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Research Report on Information Economy

Boosting IT to escape diminishing economic trend

Pressing need to overhaul outdated practices and regulation

—Cut fat to improve productivity—

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Boosting productivity through the effective use of information technology (IT) will be indispensable to grow the Japanese economy as Japan's population declines. It is necessary to eliminate various inefficiencies which prevent the economy from reaping the full benefit of IT in order to recover the opportunity for growth lost in the 1990s. The entire system should be overhauled, including business process and operation inside the firms, informal constraints in business practices between the firms, as well as formal rules of the legal and regulatory frameworks.

Although population decline represents a source of enervation for the Japanese economy, information technology (IT) constitutes a source of empowerment. Even in Japan's golden age of the 1960s the population grew at only about 1%. Instead, it was improvements in productivity from innovations in technology which fueled growth. Today, IT is one of the most important factors that influence productivity growth.

The Japan Center for Economic Research (JCER) organized an "Information Economy Unit" under my leadership last April to analyze the effects of IT on the Japanese economic growth. The unit examined the present situation and the issues prevailing in IT-using sectors, as well as the possibilities for accelerating growth.

Why Japan missed the IT wave

In the 1990s, the United States overcame the "Solow Paradox," in which productivity fails to rise despite heavy investment in IT, ushering in the "New Economy." Economic performances have changed somehow with the coming of the present decade, but recent academic researches reconfirm that IT investment revived the US economy since the late 1990s and boosted the pace of growth by more than 1% compared to the stagnant period of 1973-1995.

The Japanese economy, however, missed the chance to ride this wave. According to the government's "Economic and Fiscal Policy 2007," one of the most important items on the policy agenda is still productivity enhancement via IT, which had been set more than ten years previously. The fact that it is being cited again as a basic national policy shows how difficult its achievement has proved to be.

If we analyze the growth factors of the Japanese economy into the deepening of IT capital, the deepening of non-IT capital, total factor productivity and the like and then look back over the past thirty years, we find that IT investment contributed to productivity through the 1980s. In other words, Japan experienced no "Solow Paradox". Since the 1990s, however, information technology has not been making a contribution to changes in productivity. In short, Japan never saw the advent of the "New Economy".

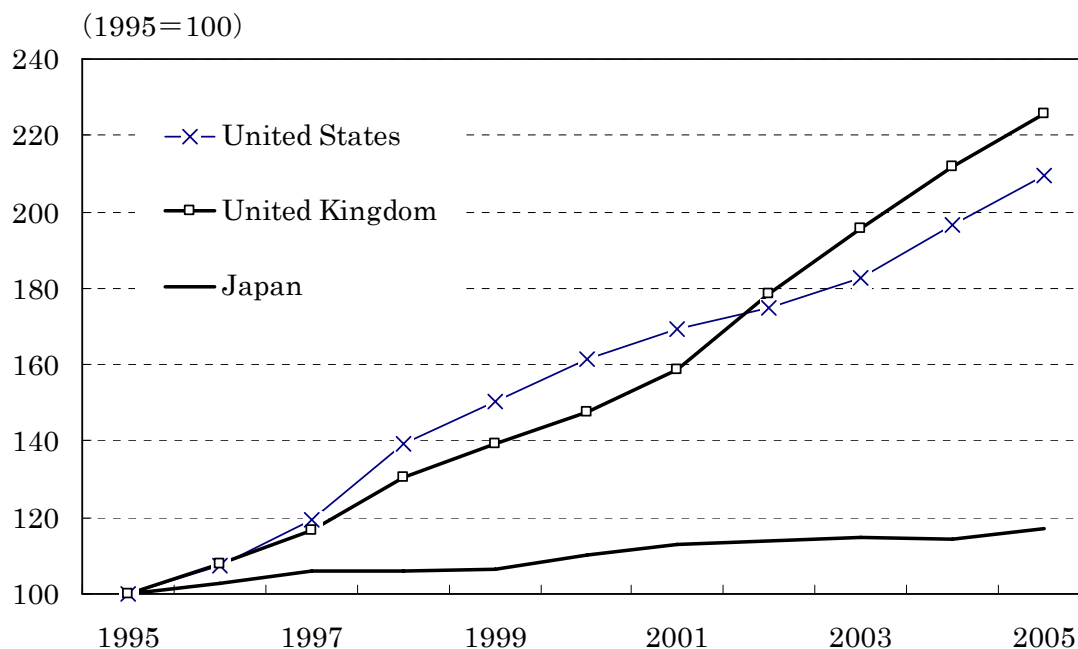
It is often pointed out that, in services industries such as distribution and finance, which have close affinity with IT and experience a considerable amount of IT investment, the low level of productivity versus the United States is striking. Given differences in the nature of the services, exact international comparisons are difficult in terms of the "level" of productivity.

Nevertheless, a look at "changes" in certain time series highlights the situation in Japan as it fell behind. Over the ten years through 2005, the distribution industry in the United States experienced a 60% increase in inflation-adjusted added value with job generation in the sector. Consequently, productivity rose by around 40%. In Japan, meanwhile, both jobs and value added remained lackluster, and productivity continued to stagnate.

High income but no growth in finance

This contrast is seen much more clearly in the financial sector, where per-head income is higher relative to other industries. With the application of financial engineering to exploit IT, the finance, insurance and real estate (FIRE) sectors of Britain and the United States boosted inflation adjusted added value more than two-fold over the ten years through 2005 and raised the number of employed by about 30%. In Japan, meanwhile, some enhancement of productivity was seen, but with a job loss of over 10%, inflation adjusted added value rose by less than 20% over the same ten years (see figure).

Figure. Real Value Added of Financial Services Sector



Note. Based on national currencies and including real estate and other financial services.

Source: OECD, "Annual National Accounts".

In fact, Japan made digitalization efforts in both fields from an early stage, and these efforts fueled investment in outdated information systems in the 1980s. One of the reasons that results subsequently failed to show the benefits of technology was that a variety of economic systems in intra-firm, inter-firm, and regulatory frameworks failed to cope well as IT evolved and to make the jump from simple high-speed transaction machinery to relevant communication tools.

Our interview-based research reveals that the common elements in IT-using industries such as finance and distribution were not so much problems relating to the technology itself but rather constraints caused by the structure of management, including business process and operations, structures in industry such as business practices unique to an industry, and structures related to governmental controls, such as laws and regulation.

As for the distribution industry, new forms of business such as convenience stores and drug stores are growing thanks to an effective IT strategy, but the major players with long business history such as department stores and general supermarkets continue to stagnate. Regarding the financial sector, Japanese financial exchanges, which are considered important nodes connecting IT and latest financial technology, are falling behind in the world.

Examining the problem carefully, we find it lies in organizational structures relating to companies and the industry. In the past, the Japanese business sectors were highly competitive due to the high quality of their human capital, especially white collar workers, as information processing capabilities, but a labor-intensive system which relies heavily on capable labor force to do everything effectively does not easily allow for the separation of job functions, and it becomes difficult to overhaul the division of labor through visualization and standardization. The consequences are revealed in three types of inefficiencies in the information age.

The first is the excessive retention of labor intensive work processes, or the lack of change in the traditional division of functions between technology and workers. The strong talent of highly important personnel is still squandered on work that now could be done with IT, so business firms miss an opportunity to boost productivity by assigning talented workers to more creative tasks.

The second failure is to give everything over to IT without reengineering the business process. The outdated business processes carried out intensively by workers should be standardized, and areas handled by IT should be distinguished from those which should still be handled by workers after the introduction of the new technology. Otherwise, information system would be too complicated and irrelevant to use. For example, building excessively complex and lumbering information systems in financial markets results in slow processing speed, expensive operation costs and high frequency of accidents.

The third inefficiency is lack of compatibility. It is difficult to exchange business data between companies if many systems spring up in disorderly fashion as a result of a corporation's unique conventions regarding workflows. Consequently, the benefits of "network effects" or "economies of alliance," which are keys to boosting productivity in the information age, can not be exploited.

Another issue lies on those sectors which have been slow to make use of IT such as medical institutions and small and midsize enterprises (SMEs). Since the 2001 proposals of the Council for Regulatory Reform, it was expected that IT would boost the efficiency and quality of medical services, and calls have been made for online computer processing of receipts, digitalization of medical case records, and standardization of medical treatments. With a diagnostic and treatment system in which compensation is on a per-treatment rather than a per-case basis, medical institutions have no incentive for improving efficiency because greater efficiency may undermine doctors' compensation.

Through the sharing and analysis of detailed digital case records, the realities of medical service could be made more visible and the best treatment options more discernable. But even were that done, any ability to provide high quality medical

services might be undermined by mediocre care unless combined with a compensation system which makes it easy to provide such services along with advanced supplementary medical care. Without reform of the medical system, it would be difficult to enhance the welfare of society as a whole over the long term by relying solely on the enthusiasm of individual doctors.

As for the application of IT by SMEs, it's been demonstrated that, the smaller a company is, the greater the constraints on reengineering business processes and training employees are, making it difficult to increase efficiency. There are a great many SMEs, and if this problem is addressed haphazardly without more precise focus on company size and field, it would result in a continuation of the existing policy of protection under the signboard of IT. In this sense, policy coordination is needed across the boundaries of subdivided government ministries and agencies, focusing on clinic doctors since they account for more than 90% of the medical institutions and confront SMEs' IT problems.

Regarding the regional economic development, there is no great difference in the distribution of SMEs in major urban areas and regional areas, and in the stimulation of regional economies, one issue will be to understand, for each district, the causes of underlying structural changes in industry and population movement, for example, which attend the progress of information technology.

Exploiting "economies of networks"

In spite of several challenges, IT is expanding new frontiers for the Japanese economy. The power of IT lies not merely in speed and space but in the transfer of ideas beyond organizations and bringing those ideas to fruition. The power is open for not only big companies but also small firms or even individuals. A number of firms can share outside business resources, relying on each other's respective strengths, thereby giving rise to "economies of networks" or "economies of alliance." If such economies are exploited wisely, various opportunities may arise for SMEs even in the small towns and cities far away from metropolitan areas. And if globally linked financial exchange markets supply risk capital of various kinds, diverse forms of competition would be stimulated, which in turn would contribute to the economic growth.

Another possibility is the progress of "visualization for consumers" with enhanced "resolution" of information. In the lemon market, well known for asymmetric information, high quality products are driven out and low quality products abound because, owing to the lack of information about quality, the market appears to consumers as a muddle of good and bad. If consumers can clearly distinguish between high quality and low quality, products would be traded at prices appropriate for each, giving rise to a business opportunity to boost value added.

This would lead to greater efficiency and enhanced quality in medical services through the sharing and data-mining of electronic case records. In the case of Japan's agricultural products as well, those produced at high levels of quality through organic farming and other methods requiring greater labor and care are seen by consumers as both safe and assured of having high value added. The distribution industry would be able to seize opportunities for the enhancement of value added in other Asian markets where strong purchasing power is emerging.

Based on JCER's medium-term economic forecast, given progress made on increased use of IT and revamping of organization and practices in such fields as distribution, finance and medicine, the economic growth rate could accelerate by 0.3 percentage points through increased IT investment and surge of productivity.

Our unit estimates three types of macro production function models, namely the basic model, the IT capital model, and the network effects model. The basic model shows that the economy will grow at a pace of 1.4% annually through 2020, with the pace of growth increasing to 2.2% annually under IT capital model and to 2.5% under the network effects model, respectively.

As demonstrated above, the Japanese economy faces challenges and changes in terms of economic growth driven by IT. Further research will be necessary to review existing business practices and regulatory frameworks in such frontier sectors as electronics, telecommunications, broadcasting, and content because these are pivotal providers of IT related goods and services.

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