more expensive than that of the same type of

batteries for the Carbon Zinc (CZ) chemical system. For type AA batteries, the price of environmental sound batteries (AM) is two-, five, twenty- and even tough in some cases twenty-fourfold more expensive than that for environmental unsound batteries. This ratio is also applicable to type AAA batteries (Fig.4).

Then, in a developing country such as Cameroon with a major part of the population having a low income, despite the principle of substitution applied in some developed countries such as in EU, that states that “a chemical substance should be substituted when a safer alternative is available” [3], the choice of most consumers regarding the use of portable dry-cell batteries will be for the less expensive batteries and not the environmental sound ones which are at least, in the cheapest cases, twofold more expensive. One may like to know, which battery is going to last longer? But, in such countries, many customers do not care about the long lasting batteries in regard to the price.

References

- [1] Tetsopgang and Kuepouo (2008). Quantification and characterization of discarded batteries in Yaoundé, from the perspective of health, safety and environmental protection Resources, Conservation and Recycling 52, 1077–1081
- [2] Bureau Central des Recensements et des Etudes de la Population (BUCREP), 2010
- [3] Campaigning against toxics using REACH outside Europe, ChemSec, P.O. Box 7005, SE-402 31 Goteborg, Sweden
- [4] UNEP. Interim review of scientific information on cadmium. United Nations Environment Programme, Chemicals Branch, Geneva, Version of October; 2006