

Status of the lead/acid battery industry in Taiwan

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Abstract

Since 1985, the marked appreciation of the Taiwanese currency has exerted a strong influence on the local lead/acid battery industry. In particular, imports of automotive and motorcycle batteries have risen steadily. By contrast, there has been a significant increase in the production of small sealed batteries. The battery industry has recognized the need both to satisfy new environmental requirements and to invest in advanced equipment for battery manufacture.

Growth of lead/acid battery industry and the economic background

Pre-1960

Taiwan, before 1960, was an underdeveloping economy. The GNP in 1960 was only US\$ 1.7 billion and the per capita GNP was only US\$ 154. Agricultural activities accounted for most of the GNP. The number of vehicles in 1960 was only 48 475 and electricity supplies were not available to most rural areas. Battery manufacturing at that time concentrated on the production of 8 V, 40 A h units for the lighting of farm houses. Charging of these batteries was conducted only in certain specific battery shops in the cities.

1960–1970

Government encouragement of foreign investments and technology transfers contributed to the high economic growth of the 1960s. The GNP in 1970 was 3.3 times that of 1960, i.e., US\$ 5.6 billion and the per capita GNP rose by 252% to US\$ 389. Motorcycles were more affordable and the establishment of a motorcycle industry contributed to the increase in the number of vehicles. The latter was 819 104, i.e., 16.8 times that of 1960; the number of motorcycles in the same year was 701 421 compared with 26 468 in 1960. The development of the motorcycle and automotive battery industries also began at that time.

1971–1980

The GNP in 1980 was 7.3 times that of 1970 (US\$ 41.4 billion) and the per capita GNP was 6 times greater (US\$ 2344). The motorcycle industry experienced its fastest growth during this period. The number of motorcycles in 1980 was 4 million, thus showing a six-fold growth in 10 years. The motorcycle battery manufacturers numbered a record 30 companies. In addition, 70% of the total battery production was exported to all regions of the world.

1981–1990

The GNP in 1990 was 4 times that of 1980 (US\$ 161.75 billion). The per capita GNP exhibited a 3.4-fold increase in 10 years. The growth of cars, buses, and trucks was most significant in this period. The total number of vehicles in 1990 was 11.5 million, compared with 4.7 million in 1980. The manufacture and export of automotive batteries also increased at a very high pace from the beginning of this period. Political, social and economic structure caused, however, a marked change in the situation during the latter half of the decade. The shortage of labour, the implementation of strict laws to protect the environment, and the surging Taiwanese dollar greatly effected the battery industry from 1985 onwards. The number of battery manufacturers decreased to below 15. The major manufacturers invested heavily in production automation to replace manual labour.

The production of small sealed batteries also began in the later half of the 1980s and its place in the battery industry is gaining in importance. The author's company – CSB Battery – also began producing sealed batteries in 1986 in a joint-venture with Shin-Kobe Electric Machinery Co., Ltd.

Figures 1 and 2, together with Table 1, summarize the above factors that have influenced the growth of the lead/acid battery industry in Taiwan.

Battery manufacturers

Table 2 provides a list of the major battery manufacturers presently in Taiwan and their types of products. It can be seen that the actual production volume of car batteries is only 200 000 units per month against a total capacity of 410 000 units.

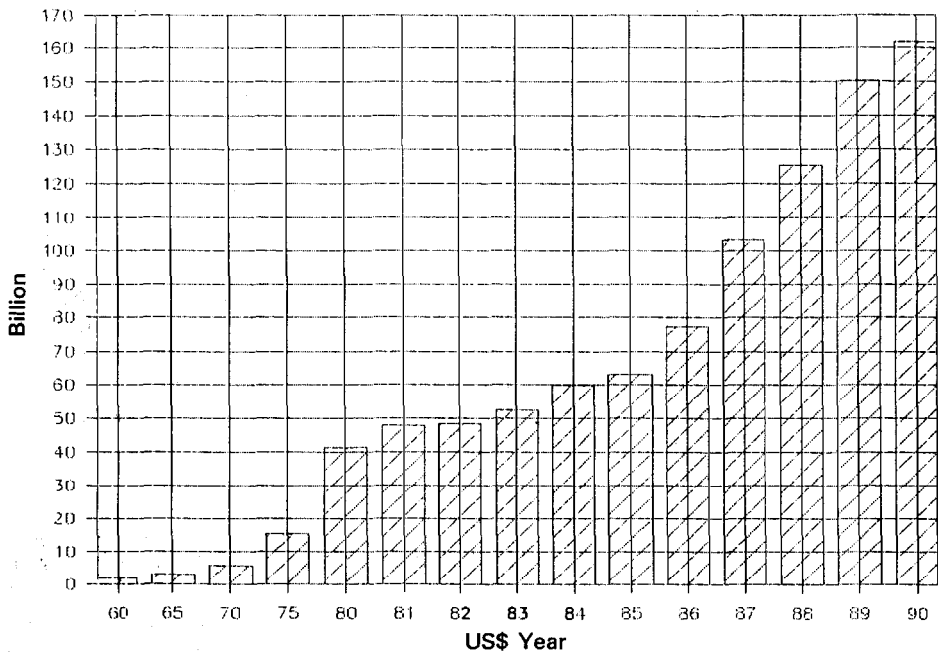


Fig. 1. Taiwan GNP for the years 1960–1990.

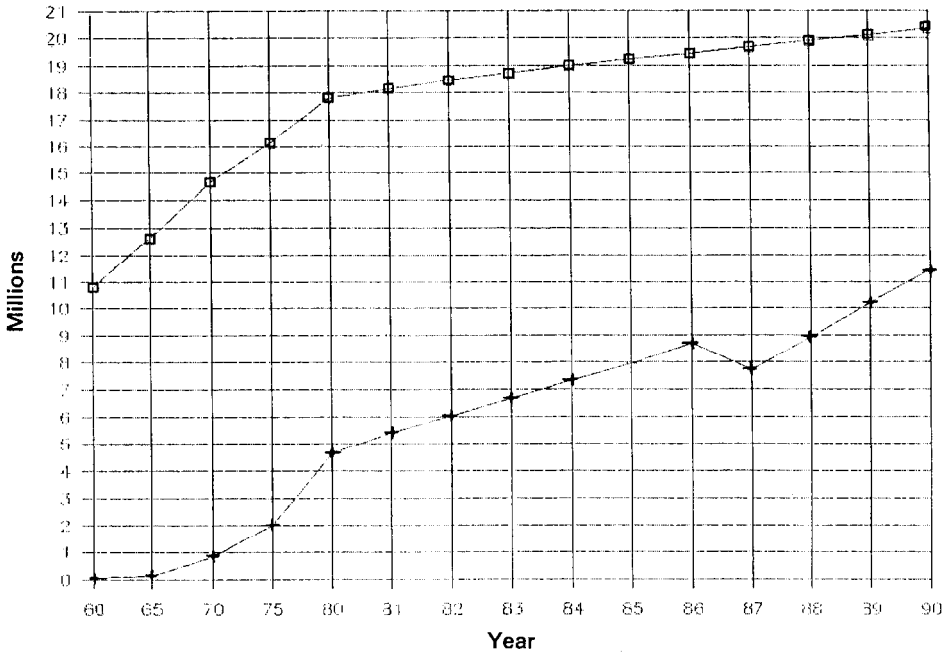


Fig. 2. Growth of population (□) and vehicles (+) in Taiwan between 1960 and 1990.

This imbalance is mainly due to a labour shortage and to environmental protection that contribute to a high cost. The result is a rapid increase of foreign battery imports (see Figs. 3 and 4). The same conditions apply to motorcycle batteries.

The data in Table 2 also show a large volume of small sealed batteries. This market is likely to become even more significant in future years. The models produced in Taiwan now satisfy all the requirements of the world market.

Raw-material industry

Battery case

All automotive batteries in Taiwan now use polypropylene cases that are produced locally. Hard-rubber cases are no longer in use. Small sealed batteries use ABS cases and these are also fabricated in Taiwan.

Separators

Pulp separator is still the major material. Nevertheless, the use of 'white coloured plain form' separators, that give higher cranking power, is becoming a trend in the industry.

The largest manufacturer of the above types of separators is Anpei Enterprise Co., Ltd. located in the south of Taiwan.

The absorptive glass mat (AGM), or so-called M-separator, for sealed batteries is imported from Japan and the USA.

Lead

Lead of 99.99% purity is imported. The major supplier is Pasminco. Lead of 99.97% purity is both imported and also refined in Taiwan. Lead-antimony alloys are

TABLE 1
Relationship between population, GNP, per capita GNP and vehicles in Taiwan

Year	Population	GNP US\$ × 10 ⁶	Per capita GNP (US\$)	Vehicles	Bus	Truck	Car	Motorcycle	Others
60	10792202	1717	154	48745	3444	7452	8005	26468	3326
65	12628348	2811	217	105590	4953	12538	15099	68198	4802
70	14675964	5660	389	819104	7954	41005	49541	701421	19183
75	16149702	15429	964	1986996	12443	106999	144860	1705236	17458
80	17805067	41360	2344	4665433	18004	237521	425443	3965515	18950
81	18135508	47955	2669	5413407	18790	277866	506291	4591547	18913
82	18457923	48550	2653	6045268	19181	314555	592154	5100500	18873
83	18732938	52503	2823	6674135	20458	352560	687860	5594609	18648
84	19012512	59780	3167	7342801	20445	388459	807155	6109083	17659
85	19258053	63097	3297	7949993	20845	408526	915598	6588854	16170
86	19454610	77299	3993	8696045	21698	418212	1046660	7194202	15273
87	19672612	103200	5275	7702150	21608	451100	1254955	5958754	15733
88	19903812	125316	6333	8930878	21955	502189	1579121	6810540	17073
89	20107440	150283	7512	10205185	21852	573576	1969291	7619038	21428
90	20359403	161750	7997	11465251	21357	632512	2328439	8460138	22805

TABLE 2

Battery manufacturers in Taiwan

Name	Type of battery			
	Car	Motorcycle	Small sealed	Industrial
Taiwan Kobe (CSB)			×	
Yuasa Taiwan	×	×	×	×
GS Taiwan	×	×	×	×
Wei Long	×	×	×	
Ya Ter	×	×	×	
Cheng Kwang	×	×	×	
Maan Shyang	×	×		
Others	×	×	×	
Total capacity	418000	940000	1252000	
Total volume ^a	198100	610000	1050000	

^aIn units per month.

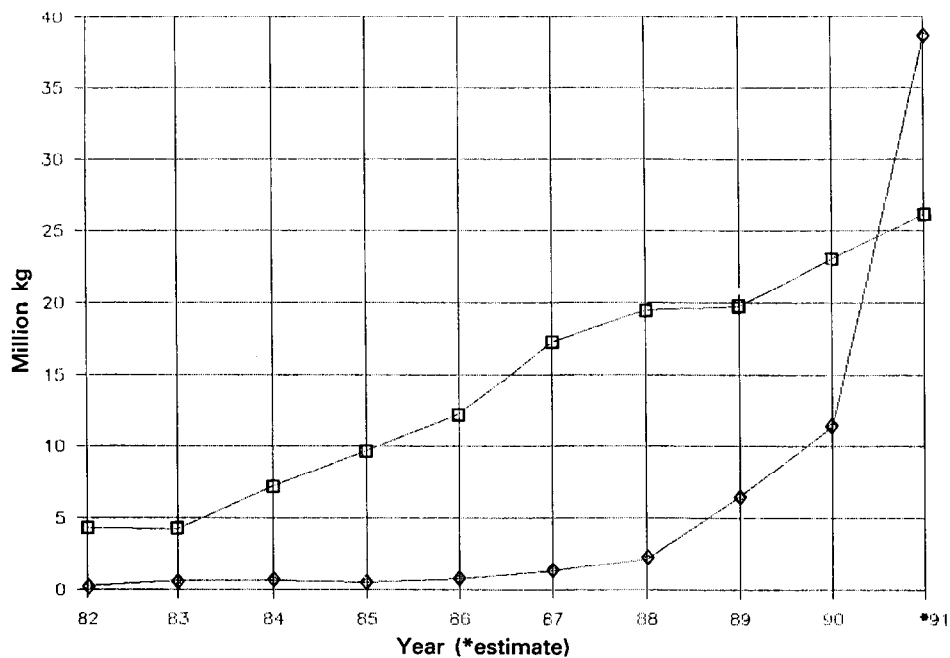


Fig. 3. Export (□) and import (◇) of lead/acid batteries in Taiwan, by weight (kg).

supplied by local companies and minor quantities are imported. By contrast, lead-calcium alloys are mostly imported.

From 1989, due to strict environmental protection laws, lead refining companies in Taiwan have been either closed permanently or temporarily by order of the government. This has brought about a large increase in imported lead since that time (see Figs. 5 and 6). A more serious problem exists with the treatment of scrap metal and the recycling of spent batteries.

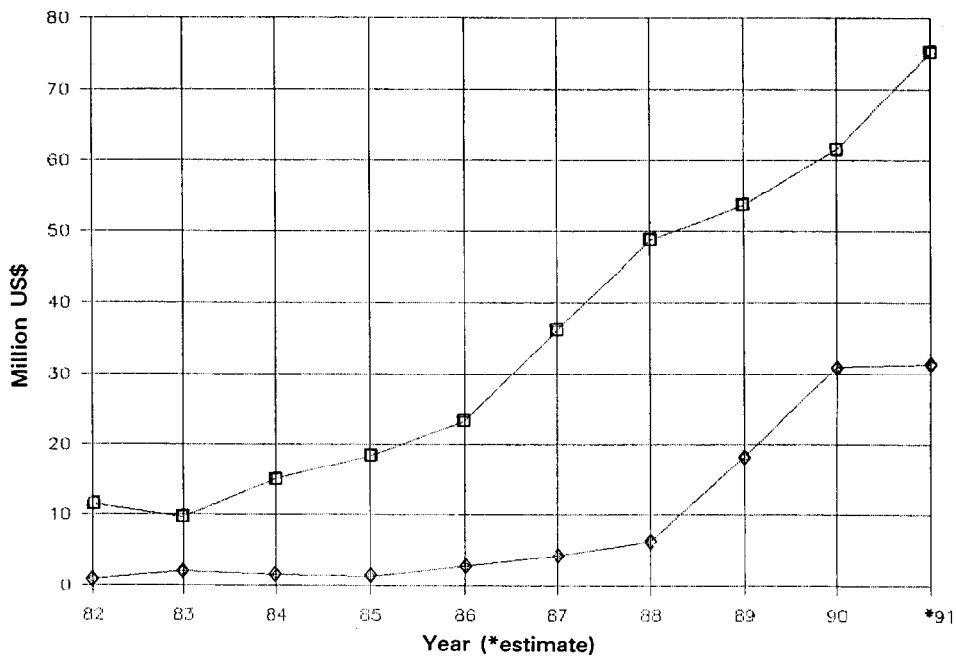


Fig. 4. Export (□) and import (◇) of lead/acid batteries in Taiwan, by value (US\$).

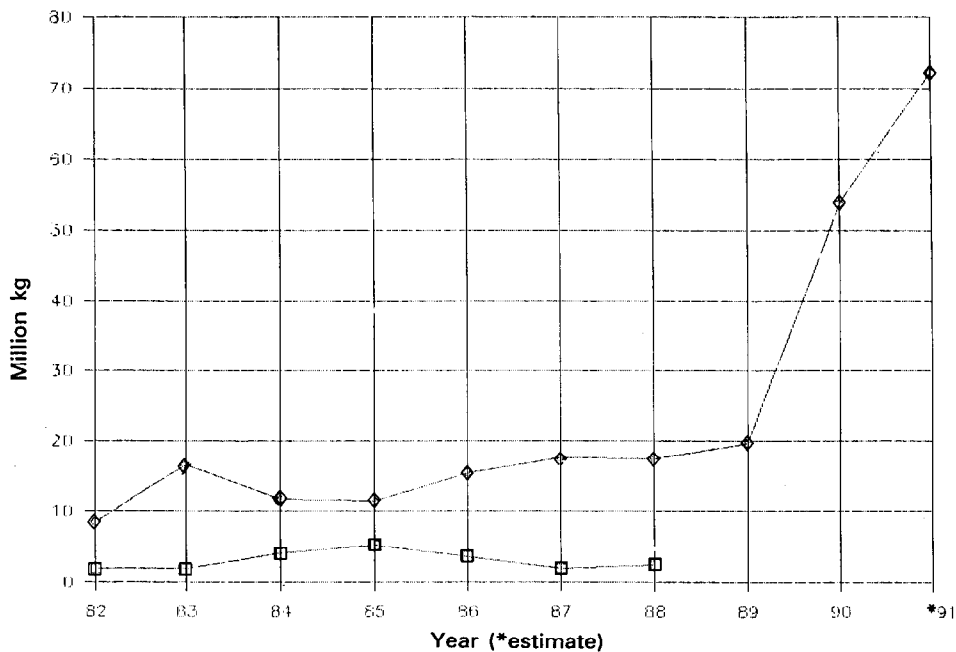


Fig. 5. Export (□) and import (◇) of refined unwrought lead in Taiwan, by weight (kg).

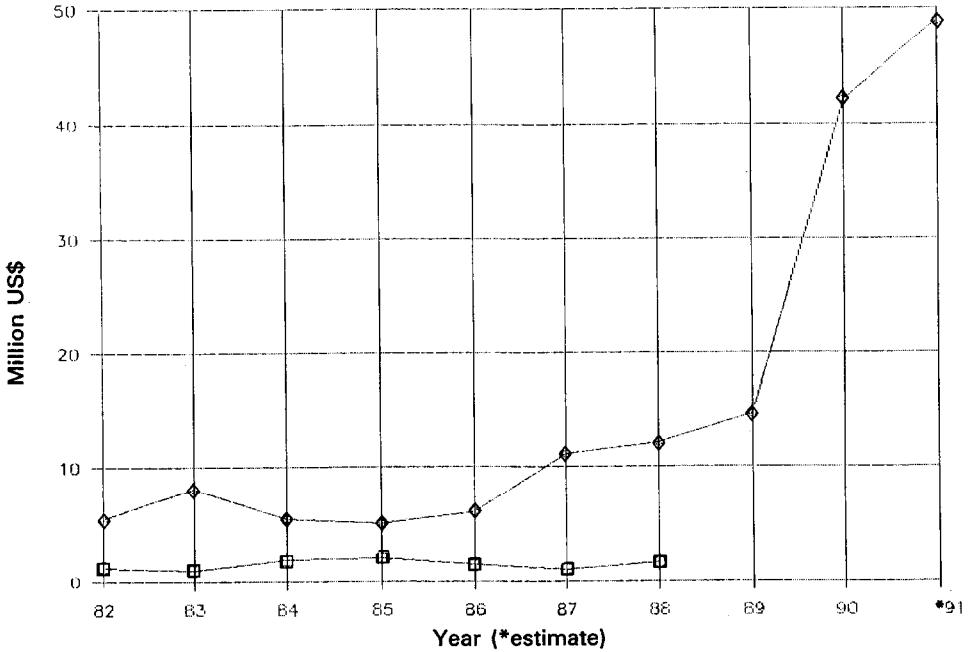


Fig. 6. Export (□) and import (◇) of refined unwrought lead in Taiwan, by value (US\$).

Conclusions

The battery industry in Taiwan is expected to continue its growth in future years. The output of automotive batteries will increase at a constant rate but motorcycle batteries will decrease. The fastest growth will be exhibited by small sealed batteries. All the battery manufacturers will place greater emphasis on environmental protection measures. There will be a heavy investment in automated equipment for battery production.