June 7, 2001

Dr. Kim Dae Jung
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Your Excellency,

It is an honor and a privilege to provide you and the Korean Information Society Development Institute (KISDI) with this report about the emergent global economy of the twenty-first century and Korea's place in it.

This report is not about the immediate financial crisis, the restructuring of the chaebols, or negotiations about reunification. Rather, we, as independent advisors, have been tasked to focus on the main directions of change in Korea over the longer term future. We have highlighted not just the challenges that face the country, but also the many great opportunities that could lie ahead for Korea and the Korean people if they prepare for the future.

Nobody knows the future with absolute certainty, and not everyone will agree with every idea presented here. We do not assume that these are the final words on the topics discussed. Rather, we, and our Korean counterparts and colleagues presented in the spirit who have helped make this report possible, write in the spirit of non-dogmatic discussion, hoping that this document will promote widespread, civil discussion and public participation in the decisions that face Korea.

Because of the constraints of time and space, many important issues, from health care and the environment, from land use to finance have been set aside for future examination and elaboration.

This report does not offer some vast central plan that only government and large corporations can design or execute. Instead, it highlights some of the main directions of change and proposed new strategies, so that all parts of the Korean society can adapt to the remarkable changes that lie ahead, custom-design their own futures, and help create a better future for all Koreans.

Thank you for the opportunity to serve you, Korea, and the Korean people by providing this perspective. We and our team at Toffler Associates see a bright future for Korea’s information society.

Sincerely,

Alvin and Heidi Toffler, Chairman and Vice Chairman Toffler Associates

Thomas Johnson, President Toffler Associates
Korea today faces a choice that will affect all Koreans and their children for decades to come. Either Koreans, themselves, make the choice or they allow others to make it for them. It is the choice between becoming a dependent country with a struggling low wage economy or a country with a leading edge economy and a leading role in the global economy.

The choice must be made soon.

Speed is necessary because the world is now going through the most rapid and radical redistribution of economic power in several centuries. Some countries will greatly benefit. Others will be left out. Korea must avoid falling behind.

The force driving this restructure is the rise of a new form of wealth creation on the planet. It has been called the “new economy,” the “information society,” or the “Third Wave economy.”

Approximately 10,000 years ago the invention of agriculture sent a slow moving wave of change across the earth, and gave rise to ancient civilizations based on peasant labor. Several centuries ago the industrial revolution triggered a second great wave of change. This introduced a completely new system for wealth creation. It shifted labor from farm to factory and, despite many transitional hardships; this Second Wave brought higher living standards wherever it occurred. The industrial powers also gained enormous economic, political and military power. Some used that power to colonize the poorer countries.

The result was a world divided into two layers. At the bottom were First Wave agrarian countries. In them peasants continued to scrape a bare living out of the soil. Even today peasant-based economies have the lowest standard of living. Hundreds of millions still live as their distant ancestors did, lacking clean water and the elemental necessities for decent survival. On top were the Second Wave industrial powers – major players in world trade, with dominant roles in the international institutions and organizations that influence the world economy.
Korea, with a poor, underdeveloped economy heavily dependent on backbreaking rural labor, was part of this world system. Like many other countries it occupied a low rung on the world economic ladder.

Then, in the 1960s Korea made a historic choice. A decision was made to leap up many rungs in the ladder and join the ranks of the leading industrialized nations. And once that choice was made, Koreans astonished the world. In a single generation, as a result of hard work, intelligent action and unbending commitment, Korea completed a transition that had taken some countries several centuries.

From 1960 to 1980, the shift toward a more productive economy in Korea was reflected in a new, more urbanized way of life. Farm families as a percentage of total population fell from nearly 45% in 1970 to below 10% in 1997. \(^1\) Industrial exports soared. Agricultural and raw material declined to 10 per cent of exports. Heavy investment in industrial technology, the rise of the chaebol, and changes in the education and social protection system made Korea an important player in the global economy while clearly raising the material standard of living of its people in almost every category. On the eve of the Seoul Olympics, the Economist called Korea "a textbook example of development." Korea led the so-called "Newly Industrialized Countries" or NICs.

**A Tri-Sected World**

What has happened since? Why have Korea and the other NICs undergone severe economic difficulties in recent years?

One can point to the financial crisis, increasing competition from other exporting nations, corruption scandals, over-borrowing by chaebols, loose lending practices by banks and many other problems. There are many reasons. But a crucial factor is the arrival of a revolutionary new form of wealth creation that makes industrial-era economic models increasingly obsolete.

This new, Third Wave economy is based, as we know, on innovative applications of knowledge – creative mind-power instead of brute muscle-power. In the Third Wave, innovative knowledge becomes the most important factor of production, capable of reducing reliance on all the others. Data, images, symbols, culture, ideas, and processes can drive down requirements for labor, capital, inventory, raw materials, and energy. As President Kim Dae-jung told a November 1999 World Bank symposium: "In the 21st century...intangible elements such as knowledge, information and cultural creativity will be the source of a nation’s competitiveness."

As a result, the entire structure of the global economy is changing. Peasant
economies are still on the bottom, but traditional industrial economies of the kind Korea built so successfully are no longer on top. Emerging knowledge economies now occupy the highest position. The global economic system is increasingly tri-sected. And that changes Korea’s place in the world.

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Korea — if it is to provide jobs and increase the standard of living of ordinary Koreans — must once more leap to a higher rung on the ladder. It must either join the world’s most advanced knowledge-based economies or it must see more jobs disappear, more wages decline, and more suffering by the people. The gap between the world’s leading and lagging economies is widening. Korea has to decide whether it will continue to be a Second Wave nation – or join the leading, increasingly Third Wave, innovative economies on top.

This report strongly urges Koreans to make a commitment to the development of an advanced Third Wave economy.
Ever since the Asian financial crash starting in 1997, Korea has been struggling through a painful period of reinvention and reform. The crisis revealed that what many regarded as strengths in the Korean economy had, in fact, turned into disadvantages.

Its financial structure, for example, was weak and squeezed by an alliance of government and the chaebols, making it difficult to allocate capital independently. The result was a lack of democratic access to capital, an over-concentration of investment in a relatively small number of giant firms, the investment of huge sums in projects and companies that were hopelessly unprofitable, and corrupt paybacks to politicians and others who kept the system going.

These practices may have worked during Korea’s period of industrialization, when global competition was low – when China and Southeast Asia exported little and offered little competition to Korean industry. They do not work in today’s hyper-competitive, world economy in which currencies and investments cross borders instantaneously, technology becomes obsolescent overnight, and when finance itself is going through a profound technological upheaval.

As companies around the world struggle to keep up with today’s massive, ever-accelerating changes, even giant family-dominated firms must turn to the outside world for capital. But investors, both Korean and foreign, have more options than ever before and now demand more transparency in the internal arrangements, cross-holdings, and accounting methods than ever before.

In this 21st century world, companies must be capable of instant adaptation to changes in customer needs, technologies, finance, taxation, markets and other variables. Survival depends on extreme flexibility at every level from engineering and marketing to manufacturing and distribution.

They need management flexibility. They need technological flexibility. They need financial flexibility. And they need informational flexibility – impossible without
advanced telecommunications and information technology.

They also need to shift jobs around and, all too often, to close operations in one place and move to another. The social costs of such flexibility are painful. But collapse or bankruptcy of whole sectors of the economy clearly would be worse.

These problems are not exclusively Korean. They confront companies in all the industrialized nations. Nor is it only business that faces fundamental change. The same is true for governments. Around the world, bureaucratic governments, often corrupt and inefficient, need wholesale overhaul. Like businesses, they, too, need to apply advanced information technology to help them de-bureaucratize, service their citizens, and make better, faster decisions.

As a result of these new pressures, and the obsolescence of old methods, Korea today is going through a difficult process of reform.

Unless this process is completed, its economy and social life are destined to grow worse, not better, in the years and decades ahead.

Fortunately, while there remain strong and legitimate differences about how to carry out the necessary reforms, and much controversy about the specifics, there is widespread public recognition that the government’s reform program is not a matter of choice, but of necessity.

But these much-debated reforms, as we’ll see, are only a small piece of a much larger story.

Is the Revolution Over?

Starting with the first commercial uses of computers in the United States in the mid-1950s, a new kind of economy has been growing up around the world. This “new economy” is based on the changed role of knowledge in the creation of wealth, and how Korea reacts to it will determine Korea’s economic future.

Recent events in world financial markets, beginning with the crash of the dot-coms and, more recently, the high tech sector generally, have led some economists and management theorists to suggest that the “new economy” is dead or that, indeed, it never existed. We believe this view to be wildly mistaken.

To say that the new economy is dead is the equivalent of insisting in the early 1800s, that the entire industrial revolution was over because some textile manufacturers were going broke in Manchester.
Not only has the new economy not died, there is strong reason to believe that it is about to advance to a completely new stage that will carry some countries’ economies to higher levels of profitability and productivity than ever known before. Korea should position itself to be among them.

At the dawn of the industrial revolution in Western Europe and the United States thousands of start-ups failed because their business models were wrong, their drive and optimism misdirected. No one knew how to operate in the emergent, post-agrarian environment. Businesses had to invent everything anew — factories, distribution chains, labor relations, sales. Markets gyrated, and plenty of investors lost their money. Today businesses and countries are in a similar situation. We, too, are living through the dawn of a new wealth creation system.

As Alvin and Heidi Toffler have elsewhere pointed out, the notion that the new economy never existed is ludicrous if we look at how deeply it has already restructured even the biggest and least Internet-dependent corporations. Their hierarchies are flatter. Their products are more customized. Their skill requirements have changed as muscle-work declined and mind-work increased. Alliances and complex supply webs have reduced vertical integration. Markets have nichified. Firms participate in a global economy that is itself profoundly restructured. They are forced to innovate and operate at a faster pace than ever. The competitive forces producing such changes are likely to grow more, not less intense.

**The Promise**

In the U.S., changes like these and many others have resulted in significant returns to the economy as a whole. Just focusing on the Internet, Robert Litan, director of economic studies at the Brookings Institute in Washington, along with Alice Rivlin, former vice-chair of the U.S. Federal Reserve, recently (after the plunge of the stock markets and the dot-coms) estimated that “the Internet may save Americans as much as $200 billion annually. In a roughly $10 trillion economy, this 2 per cent savings translates into potential annual productivity improvement of .4 per cent.... If cumulated over 10 years [this] would increase the income of the average American by 4 per cent, or roughly $1600.” These numbers may be exceeded if account is taken of indirect, unmeasured benefits in such fields as health and education.

In the past 30 years, as information technology spread throughout the economy, American families not only bought more appliances, financial services and automobiles, but floor space in the average American home jumped by 40 per cent. And today, even after the turbulence in stock markets and the crash of many companies, unemployment in spring 2001 in the U.S. stood at 4.1 per cent – down from over 7 per cent in the eighties and early nineties.
An August 2000 Goldman Sachs analysis compared the arrival of the Internet to the arrival of electricity. With a few exceptions, individual firms did not profit greatly from the new source of power in terms of revenues or valuation. However, productivity, wages, and the standard of living all increased. Economist Jeffery Sachs makes a similar prediction for the new economy: “Even though productivity gains are likely to be substantial, most benefits will accrue to consumers in the form of lower prices, or to workers in the form of higher wages relative to prices, rather than to firms in the form of higher profits. This is because of a basic aspect of Internet technology, freedom of entry of new firms, and therefore the very high contestability of markets.”

Revolutions are, by definition, accompanied by turbulence, miscalculations, bubbles, and failed start-ups. Despite these upsets, the new, knowledge-based economy is not going away. As the UN’s World Economic and Social Survey points out, while a fall in equity prices may hurt the world economy in the short term “the longer-term benefits of the structural changes associated with the new economy are expected to continue.” This is especially likely as innovative “dot-com” technologies diffuse into traditional companies.

For Korea, too, the gains may come less in the form of a sudden increase in profits and stock prices, than in overall gains to the economy and society, higher employment and lower prices of consumer goods.

A successful transformation to a knowledge-based economy is needed to assure that Korea avoids being caught in the downward spiral of competition from lower wage countries. That competitive rivalry could come from China in the near future or perhaps from Africa, after a decade or two, as they shift from peasant agriculture to factory-based economies. Indeed, China’s leaders are hoping to leapfrog elements of Second Wave industrialization. They are investing heavily in Third Wave technologies in the hope of skipping some of the steps taken by Korea and earlier industrializing states.

**Commerce+E**

Despite sensational media reports to the contrary, e-commerce is not dead. It is becoming Commerce+E. The English language term “E-commerce” misleadingly implied that electronic technology is more important than the purposes for which it is used. Yet commerce existed before digital technology and will continue to exist after more advanced technologies supplant it.

Though billions were blindly invested in dot-com companies whose values rose to insane, “black tulip” levels and then crashed, numerous digital, post-dot-com enterprises exist, continue to grow, and will multiply. The massive U.S. stock market collapse, which pulled down the share prices of
solid high tech companies as well, was a result of convergent factors. One was the ready sudden over-availability of capital in the U.S. Initial and secondary stock offerings more than quadrupled between 1998 and both 1999 and 2000 then quickly dropped back in early 2001. This was accompanied by the rapid spread of share ownership by the public; media hype; irresponsible financial analysts; and self-serving stock brokers who misled the public.

However, a deeper, more important cause of the recent “bubble” is the fact that, in this capital environment, most of the digital start-up companies were experimenting with novel, untested business models. As new technologies exploded out of the labs, tiny start-up firms sought ways to apply them. Most failed.

So do most scientific experiments. In recent years major firms, instead of performing all research in-house, have closely monitored the latest scientific and technological work being done externally by small independent firms — and then acquired only those whose breakthroughs were readily commercializable. The risk inherent in research was thus transferred from the large companies to small outside firms and their investors.

The rise and fall of the dot-coms can be seen as a giant burst of experimental research into new business models, with risks largely transferred from big firms to small start-ups, venture capitalists and ordinary investors. And just as scientists learn from their failures, so can investors and societies.

Indeed, hidden by the dust settling from the crash is the fact that some so-called e-commerce firms have, in fact, succeeded by becoming Commerce+E firms. As this is written, a number of Commerce+E firms have survived the crash and gone quietly about building a business. In the U.S., these include on-line florists, jewelers, and sellers of beauty products, real estate, and other services. Minimizing infrastructure costs, focusing on high margin sales, forming horizontal partnerships, and diversifying revenue streams they have outlasted the firms started primarily for a quick stock price run-up.

Others have fused with existing retail firms and vice versa. Major firms in almost every field have created their own on-line entities, not as stand-alone firms, but as supplements to their existing business, offering customers choices and extra services not previously available. This is what W.W. Grainger [a company that provides maintenance, repair, and operating supplies to businesses and institutions], Walgreen’s [a chain of pharmacies], and many other companies have done successfully. Thus last year Grainger reported processing $337 million in sales on-line. Says the Wall Street Journal, “the companies that make best use of the Internet are those that tie it to their existing strategies and competitive advantages.”

Meanwhile, in Korea, the government along with a few of the old-line chaebols have made substantial investments in e-commerce, resulting in chaebol domina-
tion of the cyber market. An e-commerce boom is materializing, with sales estimated at $15.2 billion for 2000. Perhaps even more encouraging is that they are adapting their business model to Korean culture. Many of the sites offer a plan allowing customers to pay for products purchased over the Internet after they have received them.

Ironically, while the so-called “clicks” companies spoke about the importance of universal “connectivity”, most operated as though E-Commerce were disconnected from existing “bricks” commerce. They argued the advantage of electronic integration, but were themselves poorly integrated with the massive non-electronic economy they sought to quickly replace.

On the B-to-B (business-to-business) level, start-up exchanges in such industries as auto manufacture, paper products, chemicals, food and beverage have found it more difficult than expected to sign up participants. Despite the savings promised, many firms were reluctant to share information about their sales, their supply chains, and their customers. Nevertheless, even if their development is slower than over-enthusiastic promoters claimed, the potential savings are so large that, under competitive conditions, industry-wide electronic exchanges will over time succeed. This, too, is Commerce+E, rather than the reverse.

Korean firms face special obstacles in developing B-to-B electronically. Among these are a reluctance of companies to share information, a top-down relationship between the chaebols and their vendors, and inadequate standardization.

For these reasons Korean companies should certainly not rush in to such B-to-B exchanges or invest blindly in retail level electronic sales without clear business models that stand up to close scrutiny by skeptics. But no company can afford to ignore fast-changing developments in these fields, and every company of any size, must be ready to move aggressively when “second round” Commerce+E business models have proven to be successful. That could occur much sooner than hardline traditionalists suspect.

At a minimum, government can, and should, encourage the shift to Commerce+E by systematically reviewing and eliminating tax and regulatory policies that discriminate against service and knowledge-based business; by putting strong privacy and consumer protection policies in place; by supporting access to encryption, authentication and certification technologies; by policing and protecting intellectual property rights and by promoting revision of accounting methods biased toward the old industrial economy. This may include resisting some elements of U.S.-based GAAP (Generally Accepted Accounting Principles) standards, which are still tilted toward the old vs. the new economy.
Which New Economy Are We Talking About?

The Third Wave economy is not just a matter of stock prices or digitization or online commerce. All these, of course, affect it. But there is much more to it. It is part of an historic shift from wealth creation based on human muscle-power, which is limited, to one based on mind-power, which is essentially unlimited. This transition, as it unfolds, transforms economies and societies.

1. Capital. In pre-industrial peasant economies, the key factor of production is land – the source of both wealth and power. In industrialized economies the main factors of production are land, labor and capital. In the new, Third Wave economy, knowledge becomes the most important factor of production because, under appropriate circumstances, it can radically reduce the need for land, labor, capital or, for that matter time, energy and other inputs.

The fact that astronomers, for a long time, didn’t know how to measure the energy output of the sun didn’t make it any less important to human survival. The fact that neither investors, economists, nor accountants yet know how to value and measure this form of intangible capital properly does not reduce its overwhelming importance.

2. Money. The continuing shift to electronic money at all levels from huge foreign exchange transfers to personal credit card expenditures has tremendous consequences. By speeding transactions it reduces “float” at banks, it demands faster human decision-making, it makes it possible to assemble and disassemble huge pools of investment quickly – and to drain so-called “hot money” out of a country instantaneously. According to Mervin King, Deputy Governor of the Bank of England, it will also strip away many of the current functions of central banks.

Thus even as Europe struggles for full acceptance of a single Europe-wide currency, electronics makes possible many diverse forms of what might be called
“Para-money” – money surrogates that can be used in place of actual cash. For example, airlines and credit card companies offer users points that, like actual money, can be traded in for goods or services, including everything from computers to hotel stays in Tahiti.

It may soon be possible for parents to give schoolchildren cards with which to make small purchases – but which can be programmed to prevent unapproved spending. For example, the card might be programmed to refuse payment if the child wants to buy pornographic magazines or certain unhealthy foods.

In the new economy a new law is at work: As information is monetized, money is informationalized.

3. De-massification. Industrialization, often called “modernization”, promoted social and economic uniformity or homogeneity. The new economy reverses this and permits and promotes greater diversity. Increasing numbers of goods and services are customized. Markets are progressively segmented into smaller, more specialized groupings, and in some fields personalized “markets of one” become possible. The media, which connect production and consumption through advertising, also de-massify as the number of channels reaching into the home multiply, with the Internet, ultimately, bringing an infinite number of “channels” into the home. The result is a de-massification of imagery, culture...
and consumer tastes and preferences. In the civil society, meanwhile, more different groups spring up, introducing a much wider diversity of new, narrow issues for governments to address, from endangered species to AIDS or breast cancer.

In the new economy, therefore, manufacturing companies must reduce the cost of variation in output through sophisticated use of new information technologies. Retailers must apply them to manage complexity. (It is this, which makes it possible for a typical Walmart store in the U.S. to stock and manage as many as 110,000 items for consumers to choose among.) In the service sector it is advanced “cyberization” that permits successful banks and financial service firms to customize everything from insurance policies to personal loans.

Further, as products and services de-massify, so do prices. Thus we see increasing use of electronic auctions and reverse auctions on the Internet. Airlines diversify the prices they charge per seat. Hotels segment their markets, provide high-priced “executive floors” and seek out the individualized preferences of each visitor with respect to food, amenities, and services. Further customization of services will lead to more customized pricing. In almost every field, companies that fall behind the drive toward de-massification or customization will face sharp competition from companies that do.

The optimists spoke to us of a digital revolution. But by predicting steady growth and ever-rising stock prices, they forgot that revolutions, by definition, are marked by surprises, reversals, upsets, wildly volatile swings and a heightened role for chance.

Indeed, during the early stage of the industrial revolution thousands of start-ups failed because, like today, their business models were wrong, their drive and optimism misdirected. No one knew how to operate in the emergent, postagrarian environment. Businesses had to invent everything anew — factories, distribution chains, labor relations, sales. Markets gyrated, and plenty of investors lost their money, to a chorus of I-told-you-sos. To imagine that the new economy is over is the equivalent of thinking, in the early 1800s, that the industrial revolution was over because textile manufacturers were going broke in Manchester.

Today’s stock-market agonies hardly prove the new economy’s non-existence. If stock prices plunge 50 percent on a given day, does that mean the actual underlying economic activities have been cut in half, that workers are producing half of what they produced the day before? If share prices mirror reality at all, they frequently do so with enormous lags and leads. The notion that the new economy never existed is ludicrous if we look at how deeply it has already restructured even the biggest and least Internet-dependent corporations. Their hierarchies are more flat, their products more customized. Their skill requirements have changed as muscle-work declined and mind-work increased. Alliances and complex supply
These are only a few of the deep changes now occurring as countries attempt to move toward more advanced 21st century economies. The new economy also brings changes in size, reducing economies of scale in many (though clearly not all) industries, and changing the entire relationship of producer and consumer. It allows some companies to cut jobs and externalize costs by shifting part of the burden of work to the consumer as in the case of ATMs, package tracking, on-line airline ticketing, etc. But it also enables consumers to band together overnight to protest defects in products from tires to toys. The new economy drastically changes the nature of work, and the hours and location of work, shifting many jobs into the home and other locations outside the factory and office. As we’ll see, it also changes the role of government in the economy.

Above all, it speeds up all economic interactions demanding that firms move toward real time operations. As Alvin and Heidi Toffler have written, “in a Second Wave economy, we learned that time is money. In a Third Wave economy, that law changes. Every interval of time is worth more money than the last because more can be done in it.”

The Third Wave economy actually reverses many of the Second Wave principles, practices and priorities that made companies and countries successful in the industrial age. Under the new condi-
tions facing us, we need to revise old assumptions — that economic development is separate from or more important than social and environmental development; that exports are more important than domestic goods; that big business is more important than small business; that quantity of products is more important than quality; that producers are more important than consumers; that homogeneity is better than heterogeneity. And if the size of one’s muscles is now less important than the size of one’s brain, the subordinate role of women in the labor force and in society will need drastic rethinking. (Ignoring or devaluing the brainpower of half the population is hardly a smart strategy for leadership in an advanced knowledge-based economy).

The economic turbulence, moreover, has only just begun. To understand why, we need only ask a simple, frequently unasked question: What comes after the first digital revolution? Stunning and powerful as it is, the digital revolution is not the only source of fundamental change. In science, we’ve just achieved the first imaging of orbitals — the so-called glue that holds the atoms of the universe together. Stem-cell advances point to our ability to regenerate human organs. We’re making less visible breakthroughs in fields as diverse as conductive polymers, composite materials, energy, medicine, cloning, supra-molecular chemistry, optics, memory research and scores of other fields.

But it is, of course, in genetics and biotechnology that the most powerful effects are about to be unleashed. In the U.S., the Food and Drug Administration has already approved some 80 drugs and vaccines developed by the biotech industry and another 350 or more are already being tested on humans.

We have barely begun to feel the impact of the biodigital convergence. For example, we now have clues to the genetic manipulation of certain forms of intelligence. Imagine what that might mean to a knowledge-based economy — but also what social and political dangers might arise from such manipulation.

Day after day these discoveries are pouring out of our labs. Many, at first glance, seem unimportant. But that’s because we typically think of them as unrelated to one another. In fact, many of them will converge. And when they do, they could astonish us.

Of course, all these advances rely on computers and digital technology, as well as on the Internet. But many have implications that will feed back into, and change, the future of information technology itself, whether in the form of biochips or DNA-based computing,
and, who knows, new communications technologies based on DNA models and biochips.

THE FIRST PHASE

It is now clear that the entire digital revolution is only the first phase of an even larger, longer process. If you think the revolution is over, get ready to be shocked again as information technology fully converges with and is, in turn, remade by, the biological revolution. In the first phase, information technology revolutionizes biology. In the next phase, biology will revolutionize information technology. And that will totally, once again, revolutionize economies. Together these represent a turning point not just in economics, but in human history.

The upheaval in the stock market is extremely painful. But we will look back on it as a minor spike in the early history of the new economy of the 21st century.

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But it is, of course, in genetics and biotechnology that the most powerful effects are about to be unleashed. In the U.S., the FDA has already approved some 80 drugs and vaccines developed by the biotech industry and another 350 or more are already being tested on humans.

The changes brought by this technology, however, will extend far beyond health and medicine. Until now the biological revolution has depended on computers and digital technology, as well as on the Internet. By contrast, information and communications technology may soon come to depend on biology in the form of biochips, DNA-based computing, or self-assembling systems modeled after bio-evolutionary processes.

It is now clear that the entire digital revolution is only the first phase of an even larger, longer process. In the first phase, information technology revolutionizes biology. In the next phase, biology will revolutionize information technology. And that will totally, once again, revolutionize economies. Together these represent a turning point not just in economics, but also in human history.

Movement in all these directions will continue, driven by competition, whether or not financial analysts, economists or others think we’ve seen the end of the new economy. The fact is, we are still only at its beginning, and Korea must prepare even better for it.

Inventing a Model

This does not mean that Korea must adopt the same values, culture or strategies of other countries, be they Japan or the United States, or any other. It means Korea must design a customized strategy, suited to its own needs, for thriving in
the future. It will need to invent and reinvent its way into tomorrow. This is true at the level of nation, as well as that of individual businesses and institutions.

Why, it is worth asking here, was Korea so successful in making its last great transition – the one from agriculture to industry?

The hard work, drive, and intelligence of the Korean people are recognized around the world, and a generation coming out of the era of colonization and war threw itself wholeheartedly into the Second Wave transformation.

But there was another factor as well. The path Korea took toward development had already been pioneered by others – Europe, America and nearby Japan. The basic principles of industrialization were well established, and many Second Wave business models had already been tested. Korea’s goal was to take advantage of mass production, mass consumption, and mass markets, as well as Japan’s experience with export-led development. The basic rules of industrial economies were known: standardization, synchronization, maximization of scale, concentration of production in a few places, centralization of management, close links with government. Korea applied these principles brilliantly.

Antonio Guterres, Portugal’s prime minister concedes that Portugal missed the industrial revolution, but declares that his country cannot afford to delay the transformation of society required by new technology. He aims to transform Portugal into a “knowledge-based society” by focusing on education, professional training and new technologies.  

Today, by contrast, with the newest wealth creation system still in an early stage, there are no proven models for Korea to follow. While Korea can learn some things from the experience of other countries, there is no one to imitate. Each country making the transition is now compelled to invent and reinvent, to customize its strategy rather than applying some one else’s. In a word, Korea needs to invent its future.

The same is true at the level of industries and individual companies. The old economy permitted firms to imitate a rival and compete by lowering price, capturing market share, and holding on to it for years, even decades. In the new economy that is not enough. In a Third Wave globalized economy, innovations can now be copied overnight, whether legally or not. Things change so rapidly and multi-dimensionally, competition arises from so many strange directions, and product lives are so short, that only continual innovation permits a firm to stay ahead. In short, innovation in the economy must go from intermittent to continuous flow.

This does not mean that everything old is worthless and newness must be pursued for its own sake. It does mean, however, that countries that develop a culture of innovation, an openness to innovation, cherishing innovators and
raising the rewards for new and better ideas will have a distinct edge.

The good news is that Korea has already made a bold start in paving the way to a more advanced economy.
A Bold Start

The earlier shift from agriculture to industry in Korea, as in all other industrializing nations, required a new physical infrastructure. Smokestack countries typically need to expand their energy production. They need more and more roads and streets as cars multiply. They need more miles of railroad track. They need a better postal system. They need elementary telephone services. They need bigger harbors and airports.

To move beyond an industrial age economy, countries need to install the advanced electronic infrastructure needed to carry immensely increased loads of data, information and knowledge. They need a tremendous diversity of computers, communication options, networks of many kinds and universal Internet access.

Korea has already begun to roll out just such an information infrastructure, while working to bridge the digital divide. In fact, Korea has made one of the most impressive and successful investments in information infrastructure anywhere, with 15 million PCs, 44.1 telephone lines per 100 people, and 18.9 million IP addresses (as of December 2000). The nation’s estimated 22.3 million Internet users make up the fourth largest Internet market, after the United States, Japan and Germany. More than a third of South Korea’s 47 million people are logging onto the Internet.

The penetration of cellular phones is over 50% in Korea, topped only by Hong Kong, Taiwan, and Singapore, while Japan, perhaps better known for its cell phone usage, comes in about 10% lower.

More startling yet: household ownership of a personal computer is five to ten percentage points higher than it is in the U.S. and Korea is the third in the number of high-speed Internet lines. It continues to have the most broadband lines per 100 inhabitants of any country in the world and connects up to 100,000
broadband users every month. The number of homes with broadband access has doubled to five million in the past six months—meaning that now more than half of Korea’s households connect via broadband. In Japan, the figure “is a puny 640,000 for homes and business combined,” according to www.time.com. Even with this high level of PC ownership and connectivity at home, at least 20,000 PC-rooms dot the country.

A January 2001 Nielsen survey found South Koreans to be the most avid Internet surfers in the Asia-Pacific region. This assessment is based on the number of web sessions per month, time spent online, number of sites visited, and total page views.

Korea has also moved into IT manufacturing, most dramatically in chips but also, more recently, in personal computers, mobile phones, and handheld devices. Efforts such as the MIC White Paper and Cyberkorea 21 demonstrate Korea’s seriousness in planning for a transformation to the Third Wave.
Yet much remains to be done. Korea’s 9.25 trillion won software industry remains much smaller than such gross figures suggest, since much of what is counted is actually sale of foreign software from companies like SAP, Oracle, Microsoft and Hewlett Packard, and installation and repair of hardware and networking equipment.12

It is estimated that, overall, the I-T industry in Korea is two to three years behind that in the other developed economies, and more in the case of optical network core technology. By contrast, with respect to mobile Internet technology, the gap is small – only one to two years.13

Further development of Korea’s physical infrastructure will be necessary, especially because today’s rapid rates of technological advance make installed systems incompatible with newer developments at a faster and faster pace. In the industrial era many parts of the infrastructure – streets and highways, for example – remained in place and remained useful for many years. They were typically expanded, by adding more of the same.

By contrast, the new Third Wave infrastructure is dynamic, growing and continually adaptive to new requirements.

But having made a good start at installing the new infrastructure – partly by inventing and in part by reinvention – Korea must now make this vast physical infrastructure pay off for the entire Korean economy. And here Korea should not make the same mistake Japan made – one that is costing it dearly today.

The Japanese Half-Step

Japan’s post-war development of a powerful Second Wave economy was remarkable. After World War II Japan’s products were of such poor quality they were unable to export many of them to the U.S., even though a 1955 agreement had opened the doors to expanded trade. The U.S. was developing numerical controls and early computer technologies for use in manufacture, but made relatively little use of them. Its economy was growing and companies were complacent.

The Japanese did two things. First, they invited quality expert Edwards Deming – who subsequently became a national hero to the Japanese – to teach them how to improve their products. But, in addition, they seized on the latest American innovations in manufacturing technology and quickly applied them. Within a decade Japan was producing competitive goods of the highest quality – and truly innovative products the world had never seen before – the phenomenally successful Walkman, for example. The result was Japan’s skyrocketing rise toward the top rank in the world economy.
Success, however, is dangerous. Just as the complacent Americans failed to make early use of their own innovative technologies, the Japanese also became complacent. They over-focused on export-oriented manufacturing. They failed to diffuse these technologies adequately throughout the economy, and especially in finance and services. In short, the Japanese started converting from a Second Wave to Third Wave economy but stopped half way.

By 1993, America’s auto and semiconductor industries had regained the technological lead. Foreign banks like Citibank are now buying up their financial institutions and introducing technologies that will bring it to the level of the manufacturing sector. This is painful for some Japanese to watch, but it will strengthen the economy and at some point they may well own their financial systems again.

**Beyond the Siliclones**

One crucial key to success is the degree to which the new, Third Wave infrastructure in Korea is used in every business and sector of society. A partial survey by Toffler Associates in 2000 found over 50 cities, regions or countries striving to clone Silicon Valley. There was a time when this made sense. But that time is now over.

The competitive situation has been transformed, with Costa Rica and India selling software to the U.S., while India buys software from Vietnam. IT production zones can no longer guarantee the same remarkable benefits that early movers such as Singapore achieved. Just as in the case of steel or cars, when everyone follows the same strategy it is no longer as competitively advantageous as it once may have been.

The race today is different. The competitive edge is more likely to go to countries with a well-developed information infrastructure that use that infrastructure innovatively throughout the whole society, rather than narrowly in a few specific industries or places.

Korea, having installed much of the necessary infrastructure, must now complete the job, and ensure that it is utilized effectively, not merely to amortize its cost, but to raise wealth production capability in all sectors of society. The central task now is the diffusion of the power of IT.

To obtain full value means using information and new technologies to make traditional large-scale manufacturing and marketing of goods such as steel, cars, or shoes more efficient. But it also means giving small enterprises and entrepreneurs the benefits of ever cheaper and faster technologies and helping them to introduce innovative processes, products and services.

Ireland’s focus on fostering Third Wave business development has placed it among the most prosperous countries in Europe. Ireland has coped well thus far...
with the worldwide fall in IT demand because many of its companies, even niche micro-players spawned by the presence of the multinationals, concentrate on a global rather than U.S. market.\textsuperscript{54}

The objective is not blindly to shift all activities from off-line to on-line but to combine the two in creative ways that permit richer communication, smarter decision-making, elimination of waste and environmental pollution, customization to meet individual requirements of customers, faster response times, reduction of time spent commuting, reduction of boring rote labor, and general improvement in the quality of daily life.

**Speeding Diffusion**

Several policies can help speed widespread, productive usage of the new cyber-infrastructure.

In Second Wave, industrial economies universal telephone service is a precondition for economic development. But in the Third Wave, traditional voice telephone service is not enough. Because knowledge-based economies are increasingly differentiated, complex and fast changing, they require far more diversified communication services. Companies require customized systems for the near-instantaneous exchange of data, voice, images, sounds and other messages. No single source can be expected to supply the entire economy with all these varied services at low cost.

That is why, around the world, starting with the break-up of the American Telephone and Telegraph Company in 1984, the communications revolution has led to de-monopolization and increased competition. The objective is to provide diversity of service while keeping costs low enough for consumers to adopt new technologies. In the words of Harvard University’s Center for International Development: “Effective regulation should promote competition, ensure affordable pricing for consumers and maximize telecommunications access in the community.”

Korea has taken important steps in these directions. The World Trade Organization Agreement on Basic Telecommunications will require further movement. Next steps could include increasing the independence of the regulatory body, facilitating interconnections between providers, and opening up the local loop to more competition. It is also important to eliminate regulatory barriers that separate various sectors and prevent the collaboration of phone, cable television, and satellite companies.

The broadest public use of the Internet and the new communication services is in the national interest.
Seize the Biotech Lead

Korea’s new cyber-infrastructure can help Korean firms move into the world markets and fields most likely to expand in the decades ahead.

One of the greatest opportunities for expansion lies in the field of health. Two powerful forces are converging to create explosive growth, not merely in health services that will provide new job opportunities, but in self-care, and in advanced health technologies.

As populations age, not only in Korea but also from Japan and China to Europe and the United States, demands for health care will escalate. Innovative health services will be required. Many of these can be facilitated or actually delivered by the cyber-infrastructure. The market for small, smart, cheap medical technologies for use in the home will also expand. Biosensors to monitor heartbeat, blood pressure and other body functions, and to transmit them to physicians via the Internet are already appearing in the marketplace. The number and variety of these will soar, and Korean industries are well placed to design and produce them.

Even more important, however, the shift toward an older population is converging with spectacular discoveries in biology, from stem cells, and cloning, to potentials for the fusion of human nerve cells with computer chips.

Korea can position itself as one of the world’s most important users and exporters of advanced biotechnologies for human (and animal) health, and of services related to them.

The coming full fusion of I-T and biology opens new opportunities for Korea in both fields. IT acts as a primary tool in biotech research in fields like genomics and proteomics, as the rising power of computers makes possible and reduces the cost of massive computations. Thus IBM is developing an even more powerful
“Blue Gene” computer that will reportedly “tackle a problem so complex that it makes simulating a nuclear explosion, or the collision of two galaxies, look like a picnic in comparison. It is intended to help biologists explore how proteins fold themselves up into their distinctive shapes.” This move is part of IBM’s plan to become the biggest supplier of computer hardware and software to biologists, a market estimated to reach $10 billion two years from now.

According to IBM vice-president Caroline Kovac, “Biology is the science that’s driving high-performance computing today.” Compaq Computer has created a $100 million investment fund to acquire stakes in biotech start-ups. Sun Microsystems started an Information Advisory Council to puts its designers in touch with biotech researchers and executives. Two years ago, Hitachi Corp. of Japan formed a “Life Sciences Unit” with a product-redesign mission similar to Sun’s.

At the same time, biology could well transform computers and computing. Successful development of techniques for growing “biochips” could impact Korea’s competitiveness in the semiconductor market. Beyond this, the integration of information technology, biotechnology, materials sciences, and nano-technology will spur innovation across many disciplines. Korea should participate in all these efforts.

The Korean government designated biotechnology as a key industry for the 21st century. The 14-year Biotechnology 2000 Programme began in 1993 and involves seven government ministries. Nearly half of $900 million of biotechnology products, including vaccines and antibiotics, produced annually is exported, mostly regionally.

However, a review by the Organization for Economic Cooperation and Development (OECD) found gaps between scientific research, applications research and
commercialization of technology in Korea. It also found that most Korean production technology is imported and for many of big chemicals and food processing businesses, biotechnology is only a sideline. This leaves considerable room to increase the level of research and to capture more value than the research currently underway.

Korea’s goal of raising biotechnological capabilities to the level of the world’s leading countries by 2007 will depend on its ability build on and move beyond successes such as fermentation technology, antibiotics, diagnostics, and Hepatitis B vaccines to such fields as “farm-aceuticals” – for example, the attempt to harvest human antibodies from genetically altered plants grown cheaply on an agricultural scale.

Over the next decade, biotech research will move from the medical lab and supercomputer to the desktop. This will open up possibilities for smaller firms and those without access to supercomputers. In the meantime, however, the need for technology and expertise will require collaboration between firms and with university research centers, and the government.

China is making a major push in genetics, cloning, and other biological fields. It staffs its leading research centers with very young graduate students finishing their masters and Ph.D. studies. It also maintains close contact with ethnic Chinese researchers in American and European laboratories. According to the Far East Economic Review this web of personal contacts facilitates “the transfer of ideas, personnel and funding... back to China.”

Today, as venture capital funding for advanced technology shrinks in the U.S. and elsewhere as a result of stock market declines, the Korean government should quickly create, jointly with Korean private companies and universities, a “Bio-Venture Fund”. The Fund should be used to make limited investments, with careful accountability, in 100 small, leading edge biotechnology start-ups in the U.S., Europe and China — with the proviso that Korean scientists and graduate students accompany the investment and participate in the work. In this way, while some small investments will be lost, others may compensate for the loss, while exposing Koreans to the most advanced knowledge in the field. It can also help Korea take the next step, which is not merely to develop biotech, but to identify, as early as possible, the key subsets or niches of the biotech industry that will yield the highest value a decade or more in the future.

The advance of the biotech industries will give rise to a wide array of support services, to which Korea might contribute. For instance, the new industry will require scientists with business skills and managers with a background in genetics. Leading Korean universities or private firms might create a new kind of MBA – a “Master in Bio-Administration” that could produce the next generation of CEOs in this key industry of the future.
The proximity of a large Korean ethnic community in Southern California to the fast-emerging “Biotech Corridor” between Los Angeles and San Diego offers plentiful opportunities for joint efforts between U.S. and Korean research institutes and companies.

We have focused on biotechnology, not merely for its own importance to Korea’s future, but as a case model of what might be done with respect to other advanced industries, too, as Korea seeks its place in tomorrow’s tri-sected world.
The Future of Exports

Almost from the start of its drive to industrialize, exports have played a dominant role in Korea’s development strategy. The great cheobols geared themselves to export and such names as Hyundai, Samsung, Daewoo and Goldstar soon became household words around the world.

Investment in and attention to the manufacturing sector should, of course, continue. The exporting of cars, ships, and steel are still important to Korea’s prosperity today, and they won’t be unimportant tomorrow. But in an era of “export overload”, with increasingly intense competition from China and numerous other countries, Korea needs to shift its export strategy and change the role exports play in the economy as a whole. It must move to higher value added exports and increase its export of intangibles.

While First Wave or agrarian countries typically export food and raw materials, Second Wave countries mainly export physical things. The U.S., whose economy is among the most advanced, exports plenty of tangibles. But it also exports a vast assortment of intangibles. As Alvin and Heidi Toffler wrote in War and Anti-War, these include “financial services... management consulting... software... television programming... banking... reservation systems... credit information... insurance... pharmaceutical research... network management... information systems integration... economic intelligence... training systems... simulations... news services...” Indeed, movies and television are among its biggest exports.

Although Korea maintains an overall trade surplus, it has recently been a net importer of services. To move forward, Korea must capture its share of the rising trade in global services, a crucial component of a knowledge-based economy. Services increased from a quarter of world trade in 1975 to more than one third in 1993.

According to the World IT Services Association spending for IT services alone
could reach $476 billion in 2001. In addition to providing services directly, Korean firms can benefit from the 25 percent of this total that will be outsourced. This means there will be over $110 billion in play. Yet only 1.6 percent of the software produced in Korea is exported.\(^7\) This picture leaves an enormous potential for Korea to strengthen and diversify its economy.

Korea could offer many other kinds of innovative services, too. Korea has often exported cheap, largely unskilled construction labor to other countries. But higher value added exports could be developed based on highly specialized skills. For example, Japan’s feeble and confused response to the Kobe earthquake in 1995 revealed a need for a package of instantly available disaster services. Korea could create specialized, profit-making disaster service teams capable of flying at a moment’s notice to the site of earthquakes, volcanic eruptions, killer fogs, tornadoes, typhoons, hurricanes, tsunamis, avalanches, or hazardous material releases anywhere in the world. By restoring basic services faster than untrained, ill-equipped, and unprepared local teams this extremely high value added service could save not only lives, but also enormous sums of money for the stricken country. The export of such high value niche services could generate far higher returns than those produced by the sale of low skill mass labor. It could be followed up by contracts to install emergency networks for the future.

Korea’s knowledge and skill exporters can be helped by favorable tax policies, traditional export promotion activities, alliances with internationally known service providers, and contacts with Korean students at key foreign universities. Korean-made movies are slowly gaining distribution in the U.S., and some Chinese-American teens are singing Korean songs.

**Build the Domestic Economy**

Exports will remain an important part of the Korean economy. But rising competition, unpredictable economic cycles, and global “contagion” effects present risks even for exports of high technology, services and intangibles. Some observers blame Japan’s recent decline on its continued over-reliance on export-led growth. Indeed, according to these critics, successive Japanese governments have deliberately discouraged consumption by keeping the price of imported goods, from household appliances to computers, artificially high. The objective of this and many other measures was to create high savings and convert them into cheap loans to export-oriented manufacturing industries. Today, when Japan faces deflation, many policies introduced to increase consumption have failed. Consumers are afraid to spend.

According to Milton Ezrati, formerly head of American investment for Japan’s giant Nomura Securities, “The long term focus on exports might have suc-
ceeded in securing Japan’s independence from foreign suppliers, but it has just as surely made her dependent on foreign consumers and the economic policies of the nations where those consumers reside.”

To some degree, Korea, too, is over-dependent on the sale of goods to other countries, hence dependent on what happens to the American and European economies. Stronger domestic markets for goods and services could help protect Korea from downturns and unpredictable shocks due to political or technological disruptions. Relevant ministries should survey the domestic market for opportunities, and adjust tax and tariff policies to encourage growth of domestic markets.

One key opportunity: home construction. Here, again, Japan offers a negative example. Successive governments have tried for a decade to spark the lagging Japanese economy by pouring trillions of yen into vast public construction projects, including unneeded roads, bridges, and other structures. These expenditures have had little effect. Skeptical observers might note that these trillions have been funneled into giant construction firms that for generations have had corrupt ties with various Liberal Democratic Party political factions. Had the same sums been allocated to small, local contractors for improving residential housing, and providing tax and other benefits for individual home buyers, much of Japan’s housing stock could have been improved, with funds passing through the hands of consumers in need of additional furniture, appliances and other goods and services, and providing a stronger stimulative effect on the economy.

The Korean government plans improvements in residential areas and construction of 15,000 rental-housing units for low-income earners to energize local economies. More importantly, the plan to lower the tax burden for buying houses will build demand according to market principles. New home construction should produce broadband-ready units and increase uptake of new technology as well.

In short, Korea needs these and more innovative measures to reduce the current over-reliance on the ups and downs of the export market.

Welcome the World

Until very recently, Koreans were much less tolerant of foreign ownership of financial and industrial assets. After the financial crisis, the Foreign Investment Promotion Act liberalized FDI, and capital inflows surged. There is still room to liberalize investment in the service sector and venture businesses. Investment introduced new ideas and processes, but also makes some groups, such as unions, uneasy. The tradeoff of an extensive reliance on FDI can’t be denied. Industry in Korea 2000 observes:
The Changing Nature of Sovereignty

The industrial revolution beginning in the 17th century brought with it factories capable of producing more goods than local markets could absorb. What followed was the development of national markets – and a new concept of sovereignty. This was the idea that the world could be divided into neatly non-overlapping nation-states, each of which enjoyed complete sovereignty – subject, that is, to no higher authority.

This theoretical notion of sovereignty is now changing, in part because powerful new technologies are capable of producing more goods and services than even national markets can absorb, but also because problems are arising that are beyond any one nation’s power to solve. As borders today become more porous – open to cross-border flows of money, information, pollution, products, people, disease and crime – and nations less able to control them, other institutions arise to challenge or curtail the theoretically unbounded, sovereign power of the nation-state.

In reality, except on paper, no state ever had total sovereignty. Today, however, the limitations on the power of individual nations are increasing and becoming more and more complex. Instead of a flat map showing static, completely enclosed nation-states, the new map would be multi-dimensional and show inputs leaping across boundaries – city to city, region to region, company to company, along with tens of thousands of NGOs and civil society organizations, all interacting with one another, forming continually shifting, dynamic networks of power. Nation states do not disappear. But they share power with other institutions and none – not even the most powerful – can exercise total independence or total sovereignty.

Thus the European Union transfers control of

“...In general, foreign direct investment enables the domestic economy to secure sufficient foreign capital, improve management transparency, acquire advanced management expertise, expand markets, and create new jobs. In addition, the increasing weight of foreign invested companies is accelerating the globalization of the Korean economy and forcing the adoption of the United States-style market economy. On the other hand, competition has become fiercer even in the domestic market, and the distinction between the domestic market and the overseas market is gradually disappearing.”

It is perhaps worth noting that when the U.S. needed to build its infrastructure for industrialization in the late 1800s, it was done with the aid of foreign investment by the British, Germans and other Europeans. Before long, as a result of economic vicissitudes, the infrastructure was owned by Americans. Ownership, however, is often less important than the net benefit host economies receive.

The changing global economy has eroded traditional notions of Sovereignty, while increasing the benefits of cooperation between companies. Building capacity in emerging sectors such as biotech can require both large infusions of capital and know-how, which can take years to develop in isolation. Foreign direct
investment provides a welcome boost.

The lesson from Ireland is that a public-private partnership such as Ireland’s Industrial Development Agency can attract targeted investment to promising sectors. Investment in pharmaceuticals, semiconductors, and PCs created a knowledge-driven boom in Ireland unsurpassed in Europe. It has attracted both multinationals and overseas Irish, who had been emigrating in large numbers in search of work.

An equally dramatic example is Sweden. Sweden has certain advantages. Widespread English competence is one, comparatively low levels of corruption is another. More important than these, however, is Sweden’s sophisticated cyber-infrastructure, (it is third in the world in per capita investment in information technology), and its strong receptivity to foreign investment.

With a population only one-fifth the size Korea’s, Sweden has attracted $80 billion in investments from the U.S. in the last four years. American software and desktop technology companies raced to form powerful, convergent partnerships with Swedish firms skilled in wireless technologies. U.S. capital also helped spawn 700 small start-ups. The same period saw Swedish jobless figures cut in half.

The spread of information and goods can lead to the de-nationalization of territory. For example, sociologist Saskia Sassen calls global cities like New York “a free-trade zone for finance.” Economies now extend beyond national boundaries. New rules are necessary to protect contracts and intellectual property. At the same time, parts of the economy (such as foreign exchange trading) move beyond the control of any government or private agency. In 1997, Korea saw the effects of contagion and economic forces beyond its ability to control them, and this problem is likely to intensify. Korea’s own economy is much more open to investment than it was five years ago, which brings access to capital and ideas, and increases interdependence with the world economy.

**Staying Ahead – New Opportunities**

A successful knowledge-based Korean economy of the future will not only need to make use of knowledge, but to produce high value added new knowledge. This is the function of research and development.

To keep up with competition, Korea will have to be an “early-adopter” of advanced technology. Companies, including small ones, will require better monitoring of advances in key fields, with special focus on potential convergence of various technologies with one another. They will need to apply sophisticated methods for identification of “precursor” and “post-cursor” opportunities.

But as scientific and technological progress everywhere accelerates, Korea can participate in two other ways: by conducting research and by inventing new or better tools for researchers around the world. In biotechnology, for example, the search for new drugs is intense. By 1997 there were already more than 1200 biotech firms in the U.S. alone – only a few of which were profitable. But there is evidence to believe the tide is shifting because new tools are becoming available that dramatically speed collection of genetic information and deepen analysis. For example, according to Gary Zweiger, author of Transducing the Genome, “Rather than making half a dozen modifications in a single plant-derived toxin, thousand or even millions of modifications

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**Sweden - Smart Living**

The B+W supermarket chain [in Sweden] has introduced a scan-as-you-go alternative to the traditional wait at the cash register. Hand-held grocery scanners no bigger than a cordless phone allow shoppers to pay for their purchases with a credit card as they select them— and the option of deleting them if they change their minds—one of many ways technology is being applied to everyday tasks to make living even easier in Sweden.

As the country with the world’s highest penetration of Internet access and mobile phone use—both upward of 70% of the population—Sweden’s 9 million citizens are enjoying the first refreshing splashes of the “smart”-living wave that analysts say will eventually engulf the developed world.

Sales began in March for a 155-unit apartment complex here that will offer Internet-driven conveniences already available in an “intelligent home” enclave in the bedroom community of Varmdo, about 15 miles east. Even easier than the self-scanning shopping option, the homes in Stockholm and in Varmdo feature refrigerated lockboxes accessible from each unit’s carport, allowing delivery of Internet-ordered groceries even when the consumer isn’t home. The single-family houses in Varmdo—selling for nearly $600,000—have computer-run geothermal heating and air-conditioning, security systems tracking every door and window, and mobile-phone-operated remote controls for the appliances. They even have self-propelled lawn mowers that roll out of their storage sheds at preset intervals and mow the grass by following sensors embedded in the ground.

 “[The mower] runs around like a little dog,” said Suzana Jakopovic, marketing manager for the Jon Matsson construction company’s smart-living division. The builders developed
can now be made on any one of a growing repertoire of synthetic compounds.”

Making powerful tools for a growing field is a good “precursor strategy”. Even better, sometimes, is making tools for the toolmakers.

More generic tools are also appearing at high speed, and, along with them, new methods. Thus, experiments are under way that link up the spare, unused capacity of tens, and potentially even hundreds of thousands, of on-line PCs into temporary super-super-computers. As more computers are connected via the Internet and as broadband capacity becomes more widespread, the power of such temporary systems can offer Korean researchers undreamed of potentials. Such networking of even small computers can not only accelerate research but also increase the crucial rate at which convergent work in different fields is linked together in novel ways. Of course, the attendant risks presented by hackers, crackers, and cyber terrorists must be dealt with too.

Other new tools are institutional. For example, new types of public-private research cooperation are appearing, including potentials for research funding by venture capital funds jointly owned by government and private organizations. We are also seeing more academic institutions providing research support in return for potential royalties. All sorts of interesting new arrangements are possible in support of applied research – for example, the Varmdo houses in cooperation with an Ericsson-Electrolux joint venture, E2Home, offering other Swedes—and soon, other Europeans—their services in networking existing houses.

Sweden’s lead in smart living is bolstered by information technology spending per capita that is third in the world behind Switzerland and the United States. Its investment of 4% of GDP in IT research and development is the world’s highest. The country also benefits from a long education history—Uppsala University opened its doors in 1477—reliable and affordable energy supplies and a high comfort level with communications gadgetry among 9 million people scattered across a territory somewhat larger than California.

Part of Sweden’s success can be traced to its early embrace of communication technology. By 1895—less than 20 years after Alexander Graham Bell’s famous invention—Stockholm already had 4,000 phones in operation, noted Ann-Marie Nilsson, general manager for the Association of the Swedish IT and Telecom Industry.

Sweden is also profiting from huge U.S. investments creating synergies between American software and desktop developments and the Nordic countries’ lead in wireless communications. U.S. companies have invested more than $20 billion in Sweden in each of the past four years, mostly in partnerships with companies such as Ericsson, Volvo and ABB Group. But many of the 700-plus U.S.-owned companies here are smaller, little-known start-ups. The power of foreign capital driving Sweden’s economy is apparent on the stock exchange, where 43% of shares are foreign-owned, said Mats Engelmark, head of the IT marketing project for the Invest in Sweden Agency. “Swedes have gotten used to the internationalization of business. When Ford bought Volvo, there was no uproar here.”
Engelmark said. “People feel the benefits of these changes in their pocket.”

Engelmark sees big growth potential in services through mobile phones—the third-generation handsets that give users access to the Internet and all the e-commerce and information they now get on their desktop computers. “Having such a high penetration of mobile phone use enables the next level,” he said. “If you think back, the people who developed television sets didn’t make as much money as those who developed soap operas to run on them.” The number of wireless companies in Sweden nearly doubled last year, from 167 to 300, and Norway and Finland saw similar growth. Start-ups continue to proliferate this year despite the dot-com crashes afflicting fixed-line Internet activity around the world, said Lee Wermelin, manager of BrainHeart Network, a venture capital group founded last year by a Swedish technology magnate.

Among the projects BrainHeart has backed is Wireless Opinion, a polling agency that conducts instant surveys among mobile-phone users. Respondents are compensated with online credit, and with mobile penetration almost 100% in the targeted 12-to-59 age range, wireless survey results are more reliable than fixed-line interviews because people are easier to catch on their mobiles than at home, said manager Bjorn Roting. “It would take you six to eight weeks to get as many responses by mail as we can get in an hour with mobile phones,” he boasted.

In showing off Sweden’s technology prowess during the country’s current European Union presidency, government hosts are using the instant polling system to take drink orders from visiting ministers from the 14 other E.U. countries during their summits that run through June.

Keeping products and services easy to use is funding by consortia of cities to support research with implications for urban infrastructure, as in the case of water, transportation, telecom, crisis services, health, etc.

While new technologies make intellectual property protection more difficult, such protection, in the form of patents and copyrights remain necessary, at this stage, to provide the necessary incentives for research and development. Korea must participate actively – even take a lead role – in international negotiations pertaining to intellectual property.

Funding for R&D has reached 4.1 per cent of Korea’s budget, and President Kim has announced plans to raise this to 5 per cent by 2003. Strategic decisions must be made as to how to allocate these increased funds among different fields of science, among basic and applied researchers, among academic, business and other types of research institutions, as between public and private sectors, and as between “big” or “little” science. Above all, sophisticated risk analysis is needed to determine the degree to which such research funding should be closely targeted or diversified in portfolio style.

Other steps to increase the return on R&D investments include:

• Promote more active collaboration among Korean universities and companies. Universities employ three-quarters of Korean scientists and engineers with Ph.D. degrees. But Korean universities receive a
smaller portion of R&D investment than the OECD average (under 10 percent vs. 18 percent elsewhere). These numbers suggest a mismatch between funding and expertise, and a need for better cooperation with the private sector, which may find it hard to attract scientists.

- Encourage partnerships among Korean companies’ research organizations and leading edge foreign counterparts. The complex nature of technological change means that no country can go it alone. In one example, MIT and the Indian government are in talks to create a multi-billion dollar Media Lab technology incubator in India. Unlike the original Media Lab in Massachusetts and its offspring Lab in Ireland, the Indian Lab would focus on education.

- Increase Korea’s share of the world scientific convention business by providing imaginative new venues, new airline services (some pre-convention meetings and discussions of scientific papers could take place in the air during long, otherwise monotonous charter flights), catering of foreign foods, and exhibits showcasing Korean scientific institutions, advances, and opportunities for research collaboration. Such business would not merely expand Korean contacts with world researchers, but also bring tourist won, and make jobs in all kinds of second- and third-tier support services from translation to security guards, to construction.

- Evaluate results carefully prior to second-round financing, not merely what Swedes believe is driving their technology revolution. “Our main task is to see that IT is reflected in Swedish society, that it makes life easier for average people,” said Bo Beckestrom, senior project manager for the state-funded Information and Communications Technology Commission. The eight-member team tracks what it calls the three A’s—awareness, access and adoption—and targets barriers to broader use. For instance, daily Internet use among rural residents and pensioners shot up after the commission recommended and won tax write-offs for home computer purchases.

The nationwide embrace of technology is also helping employers cut costs by allowing more telecommuting, which lets young parents work from home and spares the environment the extra exhaust fumes. Sweden has one of the most heavily organized labor forces in Europe, but loopholes allow companies to sidestep union edicts such as last-in-first-out layoff policies to retain newer workers if they are socially desirable telecommuters. The biggest drag on technology development in Sweden is the country’s legendary tax bite, said Nilsson of the IT association. Personal income is taxed at 55% and businesses at 28%, chasing some successful entrepreneurs abroad, where they can keep more of their earnings.

Like other countries in the high-tech vanguard, Sweden also suffers a “skills gap” and will have to import tens of thousands of specialists to keep up the IT boom. Industry Minister Bjorn Rosengren said the government is seeking to attract some of Russia’s underemployed engineering and programming talent, as well as to make better use of university-educated immigrants.

Rolling with the technology juggernaut is paying off for many companies. Consider B+W supermarkets: Customers who use the self-scanning technology spend an average of 60%
with respect to achievement of initial targets, but for possible serendipitous findings as well.

- Shift the direction of the brain drain. It is no reflection of the excellent quality of Korean scientists, engineers and technicians to suggest that Korea should import additional intellectual talent from abroad. A global race is on today from Silicon Valley to Sweden, India to Ireland to recruit brainpower, irrespective of its country of origin.

Korea should review and reduce legal, economic, immigration rules, and other barriers to the recruitment of high-skilled scientists and technical experts and engineers from other countries, whether to teach in Korean universities, work in Korean companies, or to start new enterprises. Consider steps to ease cultural barriers, including the provision of Korean interpreters to work with them where necessary.

Korean emigrants to the U.S. may not bring much money with them, but they contribute to the U.S. economy through their well-recognized entrepreneurialism and hard work. In the new economy, high-skilled foreign workers bring “mental capital” with them.

The experience of the United States and other countries strongly suggests that ethnic and cultural diversity promotes innovation. Fully 15 per cent of Silicon Valley’s top information technology entrepreneurs are immigrants. They come from Korea, China, Taiwan, South Africa, Greece, Hungary, India and many other parts of the world. Many of the rest are children of immigrants. **Xenophobia is the enemy of success in the knowledge economy.**

### Bring small businesses into the Third Wave

Almost everywhere in the old, industrial economies of the Second Wave the small business sector took a back seat to big business. It was taken for granted that “bigger” meant more efficient and better. Yet as we transition to Third Wave knowledge-based economies we are discovering that diseconomies of complexity often outweigh the presumed benefits of sheer size. Some analysts speak of a shift from “economies of scale” to “economies of network.”
With the help of Korea’s new cyber-infrastructure and the Internet, small companies can access many of the same advantages that only very large firms had in the past. For example, fast, cheap connections to suppliers, customers, other small businesses... better, quicker information about competitive prices... smarter technology... and access to larger groups of potential customers anywhere in the world.

Business-to-business innovations allow lowered costs, aggregated procurement, or access to sophisticated accounting, human resource, and other services as well. New electronic networks can also help small and medium-sized enterprises with marketing and distribution. In Korea these networks may take the place of disintegrating distribution arrangements with the chaebols.

Small and Medium-sized Enterprises (SME’s) are more flexible, can change more quickly than big firms, and are often able to customize less expensively. They are a key source of jobs as the corporate landscape changes and the chaebols restructure.

The Korean government has recognized the importance of SMEs, especially in employment creation, and it has helped transform 10,000 small and medium-size enterprises into IT-based businesses. As Korea carries out more such programs, it will be important to keep in mind that to take advantage of the cyber-infrastructure, small, struggling firms need access to inexpensive, targeted training. Specialized tax incentives can help them.

**One size does not fit all.** In Taiwan, a Small and Medium Enterprises Bureau subsidizes customized software development for small businesses such as laundries, restaurants, and bicycle shops. Where markets are too small for commercial software firms to serve profitably, Korea could tap into the intelligence and enthusiasm of its university and high school students who could be awarded prizes or tuition credits for helping small, local businesses install, develop or customize software.

Many small firms and entrepreneurial start-ups also need advice on management, finance, strategy, and other business issues. Here, Korea might also tap the wide, largely unused experience and knowledge of retirees working part-time on a volunteer basis.

**Beyond the Digital Divide**

In the final analysis, the value of economic and technological change depends on how much it improves the quality of life of all Korean people, not just business. Improvements in productivity can lead to higher wages, more affordable products, and new kinds of services. For example, easier access to reliable medical infor-
Information, the link-up of rural health centers, and telemedicine can, taken together, result in better health and nutrition at lower cost. Weather and crop data could allow farmers to prepare for disasters and capture more value. Educational opportunities multiply for upgrading skills. All these can contribute more to making Korea a higher value added, economically more advanced country.

In too many countries a wide gap exists between rich and poor in terms of access to the Internet and other productive new technologies. This access-gap will narrow over time for two reasons. First, the cost of digital technologies and services are plummeting, and new, cheaper forms of access to the Web and other services are becoming available. Because of technological convergence, many believe the Web will soon be as accessible as television is today. Second, it is strongly in the interest of major corporations around the world to make this happen.

To narrow the gap more quickly, however, the Korean government has trained housewives, soldiers, farmers, fishermen, and prisoners to use the Internet. One hundred large post offices will be centers for learning about computers and the Internet. As a result of the government’s aggressive outreach program, plus Korea’s relatively low communication costs and Korea’s egalitarian nature, the digital divide, while significant, is already much smaller than in most countries.

But the rich-poor dimension is not the only important divide. The digital divide can be a matter not just of socio-economics but also of generation, location, or sector. Are only young people taking advantage of it? Is access easier or less expensive in some parts of the country than in others? Do people dependent on one sector of the economy have more access than in another? One hundred percent equality of access is neither possible nor practical. Some services are faster, better or more versatile than others, and not everyone needs access to all of them. Some levels or types of service will inevitably cost more than others to provide.

But the lower the barriers that stand in the way of access, the better. Moreover, there may also be a utilization divide separating those who, even with easy or equal access to the Web, make little use of it. Individuals, of course, should have the right NOT to go on-line.

On the other hand, even though Korea already leads the region in Web use, more can be done to eliminate unnecessary barriers. Through reducing licensing requirements, increasing incentives, and increasing training or subsidies, Korea can further encourage all sectors of society to use I-T more productively. It is useful to identify these gaps by tracking Internet and wireless use by gender, income, and region, and make this information widely available.

The government, meanwhile, can encourage private services to target marginal users, with price and technical information for small farmers and fishermen, or
expanded small-scale loan services for entrepreneurial borrowers. It could, for instance, promote (and perhaps insure) small-scale investment circles.

Taiwanese entrepreneurs, to cite a case in point, have created an Internet version of the traditional Chinese hui, or investment circle. In a model with many variations throughout Asia, participants contribute to a common fund and whoever makes the highest interest rate bid gets to be the next borrower of the money. While traditionally carried out among acquaintances, patented software now allows this to take place over the Internet with a high degree of efficiency.

The Internet, and more broadly the entire cyber-infrastructure, is not magic, and its use is not, in and of itself, either good or bad. But their existence is the ticket of admission to the world economy of the 21st century. Together they are one of the most powerful new tools available to the human race for the creation of wealth in many forms. Korea needs to extract every bit of economic value from them that it can as the new economy spreads across the planet.
The Next Korea

Korea cannot develop a new economy without also creating a new society.

The reason for this is that economic life in every country is embedded within a social system made up, among other things, of institutions. These change whenever a new system for creating wealth replaces an older one. The industrial revolution, or “modernization”, for example, brought with it new kinds of business enterprises – factories, department stores, complex chains of jobbers and wholesalers, transport companies, and the like. It brought entirely new educational systems. It brought new forms of government, too, as ancient monarchies were replaced by new political structures.

No country today can make a full transition from the Second Wave, industrial age economy to a Third Wave, 21st century economy, without also inventing and re-inventing many of its institutions. Korea is no exception.

The Future of the Corporation

Ever since the financial crisis of 1998 Korean corporations, and especially the chaebols, have been called upon to “reform” along lines suggested by the International Monetary Fund, the Korean government, and numerous economists and consultants. It is not the purpose of this paper to engage in the heated controversy that has arisen, or to analyze or critique specific companies. Rather, it is to call attention to certain general principles that might help the economy as a whole advance.

As companies outside Korea have struggled to adapt to the new economy, they have been compelled to change their organization, their internal culture, and their
relations with the outside world. Korean firms, too, and especially the biggest, will have to reinvent themselves though not necessarily all in precisely the same ways.

During the industrial era, the most successful corporations were huge, centralized, bureaucratically pyramidal and vertically integrated. By contrast, to transition to the new economy, many firms have become smaller, less centralized, less bureaucratic, and “de-verticalized”.

Chipmaker Intel, for example, today employs 80,000.\(^\text{21}\) Microsoft employs 39,170.\(^\text{22}\) These are very large firms, but they do not approach the scale of the largest old economy firms. AT&T, at its peak, before being broken up by the U.S. government, had 975,000 employees. It now employs 164,000.\(^\text{23}\) GM’s employment rolls are down from 406,000 in 1998 to 386,000 at the end of 2000.\(^\text{24}\) Small is not beautiful, but smart firms are discovering that economies of scale are all-too-frequently dwarfed by hidden diseconomies.

In transitioning to the new economy, many companies have flattened their pyramids by eliminating numerous layers between the top and bottom of the organization. Hordes of managers who ranked in the middle rungs of the corporate ladder were essentially occupied moving information up and down the hierarchy, taking information from below, partially synthesizing it, and passing it (or refusing to pass it) up vertically to the next level.

However, the new economy operates at faster speeds and decision makers cannot wait for information to move up and down step by step. Thus sophisticated I-T systems now make possible instant communication between top and bottom, as well as across lateral boundaries.

These powerful new information and communication technologies made many of these intermediate managers unnecessary and further intensified the need for accelerated decision making.

In turn, the combination of acceleration and rapidly increasing complexity also has required that more decision-making authority be devolved to those actually doing the work down below. And, because hyper-competition today demands continual innovation, and old-style authoritarian leadership typically stifles new ideas, employees in advanced companies are increasingly encouraged to question old ways of doing things.

Thus high level, decision-burdened authorities have to adjust themselves to three newly important realities: 1) they cannot know everything; 2) they cannot decide everything; and 3) disagreement is not necessarily disloyalty — their decisions can — and often should — be questioned by those below.
The result is a radical change not merely in structure, but also in the internal culture of firms operating successfully in the most advanced sectors of the new economy. It is a change that is particularly difficult to accomplish in family-owned, patriarchal firms.

If it is true that leaders can’t make all the decisions, it is also true that companies can’t perform all tasks internally.

Second Wave industrial managers were taught that vertical integration was efficient. To make a car, the company should also make the necessary steel, transport iron ore to the steel mill, and mine the ore. Third Wave managers learn the opposite.

Vertically integrated units often became, in effect, internal monopolies protected from the pressures of competition and therefore, less, not more, technically advanced, and less, and not more, efficient or adaptive.

Meanwhile, the new economy spawns thousands of small, smart, hungry, subcontractors unburdened by legacy technologies, and armed with the very latest advanced tools and methods. These small, new, less bureaucratic firms can often turn work around faster, and do it better and cheaper (partly because of technology, partly because of lower labor costs). To compete, big companies transfer more and more functions to outside sources.

Outsourcing has many consequences for the economy as a whole. It allows the big firms to transfer many risks to their (usually) smaller suppliers, including the increasing risk of sudden technical obsolescence. They also, typically, reduce the size of their own work force as the outside contractors expand theirs. Outsourcing also means that many internal costs, based on easily manipulated transfer prices, become external costs potentially subject to more transparent accounting.

Driven to de-verticalize, big companies also form plug-in/plug-out alliances, joint ventures and other links with small firms or units of larger, even sometimes competing, firms. These supply chains, and their downstream counterparts in distribution, are increasingly integrated electronically to reduce time, inventory, storage, and other costs.

Like anything else, this system can be pushed too far. At its extreme, companies were told by consultants to shed all tasks except for those based on their so-called “core competence”. The result was a wholesale, sometimes unnecessary, divestiture of tasks, along with business units, subsidiaries, and divisions, sometimes imposing unnecessary hardship on employees.

Investors came to believe that all companies should have a singular focus – and that, therefore, conglomerates were inherently inefficient. They forgot that in the
U.S. in the 1960s conglomerates were, in fact, regarded as especially valuable. They were seen as more adaptable than the unitary company because, in theory, they were able to shed or acquire units depending on circumstances. Their very diversification – especially if their parts were counter-cyclical – protected them, to a degree, against the vagaries of business cycles and the stock market.

Nevertheless, the overall direction toward which the Third Wave moves is clear. It leads away from economies dominated by a handful of fixed, pyramidal giants, whether privately or publicly owned, and toward an economy based on shifting networks of transiently inter-linked firms capable of high speed adaptation to rapid competitive changes in markets, technology, and finance. All of this, in turn, requires massive increases in the amounts and types of data, information and knowledge exchanged among both individual and corporate participants in the economy. Korea’s new, increasingly up-to-date cyber-infrastructure helps make possible the transition from the old to the new economy.

**Who Owns What?**

Not just in Korea but across much of Asia the largest corporations have typically been family owned and controlled, usually through a complex tangle of holding companies, with outside capital contained in subordinate companies controlled indirectly by the family.

Often, as such companies expand they search for additional capital. In many cases, however, minority lenders and stockholders, and especially foreign investors, lack the information and rights necessary to protect their investments, and they therefore assume greater risk than the family insiders and friendly political supporters. Hence the rising demand around the world for greater corporate transparency.

Many of these Asian giants are also what might be called “personalist”, or “partially personalist”, dependent at the top on family, face-to-face negotiation, handshake deals, and nepotistic advancement. They exist for the family. One giant Indian firm produces a flow chart as complex as a semiconductor blueprint to show where family members of successive generations fit in the management organization. The corporation actually has a constitution and by-laws making explicit the subordination of company to family needs, rather than to investors or other outsiders.

To some degree the same model, perhaps less fully developed, is found in other parts of the world. The chief stockholder of one family firm outside Asia asked Toffler Associates if it could prepare a 100-year plan implicitly designed to maintain family control for a century.
In the West, family ownership of large firms diminished as industrialization progressed and more and more reliance was placed on professionally qualified managers and on outside capital. In the process, the firms grew into more formalized, impersonal bureaucracies run, in theory at least, on the basis of merit.

Korea today is witnessing this transition played out in public almost like a vast soap opera, with all the drama of bankruptcies, corruption, captains of industry fleeing the country, and family feuds.

In some countries, including Korea, this picture was complicated by the role of government, which not only helped build family firms with contracts but with cheap loans from banks under government control or influence, in return for corrupt political and personal payoffs. The lasting consequences of this system need to reverse if Korea is to advance.

Not all family controlled firms, however, are corrupt and not all are equal. There are many examples of even very large family firms around the world that contribute to democratization and social justice and that speed, rather than hinder, the transition from Second Wave to Third Wave economies.

It is true that in times of economic hardship small, family firms are squeezed hard and frequently lack the resources needed to survive. Nevertheless, what we are seeing played across the world is not the disappearance of family ownership, or of small business, but the rapid rebirth of family firms and small business partly as a result of the outsourcing process. More of both — small business and family firms — will appear as Korea focuses greater attention on its domestic, as distinct from its export, economy.

In the end, if Korea’s great chaebols are in trouble, it is not primarily because of political pressures from the Blue House, as some might think, or the IMF, or a hostile public, but because the conditions that originally gave rise to them are fast disappearing.

The very methods, organizational patterns and customs that helped the chaebols succeed in the Second Wave past are today radically counter-productive in the highly competitive, increasingly global knowledge economy of the Third Wave present.

The success of the chaebols over the decades helped Korea. The reluctance of some chaebols to change rapidly today harms Korea.

There are, of course, plenty of smart executives in the chaebols who know all this and no doubt favor faster change, whether they say so publicly or not. They need praise and encouragement from outside.
Meanwhile, the public needs to know that there is no single, universally correct form of ownership. Ultimately, from the point of view of Korea’s transition to an advanced, more affluent economy, two things are more important than the type of ownership. One, of course, is how intelligently and farsightedly its firms are managed. Failure of managers to anticipate change can kill any firm.

The other crucial factor – whether they make cars, chemicals, or chips, whether they provide medical care or sell mutual funds— is the speed and effectiveness with which firms utilize Korea’s advanced cyber-structure to shift from mass production of low-return commodities to higher value added, information-enriched, customized services and goods.

If Korea’s companies do not successfully make this transition rapidly, Korea could wind up with perfectly well managed, perfectly transparent, perfectly accountable publicly owned companies that turn out low-value products, for low returns and low wage jobs.

Korea can do better.
Jobs and Joblessness

It is not just corporations that must change. It is equally important to change the way we think about employment. Jobs and joblessness in Second and Third Wave economies are both very different.

Ever since its beginning, the emergent new economy has seen a consistent reduction in the amount of work requiring muscle-power and an increase in the amount requiring mind-power very broadly defined. This has been reflected, in many countries, in a declining percentage of factory jobs and an increase in the skill levels required. Even in factories, a smaller and smaller percentage of workers actually perform manual labor, while the others provide technical support, do administrative work, monitor machines, and spend more and more of their time communicating, meeting, training, collecting, appraising and disseminating information.

Elsewhere, others are busy running servers, writing software, integrating data networks, and feeding the Internet. Engineers are building satellites, laying out fiber optic cable systems. Environmental experts are restoring damaged wetlands. Still others are inventing financial services, buying and selling real estate, putting information online, negotiating, teaching, studying, organizing, experimenting, writing, attending conferences, sending E-mail job specifications, or performing in TV commercials.

The fact that knowledge is at the heart of the new economy doesn’t mean everyone will need to be a computer expert or a nano-technologist. The new economy also needs an enormous variety of service workers, from hotel chefs and chambermaids to hospital nurses and neurologists. It needs caregivers for the elderly. It needs teachers and store clerks and artists and designers and police and pilots, firefighters and food handlers.

Not all these tasks are done in fixed work locations in factories or offices — or on
Furthermore, more and more work is done in hotels and restaurants, at home or on an airplane, in fact—any-place/any-time. And many jobs cross national boundaries. This can mean travel—or it can mean Indian software writers in Bangalore collaborating over the Web with Korean engineers on part of a project for a new airport outside Los Angeles.

New jobs, requiring new skills, will proliferate in the future. As intelligent household appliances spread—Internet-linked refrigerators, for example, capable of placing food orders to the supermarket are already being built—new kinds of electronics repair personnel will be needed. The biotech industry will generate not merely new medications, but a need for people to test them, produce them, sell them, and apply them.

Nevertheless, it would be utopian at best, dishonest at worst, to give the impression that such changes can occur without significant dislocation and distress in society as old skills are devalued and new ones required, and as old jobs disappear under the avalanche of the new. Many people will suffer; many more, we believe, will see their lives improved.

Some degree of “frictional unemployment” is normal in the economy. This is the temporary unemployment created when workers shift from one job to another. Rapid change in the economy suggests higher levels of this type of unemployment. More important is the

A Global Human Capital Crunch

Nayan Chanda writing in the Far Eastern Economic Review estimates that Korea will need 50,000 more IT workers by 2002. This is not an insurmountable gap, but it may be difficult to fill, given the fierce competition from other countries in the region. Foreign workers are harder to recruit and keep, and Korean workers may be lured overseas. Malaysia is feeling the pinch at home even while supplying half of Singapore’s foreign IT labor supply. Europe and the U.S. will need 2 million more IT workers by 2002. Western recruiters have begun targeting Asia’s top campuses in recent years, including Yonsei University. Cisco recently estimated there were 800,000 openings for Internet specialists worldwide in mid-2000 and predicted the number would increase to 3 million within five years. India’s minister of information technology recently estimated a world shortage of 2 million network administrators by 2005. Even if recent layoffs require an adjustment to these numbers in the short term, they represent a long-term trend that every country must deal with.

Indian firms have seized the shortage as opportunity to realize a secondary benefit from its dominance in the software sector. India’s NIIT has become known as “the McDonald’s of the software business.” NIIT’s training centers throughout the region graduate 250,000 IT workers a year. Most countries have responded to the projected shortage by increasing technical training. But the talent gap is likely to spread from hard skills such as engineering to human resources and customer service management. V. Shankar, managing director and head of investment banking in Asia for Bank of America, raised this problem in the South China Morning Post and warned “companies need to develop the soft skills to manage an international workforce.”

Some degree of “frictional unemployment” is normal in the economy. This is the temporary unemployment created when workers shift from one job to another. Rapid change in the economy suggests higher levels of this type of unemployment. More important is the
loss when entire groups with obsolete or unwanted skills lose their jobs and others with new or more needed skills replace them in whole or part. The speed up of change and the dramatic differences between the old and new economy point to greater turnover.

Many lay-offs are not directly due to technological change or the shift to the new economy at all, but to other, more familiar factors ranging from inept management, poor macroeconomic policies, and cuts in the government budget or the removal of subsidies. Many job losses result from continuing to apply old industrial strategies and planning models to economies in which they no longer work. In fact, in many cases, the more a country invests in new technology, the more, not fewer jobs are created.

As Korea moves into the new economy, the total number of jobs may not decline—it could, in fact, grow. In the U.S., for example, where the transition to the new economy began earliest, the overall number of jobs has actually grown. In 1970, the total non-farm employment stood at just over 71 million. Three decades later, it had grown to more than 132 million.25

A closer look at 89 metropolitan statistical areas in the U.S. showed that in year 2000, the ten with the highest Internet penetration had unemployment rates averaging 3.07 percent, whereas areas with the lowest Internet penetration had an average unemployment rate of 5.67 percent.26 Meanwhile, almost a year after the much-publicized crash of the dot-coms, the unemployment rate in Silicon Valley is barely 2.1 percent.27

While other factors may be more important in explaining joblessness, the numbers certainly do not suggest that use of the cyber-infrastructure reduces employment.

Just as the nature of work changes, unemployment, too, changes in the new economy. In the industrial economy, where many jobs are low-skill and interchangeable, if a country had 1,000,000 unemployed workers, it often could use Keynesian or monetarist measures to stimulate the economy and, over time, create 1,000,000 jobs. The unemployed could take these jobs.

In a Third Wave, knowledge-based economy, however, these old tools are less likely to work. It is theoretically possible to create 5,000,000 jobs and find that the 1,000,000 jobless workers cannot perform those jobs because of the
changed skill requirements. In short, unemployment goes from quantitative to qualitative.

One remedy is, of course, retraining. But even that changes because by the time certain job skills are taught they may no longer be necessary. Training is still essential, but it will have to be a new kind of training focusing at least as much on generic personal and cultural skills, such as unlearning and relearning, as on transient job specifics.

**Trade Unions Tomorrow**

These facts pose special problems for another important social institution – labor unions. Just as corporations must change, so, too, must unions.

In Europe, the United States and in Korea as well, unions have supported valuable social innovations, broadened political participation, and taken other forward-looking steps that helped modernize society. However, to be “modern” today is really to be backward.

Thus unions in Korea face a fundamental decision. Like corporations and the nation itself, they must decide whether to embrace the transition to the new, knowledge-based economy, or to resist it.

If they choose to move forward with the economy, they, too, will have to change. If they choose the path of resistance, in the hope of slowing or stopping the transition to the new economy, they risk losing relevance and influence.

In the U.S., union membership declined from 35.1 percent in 1955 to 9.4 percent of workers in 1998. While pro-business regulations no doubt contributed to this trend, it played a far less important role than the structural shift of work away from factories, towards services and knowledge workers, and the marked failure of unions to make the necessary adaptations to serve new economy workers.

In the European Union, union membership is similarly in free fall. After losing 400,000 members in the last four years, five big private and public sector unions in Germany recently merged to save themselves. Membership in unions for employees in banks, retail establishments, printing and other industries is also declining. Unions everywhere have a difficult time organizing in small and mid-size business, high tech, and the professions.

This is not because employees (and self-employed) people in these fields are perfectly happy with their jobs and their work conditions. They have needs. Second Wave unions, however, are not satisfying those needs.
Unions trace their roots back to pre-industrial times when skilled artisans formed “guilds” to protect their interests. The industrial revolution, by contrast, led to unions designed to defend the interests of masses of largely unskilled, largely interchangeable workers. The transition to a Third Wave new economy requires a shift, once more, to a skilled, less interchangeable work force.

Just as unions helped protect workers in Korea’s Second Wave economy, now unions can help them prepare for and adjust to the new economy. Unions can help members obtain the necessary training and education. Facilitating the transition, rather than resisting it, makes their members more marketable in event of job loss, and unions may retain them as members as they move on to their next job. Union-led seminars can explain the changing economy and the new skills that will be required tomorrow.

A key change is the deep shift toward heterogeneity, not just in the workplace, but also in society. Just as workers have different skills they have different personal needs. One may have an invalid child. Another is taking care of a retired father. One is good at tasks requiring manual dexterity; one is smart but sloppy; another is compulsively neat and works better in a well-organized environment.

Instead of treating workers alike in the name of solidarity, unions (and employers) will need to treat them more as individuals, customizing their schedules, offering different health benefits, a variety of vacation or holiday schedules, and individualized education and training options.

This message is beginning to penetrate union thinking. Thus says Frank Bsirke, chairman of the new, merged German union: “The central task for unions in this country – and indeed in other mature capitalist countries – is to develop strength through diversity... Things don’t work any other way for unions nowadays. There’s just variety, because society is so varied.”

To serve members better, unions may also have to build strategic alliances with professional associations or other bodies. As products, markets, media and other aspects of society de-massify and offer more choice, so, too, will employment. Korean companies cannot customize products and services without, eventually, customizing their treatment of employees. And unions will have to follow suit. The workforce of tomorrow is not made of “masses” but of individuals.

It is often recommended that unions, governments and companies cooperate in the national interest and lay their differences aside. It is unrealistic to assume that unions, companies and governments can, or should, avoid all conflict. Some conflicts generate creativity – new ways to solve old problems. But conflict must be limited and legally contained. Vandalism or physical attacks on people or property by protesting workers should not be tolerated. But there must also be no room for unprovoked repression by police or for collusion between government
and business when workers stage legal, peaceful strikes or protests.

Strong, smart, independent unions can help make a stronger, smarter Korea—but only if they join with government and business to advance the transition to a knowledge-based economy. In turn, companies and government must recognize the difficulties faced by unions in making this transition and, where possible, help rather than seek to weaken or destroy them.

The country’s shift to the knowledge-based economy, even with the best of intentions, will hurt some groups of workers. Unemployment leads to loss of income, emotional stress, family turmoil and sometimes-physical illness. Some laid-off employees, especially older ones, will find it hard to obtain new high tech jobs. The Asian financial crisis showed that Korea has one of the best safety nets in the region. Nevertheless, even the IMF has stated, “there is scope to expand spending on the social safety net,” and the Federation of Korean Trade Unions has made this one of ten goals for the year.

An expanded safety net should include more opportunities for retraining and skills development, not just material support. Lifelong learning and retraining options for older workers will reduce costly clashes between the industrial and knowledge based workforces.

Another of the Federation of Korean Trade Unions major goals for the year is the introduction of a five-day workweek. A labor and management compromise could help workers and businesses adapt to the changing environment. Chances for a compromise might be increased if some of the reduced hours of work were pre-committed to training and education.

Experience in France, which cut the workweek from 39 to 35 hours a year ago, has not proved disastrous for business, as some had predicted. Instead, it, helped some employers by increasing flexibility in scheduling. Some firms – like Wanadoo, the country’s largest Internet portal — saw productivity actually go up. On the other hand, gains in the number of jobs in France that were attributable to the reduction were limited – 150,000 in a workforce of 24,000,000.

By supporting, rather than resisting, the introduction of advanced technology, and especially by allowing wider flexibility in the allocation of jobs, unions can help Korean producers remain competitive against lower-wage rivals in Southeast Asia or China.

“Increasing labor flexibility” should not be used as a euphemism for mass layoffs. But workers and unions need to recognize that companies and the economy as a whole do need more labor flexibility if they are to compete successfully. Portable benefit packages improve mobility by reducing the costs and uncertainty of a job change.
The speed of change and the intensification of competition mean that the very survival of a company increasingly depends on its ability to make rapid, adaptive changes in technology, organization, and the allocation of the work force.

Put differently, flexibility becomes a critical factor. Whatever else unions do, they will need to relax rules that slow or prevent adaptation. For example, rather than limiting workers to a single type of task, they should allow employers to reassign and redeploy workers to a diversity of jobs. Unions should support training to help workers become multi-skilled. Unions will also need to rethink work schedules, permitting greater flexibility. They will need, beyond this, to reconsider their widespread opposition to work outside the factory and office, and find ways to protect the interests of members who do.

In shifting their goals and methods, unions will also have to change their internal organizational structures and their external relations with other institutions.

Employers today increasingly form temporary strategic alliances, joint ventures and other links with other firms. They seek non-business allies as well to deal with health, environmental, regulatory, political and other issues. Unions do, too. In the future, as competition intensifies further, this will become even more important. Unions will need friends, rather than enemies, among professional societies, churches, environmental groups, other NGOs, and even rival employers.

Before conditions reach so bitter a confrontation, it is critically important for unions and employers to behave not merely with their own immediate interests in mind, but to recognize their responsibility as well to Korean society as a whole as it moves through the most difficult transition since its shift from an agrarian to an industrial base.

Above all, as companies move from mass to de-massified production for temporary niche markets, even eventually to personalized production for individuals, unions will have to de-massify their programs and customize the way they deal with members, treating them more as individuals, with individualized needs than as members of the "masses".

If Korean unions do not make such changes, the density of union membership, now about 11 percent, will shrink below 10 percent and some other, new form of organization will arise to take their place.

It is, of course, easier to make these suggestions than for unions to implement them. Korean unions need to anticipate the difficulties that lie ahead and, instead of opposing what is good for the nation – an advance to a higher-level economy – work with government and employers to cushion their members and prepare them for new roles in the economy of the 21st century.
Civil Society’s New Role

Unions are part of what is now generally called the civil society – the numerous organized and semi-organized groups that are neither part of government nor of the profit sector of society.

Unions are a familiar, established institution in democratic industrial societies. Other institutions and the public understand their purposes, methods, and the laws or regulations under which they operate. The same is not true of the thousands of milling, churning, constantly changing grassroots citizens groups that now, along with unions and churches, collectively form the civil society.

Sometimes called Non-Governmental Organizations or NGOs, they could also be called NBOs or Non-Business Organizations.

As Korea moves beyond the Second Wave or industrial era, it becomes less of a mass society, transitioning from homogeneity to heterogeneity. The “masses” and the “mass markets” they form become increasingly segmented, and the needs and wants of the population become more varied. Not all these needs are, or can be, served by business or even by democratic governments in their present form.

The result is the rapid, accelerating rise of the civil society. It consists of groups dedicated to everything from saving the whales and the spotted owl to cutting taxes, banning nuclear arms, increasing funds for breast cancer research, killing the tobacco industry, improving child care or expanding consumer rights. Many are church-related; others profess mystical or esoteric beliefs ranging from Falun Gong to Wicca or witchcraft. Some, like trade associations, are closely linked to business. Others are anti-business and anti-capitalist. Some want reunification with North Korea, others violently opposed. Some are political cults linked to fanatic groups in other countries.

This vast, unruly sector is due to explode in size in Korea as elsewhere, powered by the cheap, new, dense communication capabilities of the Internet. Indeed, many of them, because they lacked the funds to buy conventional advertising, discovered and began exploiting the Internet earlier than many businesses or government agencies.

These grassroots organizations, with growing financial support, legal and political sophistication, and organizational ability are forming more and more global links, and challenging many existing institutions and structures. They are already demanding representation – and even without it influencing – everything from local city councils to the IMF and the World Trade Organization.

The best of these civil society organizations increasingly act as both critics and important partners of government. They are an important source of innovation in
society and also serve as canaries in a coalmine, providing advance alert to problems of deriving from new trends and technologies.

Civil society groups use electronic and face-to-face networking to create highly effective, decentralized and temporary movements. Locally, they can help identify and assist those who fall through the safety net as Korea transitions to the new economy. They can also foster grassroots actions around the environment, corruption, or social justice that are the basis for a strong civil society and democracy.

Korea has significantly increased the role of civil society in the planning and evaluation of economy transformation. But there is room for even more participation by citizens groups, think tanks, and non-government-organizations to enrich the debate. Participation increases the quality of solutions to increasingly complex problems and builds commitment to see them through.

However, civil society groups in Korea, as in other countries, will face a crisis as more and more citizens question their legitimacy. Unlike elected governments, subject to electoral recall and, at least in theory, responsible to the voters, civil society organizations are, by and large, not formally accountable to anyone outside their own membership. Democratic societies are enriched by decentralized diversity. But when tiny civil society organizations force through controversial decisions or political policies unpalatable to the larger public, they, too, will be asked to become transparent, accountable, and internally democratic.

They form an extremely important part of the new society that comes with the new economy. But they, too, like unions and corporations, will have to change if Korea is to make a peaceful transition to the Third Wave.

**Schools for Korea’s Future**

The education system in place in Korea today – as in all industrial countries — was developed to prepare students for an economy primarily based on factory-style, repetitive work. But the style and content of education needed for a Third Wave economy is sharply different. For Korea to move to a more advanced knowledge-based economy, not only corporations and unions, but educational institutions, too, must be transformed in the years ahead.

Today, according to one survey, 93 percent of parents believe Korea’s schools are in crisis. They spend over 7 trillion won to supplement public education with private lessons, and many who can afford it send their children abroad to get a better education. But Korea is not alone. Education is in a global crisis.
Across the world, most education reformers propose similar steps to improve schools – more money, more teachers, more pay, more classroom supplies, less paperwork, more homework, more years in school, more standardized tests and the like. Some of these may or may not be necessary. But they do not go to the heart of today’s educational crisis. These remedies are intended to make factory-style schools run more efficiently. But the real challenge, especially in Korea, is to move beyond schools that resemble factories.

In today’s emergent, less centralized, more unpredictable business environment, where work can take place anywhere and at any time and workers need to innovate, mindless rote and repetitive work will increasingly be transferred to machines. When today’s children are grown, they will need dramatically different skills for tomorrow’s post-factory jobs.

A 21st century educational system for Korea, therefore, needs to prepare students to work and live in this environment by developing their capacity for innovation and independent thinking any-place, any-time.

A well-prepared Korean student needs more than courses in programming, math, or science. She or he needs to learn to think about the future, to make probabilistic assumptions about change, and to anticipate the direction and rate of change. Literacy and numeracy, of course, remain basic skills. But beyond these, the most important things students can learn are how to apply critical intelligence, how to form and manipulate mental models, how to communicate their ideas, how to unlearn and relearn on-line and off.

These are generic or meta-skills, useful in any job, profession, trade, industry or social situation. By contrast, specialized skills or technical knowledge, clearly necessary, are secondary and must change as needed over the course of a work life. For success in the highly competitive economy of the future, workers will also need to think innovatively about their work, their relationships, and their products. With rare exception today’s schools are not designed to accomplish these goals – and they do not.

While there can be no one final master plan for bringing Korean education into the 21st century, and local and individualized experiments should be encouraged before over-commitments are made to sweeping change, the general directions of necessary change are becoming clear.

Korean schools should prepare young people for living with greater diversity – on the job and off, on-line and off. They will confront a greater diversity of necessary data, information and knowledge, a greater diversity of tasks, products, services, people, technologies, ideas and options. They need to make wise choices.

In a de-massifying knowledge economy, therefore, choice must be available not
merely to customers and (as we saw earlier) to union members, but to students. As Alvin and Heidi Toffler wrote in *Powershift*, a “high-choice system will have to replace a low-choice system if schools are to prepare people for a decent life in the Third Wave society, let alone for economically productive roles.” Students cannot learn how to make better choices in life or at work if most educational options are limited and most choices made for them.

This suggests increasing the diversity of Korea’s public schools, teaching styles, and curricula. Consideration should be given to designing schools with a wider variety of curricular emphases, different pedagogical approaches, and different schedules.

Many huge companies break with monolithic management and create semi-autonomous profit centers, each managed as though it were a separate small business and allowed to go its own way, so long as it meets its financial goals. In the same way, very large monolithic schools or school systems might be broken into smaller, semi-independent units focused on many different subject areas, from ecology to computer science, social services to the humanities, each applying different methods. Such a system, rather than harming teachers, could liberate the best of them to innovate – to help, in short, to design education for the 21st century.

A dramatic, though still only partial, step in this direction has recently been taken by Japan. For decades, foreign experts and Japanese parents and prime ministers alike have criticized Japanese schools for failing to encourage creativity and innovation. The schools have been machines for producing homogeneity and, if anything, suppressing imagination and innovation in the young.

The Japanese Ministry of Education is not merely responsible for textbooks that whitewash Japan’s imperialist past and wartime atrocities, but has long been among the most centralist, uncreative, rigid and reactionary in the world.

Yet recently it has moved away from traditional “groupism” or enforced uniformity toward what call Japanese educators now call “education for individuality”. This means a cutback on required courses for high school students and greater freedom for each one to “design your own curriculum geared toward your own future.” This includes “finding your own goal and taking the necessary steps” and “learning at your own pace”.

That Japan, of all nations, should take even this limited half-step toward greater diversity in education is an indication that the Second Wave mass education educational model so common around the world is about to shatter – and not just in Japan. The years immediately ahead will see many experiments as nation after nation confronts the obsolescence of mass education methods that were compatible with an assembly line mass production economy, but incompatible with the emergent knowledge economy.
Korea should take the lead in diversifying education.

**The time for learning is always.** Factories require synchronized work. If a single worker arrives late for work or leaves too early, it can disrupt the workflow all along the assembly line and cause a severe loss of production. That is why workers must arrive and depart *en masse*, and it is why schools insist on punctuality, often punishing a child who is late. In doing so, the school is pre-training the child for factory discipline later in life.

However, in the new economy assembly line work declines, and more work is done asynchronously, or in continuous flow fashion at all different hours of the day and night. Night work, part time work, work while traveling all break the fixed industrial schedule. This reflects the shift of the entire economy from the “batch process” mode in which work is segregated into certain fixed hours to a 24/7 “continuous flow” mode. It is reflected in open-all-night stores, 24-hour ATM machines, and facilitated by asynchronous communication in the form of e-mail.

For Korean schools to retain the factory-style fixed-hour system prepares students not for the flexible round-the-clock work system of the 21st century, but for that of the fading industrial system.

Similarly, industrial-era schooling was based on the assumption that students could be taught a body of knowledge in their youth, then released into the world of work where they would apply the same knowledge for the rest of their working lives.

It is now amply clear that, because of the acceleration of change, knowledge once learned may become obsolete in a short time and many of the lessons of youth become irrelevant in later life. For this reason, there is now almost universal recognition that learning should not be squeezed into a few youthful years but must become a life-long process.

Continuous learning becomes increasingly essential to productivity and job satisfaction. Learning opportunities can come from employers, colleges, training centers, distance learning courses, or vendor certification programs like the one announced in January 2001 by Cisco Systems. This involves plans to train 100,000 Internet network professionals at 34 academies across India.

The needs of the new economy thus imply a vast expansion of adult education, post-retirement education, and major changes in colleges, universities, corporate training centers, and other educational institutions, both profit and non-profit.

In short, educational change in Korea most go beyond efforts to run educational factories more efficiently; it must deal with profound issues, from curricular relevance to space and time.
The most powerful tool to help move education to the anytime/anyplace, life-long model is, of course, the Internet. Korea’s efforts in wiring schools links students and teachers with others across the nation and the world. It allows them to exchange ideas with experts, practitioners, and explorers, and provides almost limitless sources of information. None of this will prove fruitful, however, if the Internet is not widely and continuously utilized by students – who may, in some cases, be more skilled at Internet use than their teachers. Skilled students should be invited to teach the class – as well as the teacher. This should not embarrass the teacher, but, instead, provide an opportunity to show young people that smart adults are always open to continuous, lifetime learning. In this way, the teacher provides an important role model.

Many U.S. schools are experimenting with alternatives to traditional education, such as the Palo Alto High School in Silicon Valley and High-Tech High School. The Wall Street Journal, June 6, 2000 has described Palo Alto High School as “a high school that isn’t quite like any other”:

“[It] has a campus computer network with ‘digital lockers’ where students keep their work and a T1 high-speed data line linking the high school to their Internet. A typical student workload includes sophisticated Web-page design. Fourteen video cameras serve 18 computers for student-made documentaries... [students are] divided into teams for tool acquisition, design and even public relations — in other words, an organization very like a high-tech start-up company.”

Similarly, the Fresno, California school system includes a “Center for Advanced Research and Technology” – a cyber-rich school in which teenagers not only design their own learning programs, but design and prototype actual products. These innovative designs range from a threshold switch device that helps wheelchair-bound people turn on lights more easily as they move from room to room to a “smart” white cane for the blind that not only alerts the user to an obstacle, but identifies its nature.

The State of Florida, meanwhile, has contracted with Jones Knowledge.Com to create a statewide virtual school, offering on-line courses for thousands of high school students who do not or cannot attend class, or who wish to supplement their face-to-face classes. The company also provides a complete on-line library that contains more books and materials than many individual schools could afford.

In the U.S. the rapid spread of home schooling also provides an alternative for those kids whose style of learning does not match existing educational options. In cooperation with schools, parents teach their own children, with results that at least equal those of their school-taught age-mates. New companies are springing up to supply home-schoolers with specialized teaching materials and on-line courses. To provide socialization experiences for home-schooled children, part-
time participation in sports and other activities may be arranged at the nearest school. It is also likely that small businesses, churches and other non-profit volunteer organizations will spring up to serve home schooled children with arts and crafts centers, computer camps, sports training and other activities as the numbers of home-schooled children multiply.

While home schooling may be less appropriate for Korea, parents can enrich their children’s education by seeking out activities that complement in-class education. Music or science camps, internships, and apprenticeships can broaden interests and build social intelligence.

All these imply changes in the role of teacher from someone who stands in front a classroom to a coordinator or learning consultant to parents and children.

There is no one across-the-board solution for the educational crisis in Korea. Moving to a Third Wave education system for Korea will require experiment with different types of schools. However, rather than sweeping, all-at-once national solutions, smaller scale local or regional trial and innovation should be encouraged.

This must include cooperation from universities and the government so that children who graduate from diverse, innovative schools are not deprived of access to universities, as happened in the past when special schools for language studies, science and gifted children were established.

For Korea’s children to be prepared for tomorrow, Korea’s mass education system, designed for a mass production economy, must be de-massified.

**Korea must not waste one its most important educational resources – millions of mentors.**

The mass education system of the industrial age was introduced at a time when most people were unschooled and largely illiterate. The teacher was the best – and often the only – educated person in the community. The entire system – not merely in Korea but in virtually all the industrialized, Second Wave nations – grew up around this fact. Thus education came to be seen as a monopoly of the teaching profession. In time, teachers organized into unions and associations to protect their interests, and through professionalization increased their skills, but resisted the idea that non-teachers could also teach.

Yet today every community in Korea has educated men and women in it, often with specialized knowledge they would happily share with others if only given the opportunity. In virtually every community there are retired nurses, accountants, pilots, computer programmers, marketers, hotel managers, carpenters, electronics technicians, executives, artists, musicians, plumbers, and mechanics, some of whom could, if a system for doing so were organized, bring their knowledge
into the education process.

Nurses and doctors might teach even young students about health, biology and elementary medicine. Entrepreneurs could teach young people business skills needed to start a small business. Hotel personnel could explain how hotels are organized and what kinds of work can be found in them. Apart from a once-in-a-while visit to a classroom, many of these people would find their own lives enriched by the self-satisfaction that comes with mentoring individuals over time.

In short, there are immense pockets of knowledge distributed throughout every community that are currently wasted and could supplement and enrich what happens in the classroom. Of course, there are complexities involved, and certain safeguards would be necessary, but Korea should take a world lead in organizing a pervasive mentoring system in every community.

Work hard to win the support of teachers and offer them the training necessary for them to supervise and manage mentoring. Involve teachers and local administrators as early as possible in these changes. The goal is participation, not just consultation after the fact, to improve the speed and quality of the change.

By combining better schools with the power of the Internet and the additional power of mentoring, Korea can become a world leader in the race to educate the next generation.

**Beyond e-Government**

By transforming corporations, unions, civil society and the schools, Korea will lay the institutional basis for the new society without which a new economy is impossible. But even these changes will be insufficient unless government itself is also reinvented.

Governments changed as countries modernized. They increasingly applied the key industrial principles of standardization, specialization, synchronization, concentration, maximization, and above all, centralization. When applied together, these principles produce bureaucracy.

Thus in both business and on a far larger scale in government, top-down, hierarchical structures grew larger and larger, more and more powerful. This process, ubiquitous in the industrial countries of the West, was even more pronounced in countries with a Confucian background, like Korea.

Specialized bureaucracies called ministries or departments took on more and more functions. Departments devoted to health, to education, defense, social welfare, and a hundred or a thousand other functions grew and grew until, for all
practical purposes, bureaucracy — the civil service — took over the actual day to day operations of government, often competing with the elected political authorities.

This system, with all its well-known defects, worked reasonably well during the industrial phase of Korea’s development. That, however, is less and less true. It works less and less well because government institutions designed for an industrial economy can’t effectively govern a knowledge-based economy and society.

According to Heidi Toffler, the principle of “congruence” is needed to make sure that organizational incompatibilities between business and government don’t obstruct economic development.

“If companies everywhere are flattening hierarchies, moving toward horizontal networks, reducing bureaucracy, devolving decision-making, and operating at high speed, but governments do not, the disparities in the way they work will make both of them less effective.” In short, governments, too, need basic changes.

Over the next decade, Korea’s government needs to play a strong role helping companies and communities, families and individuals adjust to and prosper under Third Wave realities. For example, one thing it can do is model new ways of using technology for the benefit of all.

Korea plans to realize an e-government by 2002. In 2001, 24 government departments and agencies are slated to spend 757.4 million won on informatization. Many countries have put government functions on-line, such as the issuance of permits, drivers’ licenses, or passports. Other measures could include user-friendly on-line guides to government services, funding possibilities, contract proposals, social safety net programs and a general expansion of access to government records.

What is needed, however, is a clearer vision of what e-government means and a more comprehensive, concrete plan for its realization. This plan should go beyond simply making more information accessible or creating more integrated networks inside government.

For example, new technology can also increase transparency. Korea has identified corruption as an important obstacle to economic growth and made great strides in addressing it. Comparative government agency corruption indexes can be put online, and similar indexes can be made for various sectors of the economy. These can use either subjective measures (such as those developed by Transparency International) or more objective ones.

E-government can go further and use information technology to improve communication between representatives and constituents. In 1995, the U.S. Congress,
for example, at the insistence of Newt Gingrich when he was Speaker of the House of Representatives, placed all Congressional documents on line, making them instantly available globally.

There are endless ways in which Korea’s new cyber-structure can speed up and improve operations and communication, from support of environment and health services to law enforcement. But deeper levels of change will be required.

As Alvin Toffler has pointed out, “The Internet greatly empowers consumers, not merely to shop for low prices or for obscure products and services, but to protest effectively against abuse. It does the same for consumers of government services who, if they feel abused, can almost instantaneously organize with other, similarly aggrieved people and pressure officials and elected representatives. Interaction between citizens and governments becomes around-the-clock process. The net also assists the rapid formation of thousands of civil society groups or NGOs, each with its own loudly voiced needs.” The result is the continual politicization of new, highly specialized demands by new constituencies interested in everything from breast cancer and stem cell research funding to drunk driving, the preservation of the monarch butterfly in Mexico and child labor in Bangladesh.

“As demands for action on so many new issues deluge into political and government channels they overload decision-making processes, lead to the creation of yet more bureaucratic agencies, and further increase citizen alienation from a seemingly more and more unresponsive government. Moreover, the increasing social and economic diversity slows political processes down and makes it harder for political leaders to achieve rapid consensus.”

An even deeper challenge may lie ahead – the very concept of a civil service. As skill requirements in both the public and private sectors diversify, the timely matching of human resources to the skill sets required becomes more difficult. Many government agencies in the U.S., where the gap between civil service pay levels and those in the private sector is growing, are under-performing because they cannot recruit or retain top skill employees. Various solutions are used, including outsourcing functions to the private sector, or contracting with outside firms to supply large numbers of higher paid non-civil service employees to work inside an agency alongside civil service workers.

In this increasingly complex and demanding environment, government action is required to establish democratic “rules of the road” for the new economy. Laws are needed to assure privacy for the individual and for business. The “Law Regarding the Promotion of the Information Network” passed in December 2000 was a step in this direction, but new kinds of threats to privacy arrive every day. Similarly, security has to be assured so that banks and other commercial institutions can safely and reliably use the new technologies. The “Information Infrastructure Protection Act”, also of December 2000 was timely. But new forms of
information vandalism, terrorism and crime will no doubt require changes in the legislation.\textsuperscript{35}

The Korean government also has to guarantee military security, limit environmental dangers, and protect the rights of women and regional and other minorities. It has to begin dealing with strange new issues arising from the biological and genetic revolution, and from accelerating changes in the world outside Korea.

As Korea moves toward the new economy, government will, among other things, also need to facilitate or respond to the restructuring of all the other key institutions in Korea as described above — all changing at different speeds. Such changes in the business sector, in unions, in the civil society, in the schools and in other parts of the economy and society will inevitably generate conflicts that need to be resolved politically or contained within socially acceptable limits to avoid destabilization or even violence.

In short, in the turbulent decades ahead, Korea’s government – irrespective of which party is in power and irrespective of political ideology – will face enormous new responsibilities that it must fulfill even as it undergoes its own difficult transformation. How it does this will have a major impact on Korea’s transition from a successful Second Wave industrial nation to a potentially even more successful Third Wave nation.
CONCLUSION

The transition to an advanced, Third Wave economy is a deeper and broader process than most macro-economists, financial consultants, technologists and business leaders assume. Restructuring Korea’s wounded financial system and giant companies is surely necessary. The construction and continual upgrading of Korea’s cyber-structure is an absolute precondition. But the leap to a new economy cannot be separated from substantial restructuring of Korea’s institutions as well.

A knowledge-based economy whose companies are changing at high speed cannot yield all its benefits if they must interact with a low-speed government bureaucracy and a no-speed education system. Korea cannot produce higher and higher value added products enriched with knowledge if its unions stand in the way or, if they resist transformation and shrivel away. It cannot advance economically and democratically unless its civil society organizations share in the process as legitimate participants in decision-making.

Success in the Third Wave economy, especially in the face of intense global competition, requires constant innovation. This will require that all these economic and social institutions strip aside bureaucratic organizational rules, information systems, and authority structures that suppress, rather than reward individuals for innovation.

It is clear, therefore, that what this report proposes is more than a simplistic, quick fix formula but rather a long-range vision for a better, and economically more successful Korea. The changes recommended here cannot be accomplished by some flick of the switch at the top, but by wholesale commitment by Koreans in all walks of life. Nor can it be accomplished at once. Some of the changes proposed here can be completed in a few years. Others will require decades.

No rigid master plan is called for. What is needed, instead, is strong, consistent, coherent leadership from above, intelligent exploitation of Korea’s advanced cyber structure, and a broad public agreement that the general direction is correct. Given that, enormous decentralized energies can be released to achieve what may now seem impossible.
Finally, the broad strategy proposed here is not fixed in stone. It will surely need continual revision as time and change flash by.

What is essential – starting now – is an open-minded, non-partisan national discussion of the overall approach proposed in these pages and a recognition that a new, Third Wave economy is on its way – whether Koreans choose to participate in it or not.

We believe that the sooner Korea commits itself to these changes, the shorter and less painful its path to leadership in the new global economy of the 21st century.
The New Economy in Asia: Growth, Uncertainty and Instability

No one can forecast the future with absolute assurance. This is especially true today in Asia where the major powers – and many of the smaller ones as well — face rising levels of economic, political, or geopolitical instability. Here we explore some external uncertainties that could heavily impact Korea and call for reevaluation of corporate and governmental strategies over the years and decades immediately ahead.

The China Syndrome

The single biggest change under way in North Asia today is China’s push to transform the life of nearly a fifth of the world’s total population. What happens in China can affect not only its near neighbors but also the entire global economy and peace in the world. It goes without saying that Korea cannot ignore the historic developments next door.

In the near term, China faces a change of guard next year, when Jiang Zemin steps down from formal leadership. It is no surprise, therefore, that there are rising internal tensions or conflicts among contending candidates, factions, and institutions, from pro-business reformers to the People’s Liberation Army and various power groups within it.

At a deeper level is the clash of fundamental between the peasant economy, the urban industrial economy, and the nascent Third Wave economy. This is reflected in regional political differences. Even now there is substantial evidence of internal unrest between both peasant and industrial worker populations. A minority of experts even raise the possibility of civil war sometime in the decade ahead, with risks of its spilling over outside China’s borders.
While a civil war is extremely unlikely, the possibility cannot be ignored because of its immense – even global – impact, should it occur. Korean investments in China as well as markets would be deeply affected by developments moving in this direction, as will the investments of other nations as well.

Meanwhile, various forces today in China play the “Taiwan Card”, raising and lowering tension levels with the United States.

It is against this turbulent background that a modernizing Chinese military has attempted to expand China’s reach in the region. China may want to test its growing strength in intractable disputes over territory and sovereignty.

Having noted all this, however, for the near future China has a greater stake in regional stability, and will likely try to avoid conflict in the region for its own well being.

Another reason we aren’t likely to see open conflict any time soon is that China is still not yet militarily strong enough to project force to any real distance. A recent study by the Rand Corporation, a think-tank affiliated with the U.S. military, examined 1,700 scenarios of a Chinese invasion of Taiwan. They concluded that in 90 percent of the scenarios Taiwan would defeat China, even without U.S. intervention. However, China recently announced a 17 percent increase in military spending. A CIA assessment predicts that China will have significantly improved its military capabilities by 2015, although its armed forces will still not be fully modernized.

But if analysts frequently overestimate China’s current military capabilities they also underestimate the internal challenges that China faces. In addition to those listed above, Beijing faces Islamic tensions, water scarcity, and rural and urban unemployment, and the rise of new cults and religions like the well-organized Falun Gong. China’s Ministry of Public Security recently ordered the formation of riot police squads in anticipation of social protest turning to major violence.

China’s internal problems are not just political or economic. For 15 days in 1972, the waters of the Yellow River dried up before reaching the sea. Every year since 1985, according to the Worldwatch Institute, the dry period has become longer. In 1990, even before the tremendous growth of the past decade, the number of cities short of water had tripled to three hundred. Hundreds of lakes are disappearing and local streams are going dry. The Financial Times found that “the water shortages, pollution, chronic waste and creeping aridity across northern China are now so grave that they imperil economic development.” China is not literally “running out of water,” according to Water author Marq de Villiers, who explains, “It’s an allocation, supply, and management problem.” Nevertheless, the resulting threat to China’s crops, its industry, its environmental and economic health makes this yet another major issue to contend with.
Finally, China’s accession to the World Trade Organization will intensify, rather than reduce, social and economic disruptions in the short run. Put all these pressures together and Beijing’s constant calls for “stability” and its fear of unleashed democracy are understandable.

**Post-Enigma Russia**

Winston Churchill once famously referred to the Soviet Union as “a riddle wrapped in a mystery inside an enigma.” The internal politics of its Communist leaders, even after Stalin’s death, was a hermetically sealed secret. By contrast, Russia’s post-communist turbulence, political, economic and social, has been on display for the entire world to see. Corrupt privatizations, the rise of an economic “mafia”, the disintegration of supplier and distributor networks, unpaid workers, a depressed military still smoldering over its withdrawal from Eastern Europe and the expansion of NATO eastward – all these have led to calls for “strong”, if not “strongman”, leadership. Enter Vladimir Putin.

With all its other troubles, Moscow is now looking to expand economic ties with its Asian neighbors. It has signed military aid contracts with China (which will assist in Chinese power projection), along with new trade agreements. It is also promoting a natural gas pipeline through North Korea to Irkutsk, and is proposing to rebuild the rail network connecting the Russian Far East to Europe.

Former Japanese Prime Minister Yoshiro Mori recently met with Russian President Putin. Weak economic conditions in both countries are pushing them to possibly break the 50-year impasse on the Kuril Islands and establish a *modus vivendi* for jointly exploiting Russia’s mineral resources. The strategic analysis firm Stratfor reported that Tokyo and the European Bank for Reconstructing and Development (EBRD) have also begun talks on a $10 billion oil and gas project off Sakhalin Island.

An improved rail corridor through Russia could shorten the shipment of goods from Japan to Europe from three weeks by sea to one and cost one third the current level.\(^4\) There is much uncertainty given political conditions in both countries, but better ties between Russia and Japan could eventually help tap some of the mineral wealth of Siberia. Korea, due to its location, could presumably benefit if raw materials become more readily available and transportation options increase.

Russia’s inability to solve its Chechen problem in an effective or humane way raises concerns that other regions may look to break away. If serious breakaway attempts were actually made, as threatened by various Siberian governors prior to Putin’s ascent, they would invite military bloodshed and disrupt gas and rail plans and the economy of Northeast Asia as a whole. Secession in Siberia
remains a very low probability — but one with high impact if it occurred.

**North Korea: Conflict or Reunification**

The Nobel Prize for President Kim Dae Jung was appropriate global recognition of the importance of peace between the two Koreas. The relationship of the two countries is critical to the economies and security of the whole region.

**Scenario 1: Conflict**

In a worst-case scenario, extreme economic and social conditions in North Korea could push the regime toward reform and openness. However, they could also lead to everything from a military coup, civil war, or other extreme or erratic development.

The probability of such events is low, but it is not zero.

A further drastic downturn in the South Korean economy could also jeopardize or slow reconciliation. Domestic opposition and reduced resources in the South might limit the incentives that North Korea seeks in exchange for openness. The Bush administration’s recent lack of interest in further dialogue with North Korea is by no means a final statement of policy. However, the North Korean response that the U.S. is a “cannibals’ nation” shows how delicate relationships between the two Koreas — and the U.S. — are.

**Scenario 2: Reunification**

At the other extreme lies reunification, which will bring its own set of problems. It will not be easy to incorporate a country with a collapsing infrastructure and a population affected by food shortages and a restrictive political environment, which is why President Kim Dae Jung’s measured, long term, step by step approach makes sense.

Even a decade after German unification there is very little high technology in the East and much grumbling on both sides of the old border. But the German model is not entirely appropriate for comparison. Both East and West Germany had Second Wave economies, and neither had a large hungry, First Wave population like that found in North Korea today. The shortage of food, and the breakdown of the health system and the water and sanitation systems have put the North Korean population under stress. A 1998 UN nutritional survey found that 63 percent of North Korean children were stunted from long-term undernourishment. International aid groups are helping to feed 40 percent of the population. Thus
the integration of North Korea’s peasant agriculture with a post-peasant economy in South Korea can be done, but not without considerable difficulties the Germans did not confront.

Reunification will raise new security issues, too, such as a shared border with China and Russia, decisions on the use or disposal of weapons systems (including possible nuclear weapons), Japanese rearmament, and the future of the U.S. military presence in the region.

In theory, investment in the North from South Korean and other outside sources could narrow the disparities between the two Koreas and make for reconciliation and, over time, a smoother integration.

The North does offer a low-wage, relatively educated labor pool, and by some accounts a supply of skilled programmers who might aid in a unified Korea’s international competitiveness. But the process will be long, difficult and frustrating and cannot move far ahead so long as North Korea insists on using its huge military, its weapons programs, and its export of arms as primary bargaining chips.

For these reasons, anything beyond South Korea’s current long-term, incremental, confidence-building approach would be irresponsible.

**Japan: A Comeback Struggle**

Japan experienced 1 percent annual growth from 1992 to 2000 (compared to 3.6 percent in the U.S.). Japanese exports started to lag in 1986, and stock prices collapsed in 1990, setting off a decade of stagnation. Banks never recovered from the burst bubble of the 1990s and still hold huge unrecoverable debts, which could still lead to further banking collapses. Bankruptcies, unemployment and funds for the national pension system are close to their worst in the post-war period. Deflation has set in.

On top of weaknesses in banks and corporations, a sharp decline in the birthrate and the rapid aging of the Japanese population will drive up social security costs, pensions, and medical expenses. The nation’s social insurance systems will be tested and already large deficits could become even more dangerous. What’s more Japan has always relied on its wealth to ensure global clout, rather than military power or cultural dominance. With a weakening economy, its global influence has declined disproportionately.

This, in turn, is feeding nationalist sentiments, as reflected in part in the militant rhetoric of Shintaro Ishihara, Governor of Tokyo. The majority of Japanese are still opposed to removing Constitutional restrictions on its military. But Ishihara is a
possible future prime minister if 1) the new LDP prime minister, Junichiro Koizumi, fails to turn the economy around; and 2) if the anti-LDP opposition cannot unite behind a coherent program with a leader more attractive to the new, still unrepresented forces in the country – women, NGOs, and the youth.

Japan represents a number of warnings to Korea: the failure to push ahead on reforms in banking and corporate governance, an over-reliance on exports, and the dangers of stopping half-way in the process of transformation to the Third Wave.

Thus, from its rapid gains in the past, Japan is faltering in the development of genuinely new technologies, except in isolated fields like digital games. “We have been totally defeated by U.S. technologies,” says Nobuhiro Muroya, a deputy director of strategy at the Science and Technology Agency.

While the U.S. fed innovation by encouraging decentralized entrepreneurialism, providing risk capital, and flattening hierarchies, Japan favored large, top-down, government-sponsored consortia with participation by giant firms. These have proven largely unsuccessful.

According to The Economist, the Ministry of International Trade and Industry “now unofficially admits” that the big-company consortia approach to innovation are a waste of time. Companies invited to join such projects released only their least productive people, and by the time there was anything to show, the world had moved on. In the case of the famed Fifth Generation project, what had seemed a good strategy in 1982 no longer fit the computer industry by 1992. After enormous investment, MITI ended up giving away the software for free, and even then there were few takers.

HDTV also demonstrated weaknesses in Japan’s government-sponsored cooperative industrial development. R. D. Norton, notes in “The Geography of the New Economy” that the Japanese system “allows for great staying power and steady progress down a particular path, but does not adjust well when the technological road turns.” What had worked well in the 1970s and 1980s in Second Wave industries such as cars and consumer-electronics no longer works well today.

If Korea can transform itself while Japan remains trapped by political paralysis and an economic slump, Korean companies may find significant competitive opportunities. However, Japan’s powers of recovery should not be underestimated. Japan may be on the cusp of major change.

Japan’s recent basic law on information technology established a team of all Cabinet ministers, as well as specialists and intellectuals, to formulate measures designed to make Japan one of the most advanced IT-oriented nations within five years. Four areas were named as priorities:

1) Improvement of an ultrahigh-speed Internet network and reinforcement of
policies to encourage market competition.
2) Creation of an environment conducive to electronic commerce.
3) Realization of an electronic government.
4) Reinforcement of programs to develop human resources.

But in his first speech to the Diet after becoming Prime Minister, Koizumi announced an addition to this program. Calling it his IT 2002 Program, Koizumi set a target of 60 per cent of Japan’s homes to be Internet-connected by 2005. This would include 10,000,000 homes connected with “constant access to ultra-high speed networks”, according to the Daily Yomiuri. This plan was immediately criticized, however, by the head of the Hitachi Research Center as being too slow. “Changes in the field of information technology,” he stated, “occur much faster than in traditional areas. It is OK to become one of the most electronically advanced societies in the world, but other countries could be advancing much faster in the meantime.”

This theme was echoed by Noboyuki Idei, chairman of Sony, who declared that while the U.S. “is for now leading the world in computer industries and Internet infrastructure, Japan has a technological advantage in the area or mobile telecommunications...”

“Now is the chance for Japan to become a powerful nation. It is possible for Japan to make a comeback to the top by 2010 if the country successfully establishes a high-speed network infrastructure in the next three years and realizes is structural reforms.”

Nippon Telegraph & Telephone has instituted a flat-rate high-usage Internet access service for small offices and heavy users for $75 a month in Tokyo and Osaka. As late as 1994 Japan had just 500,000 “handy phone” subscribers. In a nation predisposed to advanced consumer electronics, high prices had suppressed demand. But “Motorola’s pressure to open the market and change regulations and practices caused a revolution,” according to Richard Katz. By 1999, Japan’s cell-phone count had climbed to 50 million.

Japan is also expecting e-commerce to surge in the next few years. Electronic money transactions using a single integrated circuit card for convenience stores, e-commerce, tolls, and other purchases are planned for later in 2001. The Ministry of International Trade and Industry projected electronic transactions between individuals and companies of about 4.4 trillion yen in 2003, 13 times the 1999 volume. Business-to-Business transactions are projected to grow to about 68 trillion yen, over five times the 1999 figure.

As in Korea and other nations, Japan’s shift to the new economy requires more than changes in technology. Its recent surprising reforms in education, while not adequate, may be he first of other overdue institutional changes as well.
To accomplish these, Japan will also have to reexamine all its industrial-age priorities. This may be impossible so long as the LDP remains in power.

Taiwan in Transition

Like Korea and Japan, Taiwan underwent an industrial transformation and scored great gains in the manufacture of IT products, notably chips. An OECD report focusing on knowledge-based industries found that the “transition to a knowledge-based economy is well underway in Taiwan”. Although the report did not look at the economy (let alone society) as a whole, Taiwan’s progress in that sector is worth noting. The production value of Taiwan’s information industry is third in the world. High-tech products make up 52.2 percent of the value of the island’s exports, which rank 13th in the world. Some analysts credit Taiwan’s ability to avoid the impacts of the Asian crisis on its technology-intensive industry. Growth of Taiwan’s economy may be slowing due to drop in global demand for high-tech and electronics. However, exports to Hong Kong (much of which continues to China) may make up for some of the drop to the U.S. and Japan.

Taiwan started in IT manufacturing with monitors and terminals. In the 1980s it moved up the value-added chain due to its supply of skilled engineers. By 1996 production reached 50 percent of the global total in nine IT categories, allowing Taiwan to offer one-stop shopping for importers. As Taiwan faces increased competition from low-cost competitors, manufacturers have responded in three ways:

1. Moving the more labor-intensive activities to other countries in the region due to land and labor shortages at home. As China in particular has attracted Taiwanese plants, there are increasing worries of job shortages.
2. Moving up the value-added chain to reach higher-end markets.
3. Developing a high level of integration between production and marketing.

IT exports are one part of the picture. Taiwan is well placed to capture the benefits of the transformation, with a good information infrastructure and a well-educated population. Just over a quarter of the population has at least a college education. In 1994 a Special Committee was set up to develop a national information infrastructure. It set (and met) a target of having three million Internet

Taiwan’s Knowledge-based Economic Development Plan

The main goals of Taiwan’s plan are:

1. Commercialization of new inventions
2. Creation of new markets by encouraging innovation
3. Fostering start-ups
4. Promoting the application of IT technology and the Internet
5. Reviewing basic infrastructure, laws and regulations, labor supply, and government administrative procedures
6. Narrowing the digital divide
users by 1999.

Taiwan’s Executive Yuan approved a “Knowledge-based Economic Development Plan” at the end of August 2000 and held a national conference to bring together government and private sector efforts.

The Plan’s ultimate objective of creating a “Green Silicon Island” combines a knowledge-based economy with a just society and a sustainable environment. The long-term targets include: raising the contribution of technological progress, boosting private and public spending on education sector to at least 7 percent of GDP, increasing the production value of knowledge-intensive industries to 60 percent of GDP, strengthening broadband network installation and reducing user fees to U.S. levels, and increasing research and development spending to 3 percent of GDP (with a 30/70 split between public and private sector).

As in other countries, financing has been an important part of successful IT development. Stock issues allowed firms to expand and move up the value-added chain. Taiwan’s stock market is the world’s third largest in transaction value.

ChungHwa Telecommunications, under the General Directorate of Telecommunications, dominated telecommunications services until 1997. That year liberalization of the service market for cellular phones, paging and mobile data began allowing new players to enter the market. As in other countries, this liberalization created a boom in the demand and use of new products and services.

Taiwan passed Japan last year to become the second-largest source of equipment used to make microchips. Part of the reason for the gain was the decision of Japanese companies like Sony, NEC, and Toshiba to contract more of their production of chip making technology to Taiwan. Sales of chip-making equipment in Asia, including Singapore, Malaysia and China, reached $6 billion in 2000. Like Korea, Taiwan will have to keep a close eye on new chip-making machines being developed in the U.S. and Japan, as well as even more radical threats such as the looming convergence of biotechnology and information technology.

Taiwan’s experience in manufacturing computers cheaply and efficiently has also recently helped create opportunities in wireless production. Having lost money with in-house production due to falling prices and higher production costs, Ericsson and Motorola are increasingly outsourcing their handset manufacturing to Taiwan. Design and manufacturing costs in Taiwan are about half that of Europe and the U.S., leading Ericsson to sign a deal that may eventually be worth as much as $450 million with Taiwan’s GVC Corp. Success in the manufacturing of broadband infrastructure may follow. MIC estimates $10 billion worth of products by 2003 will be designed or manufactured in Taiwan.

Meanwhile in Taiwan shrinking profit margins due to competition and higher wages are pushing them to design at home and then manufacture in China. As
jobs are increasingly moving across the strait, tensions are rising in an economy that is already under stress. Even though Taiwan did not suffer the effects of the financial crisis as much as other countries in the region, it shares many of their structural weaknesses, such as a weak financial system and a high ratio of bad loans.

The government’s biotechnology and pharmaceutical research programs helped build a research infrastructure starting in the 1980s at institutes within Academia Sinica and other research centers. However, the OECD found that “the sector’s potential may be limited by its short development history, lack of critical mass for “big science” innovation and the steep learning curve in formulating a national strategy”\textsuperscript{54}, indicators that it is unlikely to repeat its successes in IT.

Taiwan also drew on its cultural resources in an effort to be a regional player in web content. Taiwan hopes to become an online “Global Chinese Content Centre” for the Chinese cultural heritage.\textsuperscript{55}

Every school in Taiwan is now wired and is encouraged to incorporate the web into the curriculum as much as possible. Much of the information that teachers receive from the ministry of education comes through an electronic network. The government has plans to upgrade digital education standards and push for educational reform measures. These measures include 12 years of compulsory education, building a comprehensive technical education system, and promoting a diversified college entrance program. In order to broaden the types of education available, the government aims to pass laws on community colleges and home education, promote lifetime learning, and increase availability of distance learning.\textsuperscript{56}

In higher education, overseas study has been an important part of Taiwan’s development ever since thirty-eight young scientists and engineers were sent to the U.S. in the mid-1970s. In the first half of the 1990s more than 30,000 students returning from overseas have been critical to technological upgrading and economic restructuring.\textsuperscript{57} The large cadre of U.S.-educated entrepreneurs and engineers has helped Taiwan become the world’s largest personal-computer maker.\textsuperscript{58}

### India on the Rise

The India story largely boils down to one word: software. India has made use of its high education levels and English fluency to build an impressive industry. 158 of the Fortune 500 companies outsource their software development to India. The National Association of Software and Service Companies (NASSCOM) estimates software exports to reach $6.3 billion in the 2000/2001 fiscal year and to grow by 50 percent annually to reach $50 billion in 2007-08.\textsuperscript{59} Areas of expertise
include transferring old mainframe programs to servers and providing e-commerce services.

A strong university system selecting a talented pool from an enormous population has provided India with enviable human resources. India’s Minister of Information Technology, sees “a lifetime opportunity for India,” in the global demand for IT workers, and recently announced a $650 million plan to double India’s annual graduating class of 100,000 by 2001, reaching 500,000 graduates by 2005. Even this remarkable figure may not satisfy demand: Indian software exports are projected to require a resource pool of 2 million IT professionals by 2008. And the shortage is not just of technical workers: projections are for a shortfall of 500,000 technical workers and three times as many managers and other support staff by 2006. “We’ll have no more than 10 per cent to 20 per cent of the people we need in any one area,” said Krishna Tanuku, president of Lucent Technologies India.

The major Indian firms, Tata Consultancy Services, Infosys and Wipro are reportedly looking to China to meet excess demand and lower costs, as they expect costs to be fifteen to twenty percent lower than in India once there is a sufficient pool of software professionals in that country. Moreover, customers are looking to Russia where programmers are also plentiful and skilled but cheaper.

Economic growth has slowed to a still respectable 6.4 percent, as oil price hikes, a weak rupee, and eased import restrictions hit manufacturing. Almost all restrictions are being lifted as required by WTO. Greater competition from foreign manufacturers will make India’s service economy even more important.

India is also reacting to the slowdown in the U.S. economy by exploring new markets in Japan, Germany, Australia and Britain. India’s biggest software developer, Wipro Ltd., recently opened a center in Britain to serve clients in the European region. However, the U.S. will remain a major market for India. The Federation of Indian Chambers of Commerce and Industry and the U.S.-India Business Council recently agreed to promote trade and investment in the knowledge driven industries.

The mobility of the Third Wave’s primary asset — knowledge — has worked both ways for India. While many IT professionals are working overseas, an increasingly favorable domestic economy has attracted many Third Wave professionals, some of them with substantial capital, back to India to further build up the sector. The same repatriation phenomenon has benefited Israel and Ireland too. This reverse brain drain has implications for countries like the U.S., which relies on immigration for expansion.

Fast-track privatization of the monopoly overseas telecom company is underway (one of few areas of real reform due to its importance). It will still be a monopoly until 2002, controlling all voice, 99 percent of data, and 550,000 Internet users.
A comparison of teledensity to per capita income shows large potential for increasing telecommunications in India, and Indian businesses must compete for access to limited international bandwidth. Some 200,000 km of fiber optic lines have been laid, and India is encouraging the use of wireless in local loops for short distance and rural communication. The government is establishing community information centers nationwide, linking remotest areas with over 12,000 VSATs (satellite terminals) and providing Internet access at thousands of kiosks. The government is also offering tax holidays until 2010 in software technology parks.

One benefit of success is that partners seek you out. India’s IT services explosion has provoked a number of interesting collaborations. As of early 2001 India and Malaysia were considering cooperation in software and hardware development. India has been successful in the former, and Malaysia has attracted investment in hardware. The agreement is an opportunity for India to enter the ASEAN market.

**Singapore’s New Goals**

Singapore’s IT plan, “Singapore IT2000: A Vision of an Intelligent Island”, was formulated in 1991, drawing on the expertise of hundreds of senior executives from the public and private sectors. It has five aspects:

- Developing Singapore as a global hub for goods, services, capital, information, business, services and transportation.
- Improving quality of life through electronic applications in the economy, society and households.
- Using IT to revitalize Singapore’s traditional economic sectors.
- Linking communities locally and globally to enhance communication among the Singaporean community at home, abroad and with the rest of the world.
- Enhancing the potential of individuals through government provision of improved opportunities and technologically advanced means for lifelong learning.

Singapore aims to increase electronics output by an average of 8 percent per year with the sector employing at least 50 percent of the nation’s skilled workers by 2010. Data storage and imaging currently dominate the sector, accounting for 42 percent of output value. Like Taiwan, Singapore has been able to continuously upgrade its electronics industry.

The life sciences industry grew 60 percent annually between 1997 and 1999 reaching a production value of U.S. $6.3 billion. Investments amounted to 6.1 percent of the total commitment to the manufacturing industry. The government funded over 500 innovation grants to both local and multinational companies.
Goals include making Singapore home to 15 world-class life sciences companies by 2010 as well as a regional center for clinical trials and drug development.  

Singapore’s education reform measures that may be of relevance to Korea include: 1) reviewing university entrance criteria, with more attention to extra-curricular activities and less emphasis on grades; 2) overhauling the syllabus with advice from Cambridge, Harvard and Japanese universities; 3) allowing A-level students to take texts into exam rooms during literature tests to encourage literary appreciation rather than learning-by-rote. Singapore is also taking advantage of opportunities for co-operation with Western universities, including electronic transmission of MIT lectures to classrooms at the National University of Singapore.

Measures to boost innovative ability outside the classroom include a National Innovation Framework for Action, encouraging industry to be more creative in R&D, and encouraging links between educational institutions and industries.

In January 2001, Singapore launched its SME 21 program to build the SME (Small and Medium Enterprise) sector’s role in the knowledge-based economy. The program aims to quadruple the number of SMEs using e-commerce from 8,000 to 32,000 businesses. As in many economies, SMEs are responsible for a large share of employment: some 90,000 SMEs (92 percent of total businesses) employ 51 percent of the workforce, according to government figures.

In a move similar to Japan’s but with an authoritarian edge, merchants must accept electronic money for all sales starting from 2008.

Singapore has taken the most active response in the region to the shortage of skilled labor. Ignoring public concern about the racial balance, Senior Minister Lee Kuan Yew told critics: “Unless we change our mindsets, we will be out of this race.” The government set up the Infocomm Development Authority of Singapore, or IDA, to work with the Manpower Ministry on the tech-skills shortage. The IDA estimates human capital needs to be growing annually by 10 percent to 12 percent, half of which will need to be met by importing foreign workers. In August 2000, the IDA signed an agreement with India’s NIIT to recruit 1,000 Asian IT professionals a year for work in Singapore. IDA’s advertisements are a common sight in Internet industry magazines.

Malaysian Melee

Until the Asian crisis in the late ‘nineties, Malaysia had one of the region’s most ambitious, well-rounded, carefully developed plans for shifting to a knowledge-based economy. It was also, at that time, the only majority Muslim nation in the world with a commitment to information economy as a key to development.
In 1995, Prime Minister Mahathir Mohamed announced the establishment of the Multimedia Super Corridor (MSC), a 15 km wide and 50 km long strip from Kuala Lumpur to the airport. The goal was to attract world-class high-tech companies to Malaysia and to develop local industries. The corridor aimed to become an “island of excellence” with capabilities, technology, infrastructure, legislation, policies and systems for competitive advantage, and to serve as a testing ground for invention, research and other groundbreaking multimedia developments.

Today the MSC is in trouble. The Asian financial crisis of 1997-8 saw foreign investment fleeing Asia, rather than flooding in, and set back the MSC’s efforts to attract major investments. (A number of leading global IT and telecom firms have invested relatively small, sometimes merely symbolic, amounts in the MSC). The trouble was magnified by the political storm that shook Kuala Lumpur when Prime Minister Mahathir Mohamed was challenged prematurely by his own handpicked protégé, Deputy Prime Minister, Anwar Ibrahim, who he arrested and imprisoned with a number of his followers. (In the controversy that followed, Alvin Toffler, a member of the International Advisory Panel of the MSC, after private correspondence with Mahathir, went public with a criticism of the harsh treatment of the prisoners by the Malaysian police, calling attention to the case in the International Herald Tribune.) Potential investors, observing the political instability, had a second reason to hold back. Finally, the crash of the dot-coms and decline of over-valued high tech stocks further worsened prospects for substantial foreign investment.

Mahathir continues to support the project. But, in addition to all the above difficulty, a shortage of skilled workers has also significantly slowed its development. The worker shortage is a reflection of the political problem as well. Brainpower surely flows toward high wages, good housing, proximity to research centers, a good information infrastructure, and an attractive environment. But all these being equal, innovative knowledge workers want freedom of expression as well.

Despite the obvious shortages in human capital, Malaysia is said to be “moving gingerly” on immigration. While government officials have called for more workers from abroad, all the incentives so far have focused on Malaysians. The government is encouraging Malaysians with IT skills to come home by offering tax waivers and other inducements in its 2001 budget. Some 10 percent of IT workers are foreigners, half from India, and further increasing the number of Indian visas will be difficult given the country’s racial politics. Adding to the problem of skilled labor shortages is the fact that an estimated 51 percent of foreign IT workers in Singapore are Malaysians. To build up computer literacy in the population, the Employees Provident Fund allows withdrawals for personal computer purchases.

Like Singapore, and now India, Malaysia has a partnership with MIT, this time focusing on biotechnology. The Malaysia-MIT Biotechnology Partnership Programme (MMBPP) will focus on increasing the value of traditional herbal
medicines and on enhancing the economic value of palm oil.  

Thailand – a Telecom Tycoon on Top

Thailand’s new Prime Minister Thaksin, himself a telecom company leader, has inherited one of Asia’s least IT oriented countries.

To date Thailand has made little overt progress towards a knowledge-based economy, but its vision is worth noting for its emphasis on addressing a wide range of social issues. The 1995 document “Towards Social Equity and Prosperity: Thailand IT Policy into the 21st Century” prioritizes an information infrastructure in rural Thailand and emphasizes human development more than the information technology industry itself. Unlike the master plans of other countries, it asks the deeper question of IT for what end, and does not limit itself to technological innovations without addressing the human side of the equation. The people, it holds, are the foundation and the strength of any knowledge economy, and conceptually it makes sense to begin with them. Unfortunately, implementation has been limited.

Challenges and structural weaknesses have limited the growth of IT in Thailand. The national information infrastructure, telecommunications and Internet access in particular, was both undercapitalized and over-regulated, leading to high user charges. Leased-lines rates fixed by the government-run Communications Authority of Thailand are prohibitively expensive. Long-term problems include a weak education system and a lack of research and development. As a result Thailand suffers from a shortage of qualified engineers and indigenous technological capability.

Outdated laws and regulations, including lack of intellectual property rights, further inhibit development of electronic commerce and software. Most Thai dot-coms have folded, and unlike Korea, Taiwan and Singapore, the electronics sector has not been able to move beyond the assembly stage, and may follow other labor-intensive industries to lower-cost countries in five years.

Only 2 percent of Thais are presently on-line and e-commerce still only accounts for .04 percent of GDP in Thailand, according to market research company International Data Corp. Many companies in Thailand have moved their IT departments to Singapore, and the World Bank has said that Thailand “is increasingly on the wrong side of the digital divide”.

However, there is some hope attached to the rise of Prime Minister Thaksin, who has pledged to prioritize national IT development. Legislation on e-commerce security and on-line payment may finally go through, and every district has been promised at least one Internet connection. The government has announced the
goal of wiring 10 million Thais by 2004 and there is talk of instituting a Ministry of Information Technology. The chairman of the prime minister’s executive IT committee recently stated: “This government will concentrate on the ‘I’ in IT, with the goal of improving the effectiveness and efficiency of our existing technology.” Hoping to boost e-commerce, the government will support 3,000 on-line enterprises with concept development, management, e-marketing and an e-marketplace to reach a global market.”
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