

Chopstick Technology in the Knowledge-based Era

Banquet Speech by

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In primitive societies, the death of an old wise man meant the loss of a walking library in the village. Other “libraries” could only be replenished through years of accumulation in personal experience and knowledge.

According to the futurist Alvin Toffler, it is *knowledge power* that will play a dominant role in the 21st century, akin to military power during feudal times and financial power in the industrial age. How then to acquire knowledge?

“If you steal information from one source,
That will constitute plagiarism;
But, if you steal lots of information from many sources at all times,
That is called research.”

A research institute or a laboratory is thus a den of thieves, who know when, where and how to steal what information and make a lucrative living out of this activity, and yet never get accused of plagiarism.

In the knowledge power era, however, stealing is not enough. One must harness knowledge in creative ways, add catalytic ingredients to it so as to make it potent and enabling, and become good at managing knowledge. As someone said: In the industrial age the past was a throwaway, but in the knowledge-based era, the past will be a basis for insight and knowledge. And we will need these special people with insight---*parvus numero, magnus merito*: Small in number, excellent in merit.

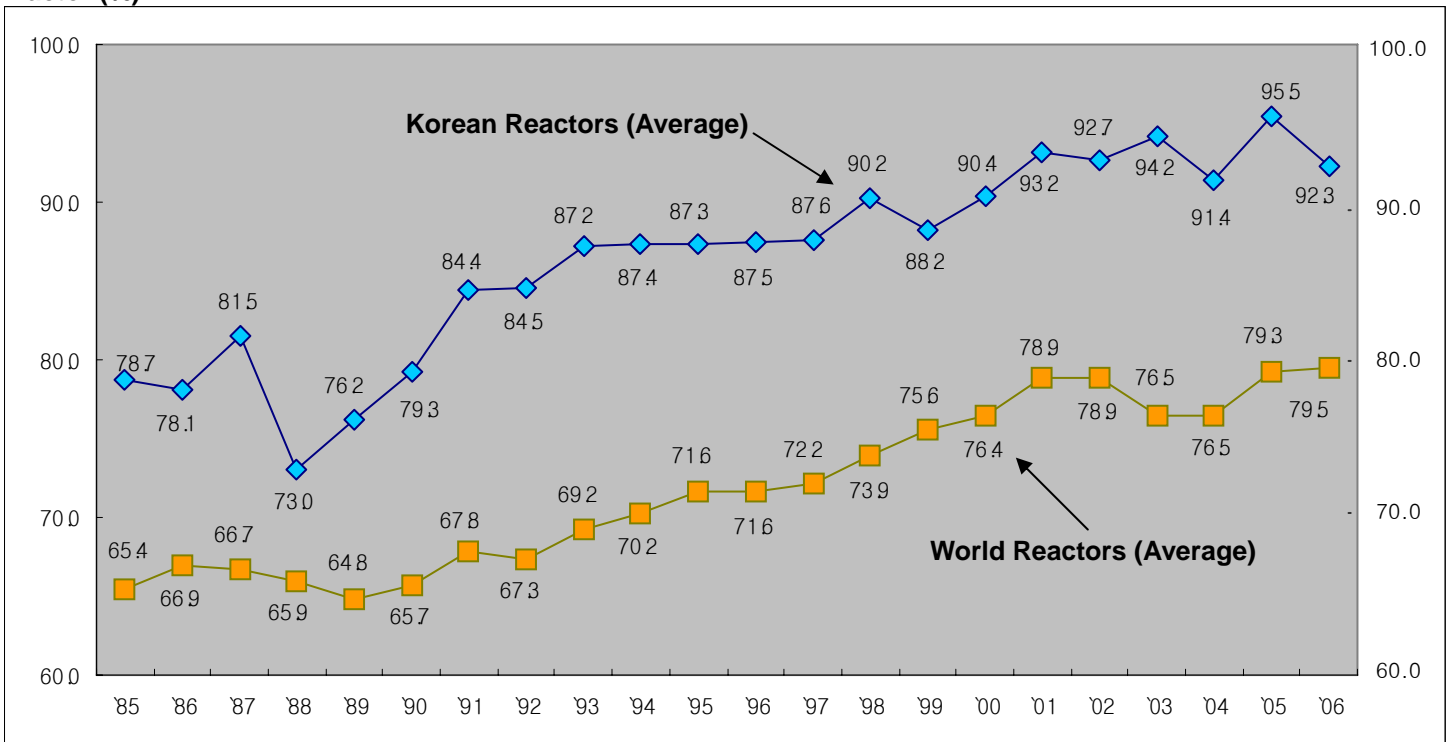
The Korean nuclear community has long regarded knowledge management, including its acquisition and transmission to juniors, as our top priority. The education and training of manpower have been our focal point consistently. The training (and subsequent retraining) of a top-notch nuclear engineer in my country usually costs an amount equivalent to his body weight in gold, assuming, of course, that he is not way overweight. Because of this, I jokingly refer to a good nuclear engineer as “Mr. Gold”, and this Mr. Gold is always aided by many Mr. Silvers and Mr. Cuppers as his supporting lieutenants.

These metal-named people have worked the week schedule of Monday-Monday-Tuesday-Wednesday-Thursday-Friday & Friday, thus putting in some 80 hours per week voluntarily. And like the U.S.-based convenience store “Seven-Eleven”, these dedicated workers work from seven in the morning to eleven at night.

Some of our new recruits were packed off to a Marine Corps’ training camp to strengthen their physical endurance and mental toughness. We also had reactor operators and technical crew sent off to a Buddhist temple in the mountains for meditation sessions and for open-minded talks with the reverend monk. The meditation training had a good effect, and made these personnel more mentally alert to tackle work, especially during stressful emergency situations.

Such intensive and extraordinary training has led to a lucrative harvest: An operating performance above the 90% capacity factor since the year 2000 and roughly 15% better in capacity factor than the world average over the past 2 decades. This is a record figure for the world nuclear community. In monetary terms, we calculate that improved revenues from this 15% higher capacity factor realized by our 20 power reactors amounted to some \$900 million in 2004 and \$800 million for each of the years 2005-06.

Capacity Factor (%)



Comparison of Capacity Factors between Korean Power Reactors and World-Average Power Reactors

(Source : Korea Hydro & Nuclear Power Co., Ltd., 2007)

So, what we have been witnessing in Korea is a nuclear *renaissance*. And just as the *Rinascimento* in Italy was not a mere regurgitation of ideas from ancient Greece and ancient Rome, and just as masterpieces by Brunelleschi, Palladio, Leonardo da Vinci, Titian, Alberti and Michelangelo were surely an improvement over what the classical world had to offer, so similarly we in the Korean nuclear sector are trying to come up with new ideas and novel concepts, though, of course, our own Michelangelo has yet to make his appearance!

Indeed the nuclear sector has been a linchpin for the Korean industry, both in pioneering and popularizing new technologies and in providing key workmanship to all corners. Just to take an example, it was the nuclear sector that introduced QA&QC practices to Korea.

Korean shipbuilders have been able to develop an innovation that meant great savings in time, manpower, cost, and space at the job site. The novel procedure involved fabricating modules offsite, and then bringing them together for assembly at the dock site, whose availability was at a premium. This modularization technique was a straight borrowing from the construction experience at one of our nuclear plants, at which the Calandria of CANDU reactor was fabricated nearby in advance and then transported by rail track into the containment building. And Korean shipbuilders are now using such modularization technology on land to assemble container ships that are 200 meters long and 15 stories high before towing them out to sea on rail tracks.

One thing we must not do, however, is rest on our laurels. Catastrophes have a tendency to sneak up to us when we least expect them. We have to guard against self-complacency and remain always vigilant, day and night, holidays and weekends in particular. Our first enemy dwells within, and it is the complacent mind-set that is grounded on good performances and compliments from others.

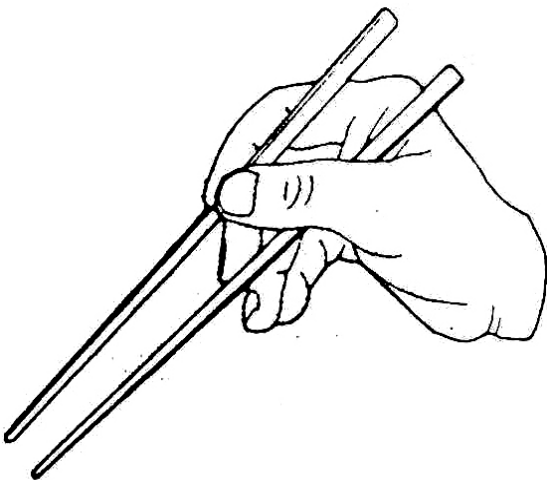
In addition to formal training at the registered institutions, our people come pre-trained from a lifelong hidden training course. I will go as far as to venture that it is precisely this lifelong training which has led to the good operational and maintenance records at our nuclear power stations. Today, I will reveal to you this secret training program, ladies and gentlemen, and I am referring, of course, to the daily use of chopsticks by peoples in the East Asia.

In pre-modern times, it was brute strength and a hardy back, which were the trait most likely to ensure one's survival chances in life. However, as we have evolved and our societies have become more complex, many different human abilities have come to be prized, and especially as specialization of all sorts have proliferated. In our post-industrial age, the ability for the hand and fingers to move in sync with one's brain is one human ability that is becoming more and more important, particularly since many of human tasks are now performed with a mouse, a keyboard or a joystick.

Thus, the new bionic human whose digital muscles and neural wiring are flawlessly integrated so as to produce optimal manual dexterity is the new human who will lead us to the new technological Canaan. The accumulated knowledge and memory stored in an individual's brain must be capable

of translating into action with almost no lag in reaction time. And I suggest that this techie wizard, whose digital motor agility is finely hardwired inside her or his brain, probably grew up eating with chopsticks.

Chopsticks were used in China as early as the Shang Dynasty (c.1766 - c.1122 B.C.), and the substitution of chopsticks for knives and forks at the table reflected the ascendancy of the scholar over the warrior and farmer as a cultural hero.



Chopsticks come in-pairs, equal in length, weight, thickness and material.

The two co-equals working in harmony point to such notions as social equality, mutual respect and cooperation, the yin and yang coming together.

One stick alone is useless, and it is only with the partner stick in tandem that the chopstick pair can perform its minor miracles. It is said that a couple who can manage good manipulation of chopsticks usually enjoys excellent conjugal harmony. The continual use of chopsticks from when we were small means that our deft and adroit hand skills become quite impressive by the time we are adults.

Chopsticks come in different shapes and sizes, and are made from various materials. Some can be very ornate, with lacquer-work, inlay, and decorations.

Chopsticks used in China tend to be longer and more blunt than those used in Japan, which tend to be tapered. Bamboo and plastics are favored in China while wooden chopsticks tend to be the norm in Japan. In Korea, chopsticks are mostly made from metals, and tend to be thin.

Regardless of the differences in chopstick styles preferred, the Chinese and

Vietnamese restaurants, Japanese sushi bars and Korean homes are all special training camps for drills in hand dexterity which will come to be more and more important in our hi-tech world. The daily use of chopsticks in the Far East will be a wellspring from which will emerge pioneers of gateway technologies for the future.

Because Korean chopsticks are metallic, relatively small and thin, they are the most unforgiving and difficult to use. One result of this is that Koreans have had to develop the highest degree of chopstick manipulation *finesse* in order to compensate for the tinny chopsticks, so that their

chopstick skills are at a level that is superior to those of neighboring nationals. For the best among them, the chopsticks have become digital extensions to their hand.

And we think that the recent phenomenal success of Korean archery athletes and women golfers on the world stage can be traced to their ceaseless intensive in-house training in chopstick utilization. And ditto with gains by young Koreans in computer gaming and in various Internet activities.

And, of course, our world-class violinists and pianists in classical music have their chopstick-training to be thankful for. And, most important of all, the rapid industrialization of the 1960s and 1970s that started the Korean Economic

Miracle was grounded on the nimble hands of the chopstick skilled Korean factory workers.

These days, Korean scientists are conspicuous in the life sciences, where that same exquisite touch is required when, say, handling stem cell lines or working with pipettes, Petri dishes, chromatographs, and so on in genetic engineering projects.

One finds many different levels of proficiency in chopstick use. I will skip the basic levels found at what we might call kindergarten to high school levels.

Persons at the equivalent of the “college level” will have no trouble picking up many tiny clumps of sesame grains from a plate or pieces of human hair from the floor within a few seconds. Up to this stage, we are talking about *static* manipulation skills, something like what you find in golf where a player swings at a target ball, which lies at a stand still on the ground.

At the doctorate level, we get into a *dynamic* program where one goes after a moving target, as in baseball, football, pingpong or tennis. One task might be to catch a fly in mid-air with chopsticks while sitting at a table after dinner.

I think that I can demonstrate this technique for you only if there were a fly near me. Nabbing a fly in mid-air is nothing special in the Far East, including Korea. Using chopsticks during more than 1,000 meals every year over many decades means that a considerable number of Koreans hold doctorates unless they are slow learners or are handicapped.

One step higher might be called the post-doctorate stage, where one relies on one’s ears instead of eyes, to catch a mosquito in the dark. A friend of mine claims to have post-doctorate skills in this area. However, even such zen-like skills do not compare to catching a jumping flea with chopsticks in bed with eyes closed---though because there are no fleas in Korea any more, Koreans haven’t had a chance to hone themselves in this ultra-precise technology.

Thank you.