Competitive Power of Japanese Industry — The Present Situation and Future Prospects

By Karatsu Hajime

The Economy and Technology

The distinguishing feature of recent technology is the rapidity with which it changes. In order to cope with this change, Japan is increasing expenditures in research and development at a breathtaking pace. In 1998 research and development expenditures amounted to ¥17 trillion, or 3.2% of GDP. The number of Japanese enterprises which actually increased spending for R & D, despite the current economic downturn, was unexpectedly large. One result of such efforts is reflected in the number of patents granted. Consistently over the past several years, of the top ten companies in terms of patents granted in the United States, seven or eight have been Japanese. Of even greater significance is the technological balance of payments with overseas countries. It has long been held that Japan is skilled at making and exporting, but that the technology employed is purchased abroad. This has led to a common conception that the creativity of the Japanese people is worthy of little note. However, five years ago the technological balance of payments turned in Japan's favor, and in 1998 the income from exportation of technology reached 1.9 times that of expenditures for purchase. In other words, Japan has become a full-fledged technology-exporting country.

However, many still believe that the Japanese people are lacking in creativity. This serves to illustrate how difficult it is to eliminate an entrenched belief, although admittedly it has only been five years since the situation changed. Whatever the case may be, the characteristic feature of Japan is that things change rapidly. Without access to the most recent data, true understanding is always difficult.

Suzuki Co. Ltd.

The factory kept running at full speed to manufacture subcompact vehicles

In Japan much is being made of the economic recession. Many people may therefore assume that every sector of Japan is foundering, but this is a major misjudgment. In reality, new technologies are developing new markets one after another. A Japan-developed digital still camera easily surpassed sales of two million units last year alone. Press the shutter and you can immediately see the image you have captured. Young women are very pleased with it because if they do not like a shot of themselves, they can delete it and take another. They can easily print their own pictures on stickers with different backgrounds, download them in personal computers, edit the images and send these images over the Internet. In short, we now have a camera that is entirely different from the previous types.

There is also a boom in minidisks. In all likelihood, these disk players will replace the long-familiar cassette tape recorder. In the current digital age, such products as the minidisk have been developed thanks to the progress achieved in semiconductor technology. Flat-screen televisions are also selling well, despite the fact that they are nearly 20% more expensive than conventional televisions. The television has consistently been viewed as a mature product in a saturated market, but this conception does not match the reality. The public is now saying that we are facing the greatest recession since the oil crises, and the booming market that has come into being owing to technological advances is hardly ever mentioned. It is only natural that one feels like sarcastically asking the economic experts and the mass media what it is that they are looking at. In

the newspapers day after day, we read only about such topics as finance and securities, and articles on technology, which is the point of departure for the economy, are pushed onto the back pages.

However, the January 18 issue of the American magazine Newsweek ran a cover story on how Japanese subcompact vehicles are becoming the global standard. Unique to Japan, the new subcompact vehicles launched last year boast the same degree of safety as a regular-sized vehicle, including measures against collisions. With significant horsepower, automatic transmission and air conditioning, these vehicles are carefully designed. They sell at unbelievably low prices. Sooner or later they will pour into the European market and become the standard even in East Asia.

Evaluating Japanese technology fairly, the editors even placed such a story on the cover of the magazine. Their point of view is obviously different from that of the Japanese mass media. These subcompact vehicles have been selling extremely well since last year and, amazingly enough, it is said that one company even kept its factory running non-stop throughout the traditional New Year's holidays. In this sector one hears no talk of a recession.

What is the New Technology?

By this point it is obvious that the departure point of the economy is technological strength. It is evident that when we contemplate Japan in the 21st century, we have to accurately grasp technology. Before entering upon this subject, however, it is essential to have a clear picture of what this new technology is, otherwise we will go around in circles.

By "technology" we mean those technologies which serve as the driving force in producing added economic value and not technology in the general sense meaning theoretical possibilities.

Success and failure for enterprises consist in developing goods and services and providing them to the market in a timely manner. Developing a completely new technology is all very good, but adroitly grasping consumer demand is foremost. Moreover, time passes quickly, so timing is a significant factor. When one thinks about the technology of the 21st century, the first topics that come to mind are information and biotechnology. There is no doubt that as a worldwide trend there will be rapid growth in these fields, but as we have already noted in the example of household electrical appliances, if we look only at high-tech areas, we have to be very careful not to form a major misconception.

Last year, an inconceivably large number of new products were launched in Akihabara. Refrigerators, until now considered the most representative of mature products, sold quite well. The same was true for a new model of washing machine and a noiseless vacuum cleaner. In addition, a flat-screen television, which judging from conventional common sense would not do well, was quite popular. The refrigerator, despite the fact that it is the same size as before, now has more space inside, allowing more storage room. Further, electricity consumption is half that of previous models. Products which sold well, like the ones mentioned, did so because they capitalized on efficiency. Despite the fact that their old model is still in working condition, consumers have begun to wonder whether it is time to buy a new model. Also on the market are new models of washing machines employing centrifugal force which wash clothes cleaner and faster. As can be seen, the change is not just a slight improvement of a conventional product but rather the addition of attractive features to the product through new technology. And these products sell even in what is said to be "the depths of the current recession," so it is only natural that enterprises are endeavoring to develop new technology in order to survive.

Some social critics dismiss such efforts. From the viewpoint of the preservation of natural resources, they claim, it is going too far to encourage consumers to buy new model refrigerators at the cost of throwing out an old one that still works adequately. There is justification for this view, but in my opinion it is an even greater waste of energy to keep using a refrigerator that consumes twice as much electricity. Technologies constantly advance, so one can counter such objections by saying that by means of incorporating new technology, one can bring about a higher level of society.

"Seed" Pattern and "Need" Pattern

As a matter of fact, one future direction of technology is toward social needs, such as environmental protection and energy conservation. Exhaustion of petroleum resources is in sight. A whole series of projects are now underway to develop fuel batteries, hydrogen-fuel vehicles, pluthermal and nuclear fusion and applications of these are being made public one after another.

Generally speaking, new technologies come in two different patterns: from social needs (need pattern) and from applications of newly possible technology (seed pattern). What is now known as biotechnology is an example of the "seed" pattern of technological development. Yet in actuality such criteria cannot be applied to distinguishing between patterns, because both the "seeds" of available technology and the "needs" of society function in tandem as an integral whole driving technological development. Here it is of fundamental importance to have the ability to evaluate what to select from among this multitude of ideas and new findings and decide how to combine them.

At present no one doubts that the power that propels the American economy is technology related to information and telecommunications. Looking at the value added and employment created, we notice that this sector does not necessarily outshine other sectors of industry.

Computers and semiconductors, as might be expected, exhibit a productivity per capita of $363,000, ranking at the top of all industrial sectors, but the software industry ranks lower than expected at $144,000. Pharmaceuticals and biotechnology are high in value-added terms at $367,000 and represent a quarter of the size of the information, data and telecommunications industry. In comparison, the automobile industry, which is generally considered to be a mature industry, had a productivity per capita of $355,000, closely rivaling the computer industry. Yet, the information and telecommunications industry has achieved the fastest growth, tripling over the past five years while the automobile industry grew by only 10%.

Only high growth-rate industries seem to attract the attention of the public, and figures indicating the size of an industry are overlooked. I believe this is a problem. Investors tend to focus only on the speed at which things change. More important from the viewpoint of the national economy, however, is how large each industry is and how much additional employment it can generate.

Thus, from an economic point of view, the figures show that it is a blatant mistake to lump certain basic industries together in a phrase such as "large-scale, heavy industries" and consider them as a sector deprived of any prospect of technological innovation. Actually, there is no exact definition of the category known as large-scale, heavy industry, but taking it to mean industries which produce basic materials, Japan's shipments amounted to ¥102 trillion in 1997, accounting for added value of ¥40 trillion — a rate of 40%. Processing and assembly industries, on the other hand, produced shipments of ¥134 trillion, with added value amounting to ¥46 trillion — a rate of 34%. Generally speaking, high-tech industries do not always have a high added-value rate. On the contrary, in the current circumstances, the semiconductor industry has sustained heavy losses because changes have occurred so rapidly.

Obtaining Fundamental Resources

Rather than dealing with ambiguous terminology, it is more important to consider what position of advantage a particular technology or product has, whether it can create a market and what growth possibilities that market has. As one investigates, one finds the significant advantages of Japan: capital goods, i.e., parts, materials and production facilities that are absolutely essential for production. Further one finds that Japan has a monopoly in a considerable number of products. This is clear from the changes in Japan's export structure. Ten years ago, it was consumer goods such as automobiles and household electric appliances which were the main exports, but now capital goods account for 70% of the total.

Akihabara is crowded every weekend with people buying the latest products

Among capital goods there is a wide variety such as press dies which are indispensable for the production of car bodies, steppers and dicing saws for the production of semiconductors, packaging materials for finished semiconductor chips and they come from both high-tech and large-scale heavy industries. They are unavailable except from Japanese enterprises. It is even the case that production facilities for car tires are exclusively available from Japanese firms.

Cellular phones, which have enjoyed a worldwide boom, are now miniaturized to such a degree that they fit snugly in the palm of the hand and weigh as little as 80 grams. As this miniaturization has progressed, Japanese enterprises have in fact monopolized the world market. This does not mean that Japanese enterprises were vigorously pushing their products, but rather they suddenly found themselves without competition when rivals in other countries ceased production. In other words, no other country was able to keep up the pace of microminiaturization that Japanese enterprises maintained so tenaciously.

Therein one glimpses an important factor for Japan's survival — Japan makes things which others cannot even if they wanted to, in both high and low-tech industries. Virtually every electronic device contains a built-in electrolytic condenser made of aluminum sheets with paper inserted between them permeated with electrolyte. The world demand for condensers is satisfied almost solely by products from Nippon Kodoshi in Kochi prefecture in Shikoku. The material used is the local Tosa washi, Japanese paper traditionally made in the Kochi area. This illustrates the accumulation of know-how in that region, and to date no other maker has attempted to imitate it. Suppose that a condenser sells for ¥100, the paper costs only ¥2, but the world market is limited to ¥10 billion. That is why no other enterprises attempt to edge into the market. Some refer to this as a niche market. When one tries to make a certain product, one normally cannot do it without such niche products, and there is nothing unusual at all about this fact.

Race Against Time

When considering the possibilities of technology in the twenty-first century, we do not lack for topics, including information-related technology, new

energy fuels, the environment, waste processing, biotechnology and cloning. However, many of these technologies will require considerable time before they can be recognized as economically feasible. From experience, it would be better to assume that it takes at least five, and generally ten, years for a newly discovered basic principle to be acknowledged in concrete form. It will generally take another five to ten years until the principle is utilized as a part of the economy, creates new needs and is accepted. Last year was the 50th anniversary of the invention of the semiconductor. However, the truly revolutionary influence of the semiconductor — the invention of the microprocessor — required 25 years. Hence there is an opinion that the validity of patents — 20 years under the current system — is too short.

Generally speaking, an inventor who works out an idea tends to concentrate on just his or her own technology. Adhering to one's own technology is certainly understandable, but one must always be aware that whatever the invention may be there are always rivals trying to accomplish the same thing. At present the mainstream of wristwatch technology is based on crystals. Prior to this, it was the tuning fork used by the American firm Bulova which established a peerless degree of precision as well as compactness and light weight not found in mechanical watches. Everyone assumed this would remain the central technology for watches. However, the company stubbornly refused applications from other companies to transfer the technology. Bulova alone could not satisfy the demand of the world market. Even if it had tried to establish a mass-production project, it would not have been able to launch such a system with ease. While the company was plodding along, the Japanese company Suwa Seikosha Co., Ltd. launched a crystal mechanism watch and Blova's fate was sealed. Some hold that if Bulova had transferred its technology in an attempt to form a family of related companies, the advent of the crystal watch would have been delayed. Therefore, a certain type of technology can become successful not because of a unique, superior principle alone, but it is also dependent on far-reaching consideration of various factors including production, sales networks and customers.

Basic Principles in Technology and Economic Strategy

Japan is said to be in a recession, but if one looks at individual industries and enterprises, one realizes that their situations vary from excellent to poor. While some are directly hit by the so-called sluggish economic climate, others are boasting that they are producing under full steam and still cannot meet the demand. The above-mentioned new subcompact vehicle enterprises are thriving without exception. This is because they are producing cars that perfectly match the needs of the world market. Shima Seki, a maker of automatic knitting machines in Wakayama prefecture, on the other hand, launched an unprecedented epoch-making circular knitting machine capable of knitting sweaters. The machine is selling in such large numbers that they cannot keep up with production. This is a reality in the world of technology even within the current economic recession. If you produce something that people want, it will sell regardless of whether the economy as a whole is brisk or sluggish.

Here we notice something important. Often when people discuss the economy, the subjects they deal with are lopsided because they exclude technology. That is why all the arguments are abstract and not down-to-earth. More troubling is the fact that such theories, which deal with money alone, determine public policy.

Therefore I offer an important proposal. That is, when we discuss the economy from now on, we should make it a principle to include technology experts and marketing specialists who are aware of that technology in order to cover feasibility in a thoroughgoing manner.

Japan is lagging behind in the education of system engineering experts required for implementing this basic principle. Designing constituent technologies into a system capable of advancing in long strides requires a wide range of specialized knowledge and many years of experience on the job. This is not necessarily harmonious with the employment system currently practiced in Japan, and that is why there are so few experts who are acknowledged by the rest of the world. This is clearly reflected in the products Japan makes and exports. It should also be noted that in the field of information networking, which has grown rapidly in the past few years, hardly any new concepts come from Japan. Frankly speaking, I feel this is a manifestation of the weakness of Japanese engineers in conceiving systems.

At a more detailed level, there is no end to stories showing where Japan fares poorly, such as in the analysis of the human genome. Upon close examination, however, one discovers that no single country is almighty when it comes to technology, not even the U.S. Until quite recently the U.S. boasted, perhaps partially for reasons of national defense, that its coding techniques were of the top rank. But then Israel announced a more advanced coding system, followed by an even more advanced system by Japan's NTT.

What this comes down to is the issue of technological strategy, and I leave that as my concluding comment. JJTI

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