

## Status of the lead/acid battery industry in Korea

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### Abstract

Lead/acid battery manufacture is one of the fastest growing industries in Korea. The battery industry enjoys heavy domestic and export sales. Nevertheless, there are problems in relation to labour supplies, technology limitations, low productivity, environment controls and trade barriers. Solving each of these difficulties will be a major task for the Korean battery industry in the years ahead.

### Korean Battery Industry Cooperative

The history of the Korean battery industry goes back to 1940 when a small assembly plant was set up. This was a small-scale domestic operation rather than an industry.

In order to understand the Korean lead/acid battery industry, it is essential to have a rough idea of the Korean Battery Industry Cooperative. The latter was first organized and established in 1972 under the Law of Small and Medium Industry Cooperatives to represent, protect and foster the members of the Cooperative. Since its establishment, the Cooperative has played an important role in the development of the battery industry, as the Korean Government has maintained a so-called 'buy small and medium industry products' policy to foster them through such Cooperatives. This means that all governmental purchases of products available from Cooperatives are directed to them. The Cooperatives then allocate the orders to the members based upon a certain criterion. Thus, members enjoy an automatic sales system. In the case of batteries, this system eventually greatly assisted the industry's growth and development.

There are one honorary member, Global & Yuasa (ex-member), and eight regular members. These are given in Table 1 together with details of each member's production range.

The Korea battery industry has two strong characteristics: rapid growth and heavy dependency on exports.

#### *Rapid growth*

The battery industry is one of the fastest growing commercial sectors in Korea. The production and sales of automotive, motorcycle and industrial batteries have made great strides in the past 10 years. Table 2 shows the trend, for the past 5 years, in the production of automotive batteries. This accounts for 80% of the total battery output.

#### *Export dependency*

As a whole, the Korean economy has been heavily export dependent since the earlier days of the Park Republic. This has been the situation in the battery industry

TABLE 1

Members of the Korean battery industry

Global & Yuasa Battery Co., Ltd. (honorary member)	automotive, motorcycle, marine, sealed, traction, stationary
Korea Storage Battery Co., Ltd.	automotive
Kyung Won Industry Co., Ltd.	automotive, traction, stationary, (sealed?)
Nam II Battery Co., Ltd.	automotive, traction, sealed, stationary
Delkor Battery Co., Ltd.	automotive
Oldham Korea Co., Ltd.	traction, stationary
Union Battery Co., Ltd.	sealed, stationary
Jae Won Battery Co., Ltd.	automotive, stationary
Sam Jin Electric Co., Ltd.	traction (mining)

TABLE 2

Automotive battery production in Korea

Year	Nominal capacity (millions of units)	Growth rate (%)
1986	6	7
1987	7.5	25
1988	9.3	24
1989	11.2	20
1990	12	4

TABLE 3

Export dependency of Korean battery industry (unit: million Korean Won)

Year	Total sales	Export	Export growth (%)	Export share (%)
1986	91298	48591	48.0	53.2
1987	130675	80035	83.0	61.2
1988	156947	95822	20.0	61.0
1989	158222	82004	14.0	51.8
1990	189140	91000	19.5	48.1

from the early 1970s: the industry has made a great effort to export its products to more than 100 countries throughout the world. The export share of the total sales has shown a steady growth except in 1989 (Table 3).

The high export-dependency of the battery industry is neither healthy nor desirable, and it is the industry's urgent task to bring the share down to a 30 to 35% level.

The export-dependency of Korean industries stems, first, from the fact that Korea has no natural resources, second, from the small size of the domestic market which is insufficient to justify a single manufacturer of optimum size, and, third, from a nearly 30-year export-drive policy of the Park Republic. The size of the Korean domestic

TABLE 4

Domestic market for automotive batteries in Korea (in battery units)

Year	OE	Replacement	Total	Growth rate (%)
1986	610000	770000	1380000	25.4
1987	1050000	830000	1880000	36.2
1988	1120000	960000	2080000	10.6
1989	1150000	1100000	2250000	8.2
1990	1350000	1470000	2820000	25.3

market is given in Table 4. The data show that the industry either requires a large export market, or is overinvested.

### Problems facing the battery industry

There are many problems to be tackled by the Korean battery industry, e.g., worker problems, technology gap, low productivity, environmental control and trade barriers.

#### *Worker problems*

Korea has had a good set of labour-related laws since 1953, but their full enforcement has largely been limited and restricted during the Park (3rd) and Chun (5th) Republics. This means that the Korean workers were subjected to work without the possibility of enjoying basic labour rights for 35 years, irrespective of the laws, until President Roh removed all restrictive measures in 1987. The latter marked an important epoch for working-class people in general, and eventually led to never-ending and violent labour/management disputes with sabotage, strikes and throat-cutting wage hikes that brought about a deterioration of society as a whole. This social problem is the most critical matter facing the Korean battery industry. Furthermore, although the number of disputes is decreasing each year, those remaining are of a more fierce and violent nature.

A second problem is the serious worker shortage; this is already a national concern. One source reports that the average shortage for Korean industries has been more than 10% for the first half of 1991. The battery industry cannot be said to have very good working conditions as compared with other industries, and this makes the matter even worse. Korean battery manufacturers have always considered that the so-called '3 D phenomenon' – dirty, difficult and dangerous – is somebody else's problem, as the per capita GNP still is somewhere around 5000 to 6000 dollars. The 3 D jobs are being strongly and thoroughly avoided by workers in Korea and this causes another social problem.

The third difficulty of ever-rising wages places the battery industry in a very awkward position. The rise of wages, with a corresponding or greater rise in labour productivity, would be welcome, but a rise without productivity improvement and with less and less working hours promotes a less competitive position or deadlock. In the case of Global & Yuasa, for example, wage rises had to be awarded of 8% (1987), 17.5% (1988), 29.2% (1989), 11% (1990) and 20% (1991). These have amounted to

a rise of 118% in just 5 years and, if the various fringe benefits are included, the figure comes to well over 130%. All this has occurred without a reasonable increase in labour productivity.

Lastly, the labour turnover of Korean industries in general is unbelievably high and it goes without saying that it is even higher in the battery industry. This situation creates two major problems: difficulty in developing skilled workers and in establishing TQC activities, factors that are both critical to any industry.

No concentrated OJT, domestic or abroad, will resolve matters when the turnover of labour is as high as 35% (year average for 1989–91), as is experienced by Global. At Global, for example, an aggregate number of 1240 men have been trained abroad in the last 10 years, and only 80% are still with the company.

The TQC movement is of fundamental importance with regard to cutting costs and improving quality. It must be of a voluntary, continuous, relevant and repetitive nature. But when labour turnover is high, the newly-recruited receive only education of the basics of TQC ideas and never have the chance to make significant advances. In this respect, the life-time employment practice in Japan which, although gradually fading, places that country in a much more favourable position.

#### *Technology gap*

The Science and Technology White Paper 1991, recently released by the Korean Government, shows that the number of R&D Institutes established and run by the private sector, broke the record of 1000 early in 1991. The Paper further advises that all factors of Korea's R&D have grown very rapidly during the past 10 years. The R&D investment of private enterprises (total sales share) in Korea is 2.14% of the GNP compared with figures of 3.19%, 3.8% and 4.7% in Japan, Germany and USA, respectively.

There are, however, only two institutes that are directly related to battery technology development, namely, the Central Institute of Battery Technology (CIBT), set up and run by Global & Yuasa in Chang Won, and the Delkor Battery Co., Ltd, in Kumi. Apart from these, only the Agency for Defence Development (ADD), the Korea Institute of Energy (KIE), the Korea Institute of Electricity (KIE) and the KAIST are known to be partly involved in battery R&D activities. Some of the battery manufacturers themselves may have R&D personnel or departments, but such facilities would be negligible.

The R&D activities of the existing institutes appear to be limited to catching up with already established lead/acid battery technology, rather than implementing innovative ideas and developments. More emphasis should therefore be placed on the advancement of new and future batteries such as silver/zinc, lithium, and others. Furthermore, the Korean industry must not neglect its efforts in the field of process engineering.

The money and time invested in the development of battery technology in Korea cannot be expected to be more than minimal. Thus, while the more industrialized countries progress by leaps and bounds in the field of technological development, the Korean industry crawls like turtles and the gap widens further.

#### *Low productivity*

When the labour productivity of the manufacturing sector grows, the growth rate of an economy naturally also rises.

As can be seen in Table 5, the growth rate of Korean labour productivity (manufacturing) is rather high, as compared with that in Japan, USA, UK, and China.

TABLE 5

Labour productivity index

Year	Korea	Japan	USA	UK	China
	1985 = 100	1985 = 100	1977 = 100	1985 = 100	1986 = 100
1985	100	100	123.5	100	
1986	117.8	101.8	128.2	103.1	100
1987	134.6	107.7	132.9	109.9	107.9
1988	154.2	120.1	136.0	115.8	118.0
1989	172.5	127.8	138.7		128.2

This does not, however, necessarily mean that Korea's physical productivity *per se* is higher than in these countries. For example, Japan's added value is said to be 16 times, whereas Korea's is only 3.1 times the original input. The productivity of both Singapore and Hong Kong is also much higher than that of Korea. For example, the Odawara Yuasa plant assembles 9 automotive batteries per man-hour, but Chang Won Global only 6; this amounts to 1.5 times in favour of Yuasa with similar machines and equipment. (Note, German manufacturers produce about 7.5 batteries per man-hour.)

According to a study made by a well-known German economic weekly last month, Korea's international general competitiveness ranks 14th in the world, (cf., Switzerland 1st, Germany 2nd, USA 3rd), labour competitiveness 5th, technology 9th, and capital 16th. The Korean battery industry must, therefore, try harder to enhance productivity if it is to become more competitive.

#### *Environmental control*

As in the case of labour laws, Korea has had a handsome set of laws and regulations for governing health and environmental control systems since as far back as 1971. There has existed, however, an awkward position for acknowledging a stringent enforcement and an effective implementation of these laws until very recently.

Today, the governmental control and supervision of the laws have become so strict and suppressive that all members of the industry and related industries (such as scrap battery smelters) are at the brink of suffocation both by the frequency of the supervisors' visits to the shops, and by the burden of investment they have to make in order to comply with the legislation. In the case of Global & Yuasa, for example, it has been necessary to provide medical checkups quarterly, and air and water checkups once a month. This has involved an investment of Won 2526 million (US\$ 5 080 000) during the last 5 years for health control and environmental control systems. The annual running costs of the latter amount to Won 712 million (US\$ 1 020 000). To quote the case of Global's Hanam factory: 7.5% of the total investment was for pollution control. Such requirements naturally raise the costs of battery production. Because of severe and stringent enforcement of the Law of Industrial Safety and Health in recent years, (such as air lead-content ratio to be <0.05 mg/m<sup>-3</sup>, 34 h per week working limit, etc.) all of the Korean lead recycling companies are nearly losing their foothold to stay in business, or seeking somewhere off-shore to move their facilities.

On top of these restrictions, the Korean Government is presently working on a new enforcement decree, to be effective from Sept. 9, 1991, to force the industry to

make a deposit of about Won 200 for every kilogram of lead/acid batteries produced for the purpose of collecting scrapped units. The industry is, of course, striving fiercely either to remove totally the battery from the designated list of scrapped materials collection deposit items, or to lower the rate.

It should be emphasized that the battery industry is not advocating that the above laws and regulations are wrong. Their purpose is indeed understood and their necessity is recognized to protect and preserve the environment from pollution and to safeguard the health of our people. The only point the industry is trying to make is that such legislation weakens the financial position, takes up too much worker time, and pushes up the cost of batteries.

#### *Trade barriers*

As stated earlier, Korea is a highly export-minded and export-dependent economy. Among the barriers, the anti-dumping allegations by competitors around the world are a great trial to the Korean battery industry. So far, there have been six allegations in the last seven years: two from the USA, one each from Canada, Australia, New Zealand and Turkey. Fortunately, it has been possible to fight off four of these, but at the expense of increased costs for legal and trade consultants, and pushing up the price of the batteries. Two of the cases are still being debated. It is the opinion of the Korean battery industry that there can be no objective or universal definition of dumping, as it may vary from one point of view to another. Usually, dumping is defined rather subjectively by a nation through legislation for its own purpose. This can hardly be generally accepted as universal truth.

The Korean industry holds the opinion that manufacturers cannot be condemned just because they sell their products at cheaper prices than their competitors through harder and longer hours of work, more rational and productive ways of manufacturing, and more effective ways of marketing. Of course the basic logics of setting up trade barriers are appreciated, but condemning overseas competitors just because the domestic counterparts are less efficient in their manufacturing practice and less effective in their marketing methods cannot always be fair. This would only force the local consumers to buy more expensive goods to the disadvantage, in the long run, of the nation as a whole.

The Korean battery industry is constantly exposed to the above type of very subjective and irrational threat, and urges that trade barriers be removed once and for all, if all are to prosper in a single and truly free international market.

#### **Prospects and tasks for the Korean battery industry**

With the above-mentioned ever-rising wages, worker shortage, low R&D activity, low productivity and soaring pollution-control costs, it is very hard to conclude that the Korean battery industry can be, or will stay, competitive in the present international market.

The Korean wage level can no longer be said to be low. Yet, it is still low compared with that of Japan. A horizontal comparison of this would, however, lead to nothing; the physical productivity factor must also be considered.

As for worker shortage, which might sound odd to others' ears, the battery industry is facing a serious problem. So much so, that some companies are seriously considering the possibility of setting up off-shore production bases in less expensive countries. Paradoxically, Korea has more than 150 000 unemployed university and college graduates.

If these people could be brought into the shops to work as plain workers, the situation would be eased. But this is unlikely to happen.

The highly-educated will stay unemployed as long as their so generous parents continue to feed them and even allow them pocket money! Korea's Educational Indices for 1990 appeared in June 1991 and show that more than 4% of the population is college educated. This is double that of Japan and UK. There must be something very wrong. What good is a higher education when you cannot get a job after graduation?

The technology gap cannot be solved in a short time. Basics in all fields of science must be solidified, more people should be occupied in R&D activities, and much more investment should be made in this direction. Industry as a whole must seriously consider raising the ratio of the R&D portion of investment out of sales to at least the level of 3%.

The environment control cost will rise as time goes on, but the corresponding share of the total costs will, it is hoped, gradually drop.

Lastly, high productivity is a result of numerous factors, of which technological development is the top priority. The industry is therefore expected to invest more for quality than for quantity. It is a matter of urgency to introduce more advanced technologies, as well as more efficient and automated machines and equipment for saving working hours, improving quality, and enhancing productivity.

The battery industry should not for the time being make any additional investment in the expansion of battery capacities. Rather, it should concentrate more on advancing productivity, technological development, and rationalization of existing production resources. To achieve these goals, the industry will draw upon its major asset — the participation of highly-educated, disciplined, determined and hard-working employees.