An Assessment of the Potential of ICT & its Impact on Economic Growth in Asia

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Technology Pivotal in ICT and Economic Growth

Economic growth is to be seen from the supply side as well as the demand side. Only growth on the demand side without growth on the supply side would result in a bubble economy, as we saw in Japan in the 1980s. Economic growth on the supply side is to be determined by the savings rate and marginal productivity of invested capital. As the savings rate goes higher, more capital becomes available for expanding production capacity through purchasing capital goods, and as technological innovation is enhanced, the marginal productivity of invested capital increases.

Asian countries now, with the exception of Japan, enjoy the highest economic growth in the world and are often cited as a center of growth in the world. In the light of the above-mentioned economic theory, assessment of their growth on the supply side is very important in order to ascertain that their growth is truly authentic. We have another theoretical concept invented by economists called Total Factor Productivity (TFP), which is used as an indicator to measure the contribution of technological innovation to economic growth. TFP apparently gravely affects the marginal productivity of invested capital. In the case of Japan in the 1980s, many economists are saying that its relatively high growth happened only on the demand side and was not assured by the high productivity of invested capital brought about by technological innovation.

Chart 1 tells us that in the 1975-'90 period the contribution of TFP to GDP growth in Japan was small, even though its GDP growth itself was higher than the growth in the US. This proves that the above hypothesis concerning the 1980s is correct. To 2000 from 1990, TFP's contribution to growth increased, whereas in the US, the contribution of labor input was always the biggest and TFP's contribution was not so big. As a matter of fact, from 1990 until 2000, TFP's contribution to growth is almost the same in the US and Japan. This means the difference in the economic growth of the US and Japan in the 1990s was mainly due to the difference in the labor force growth, reflecting the stagnant population growth in Japan compared with that in the US.

To prove that the economic growth in Asia is really authentic, we need to look at TFP growth in Asia, and how it has contributed to the region's growth. *Table 1* shows us that, though the level of TFP of China, South Korea and Taiwan was still lower than that of Japan in 2000, its average annual growth rate in the three countries is higher than the Japanese one. *Chart 2* shows us that in the electronics industry the three countries' TFP is growing rapidly and the gap between the three other Asian countries and Japan is narrowing dramatically. It would be beneficial to update this analysis and to look at how TFP in these three countries could sustain its growth most recently. The analysis for the period until 2000 truly proves their growth was authentic and fully supported by innovation.

Information and Communication Technology (ICT) is certainly occupying an important part of recent innovation and thus changing the world. Many economists point out that the IT revolution has thoroughly changed the nature of the business cycle and thus is successful in realizing stable

TABLE 1

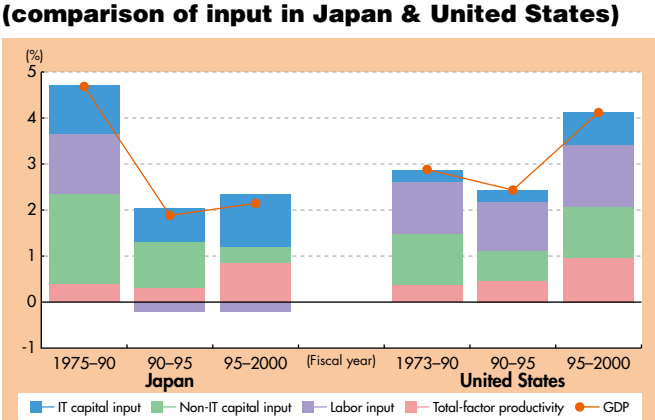
International comparison of total-factor productivity
(based on standard of 1 for Japan)

	China	South Korea	Taiwan	United States	Japan
	1982–00	1984–00	1981–99	1980–00	1980–00
1980 level	0.50	0.81	0.64	1.04	1.00
2000 level	0.66	0.83	0.93	1.08	1.00
Average annual growth rate	2.04%	0.60%	2.44%	0.61%	0.42%

Source: "Benchmarking industrial competitiveness by international comparison of productivity," RIETI column, by Kazuyuki Motohashi

CHART 1

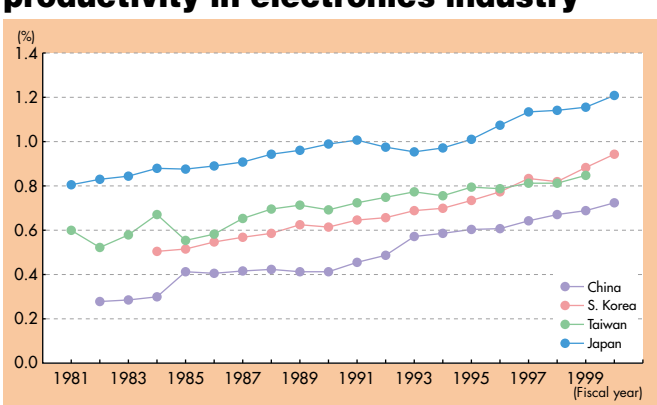
Breakdown of factors in GDP growth
(comparison of input in Japan & United States)



Source: Compiled by author

CHART 2

International comparison of total-factor productivity in electronics industry



Source: "Benchmarking industrial competitiveness by international comparison of productivity," RIETI column, by Kazuyuki Motohashi

TABLE 2

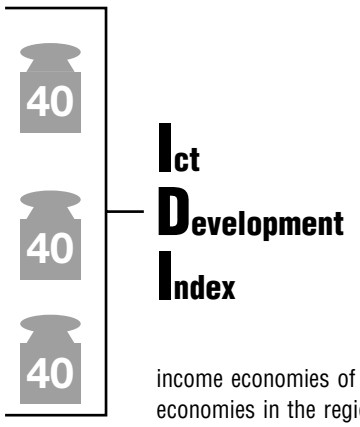
ICT Development Index: indicators and weights

ICT acccess	Ref. Value	(%)
1. Fixed telephone lines per 100 inhabitants	60	20
2. Mobile cellular telephone subscriptions per 100 inhabitants	170	20
3. International internet bandwidth (bit/s) per internet user	100'000*	20
4. Proportion of households with a computer	100	20
5. Proportion of households with internet access at home	100	20

ICT use	Ref. Value	(%)
6. Internet users per 100 inhabitants	100	33
7. Fixed broadband internet subscriptions per 100 inhabitants	60	33
8. Mobile broadband subscriptions per 100 inhabitants	100	33

ICT skills	Ref. Value	(%)
9. Adult Literacy rate	100	33
10. Secondary gross enrolment ratio	100	33
11. Tertiary gross enrolment ratio	100	33

*Note: *This corresponds to a log value of 5, which was used in the normalization step.*
Source: ITU



growth due to the constant contribution of TFP by IT to growth.

Chart 1 tells us that through the 1990s, as TFP's contribution to growth increased in Japan and the US, IT capital input's contribution to growth increased as well in both countries, meaning that IT has come to play an important role in economic growth in both countries.

ICT in Asia

What would ICT's impact be upon growth in Asia?

Since we do not have a similar analysis in Asia, I picked up the following data from the International Telecommunication Union (ITU) World Telecommunication/ICT Indicators database.

ITU created the ICT Development Index (IDI) for measuring the information society in 2009. The main objectives of the IDI are to measure the level and evolution over time of ICT developments in countries and regions for international benchmarking and also measure the digital divide, i.e., differences between countries with different levels of ICT development. For our readers' understanding of this concept, I have introduced *Table 2* explaining the factors comprising IDI. As this table shows, IDI takes account of all the important elements of the information society such as internet users, mobile cellular telephone subscriptions, etc. According to the global IDI ranking based on the calculation as described in *Table 2,* among Asian-Pacific countries (they do not have a category of Asia only) their top five countries are countries that are also in the top rank in the world: South Korea, Japan, Hong Kong, Singapore and Australia are the top five in the Asian-Pacific area while their global ranks are as follows: South Korea: third, Japan: eighth, Hong Kong: 11th, Singapore: 14th, and Australia: 15th among the 159 countries in the world. This is a much better result than the other regions such as the Americas, the Arab States, CIS, and Africa. Europe is the only region exceeding their performance, since its top five countries - Sweden, Luxembourg, Denmark, the Netherlands, and Iceland - are first, second, fourth, fifth, and sixth, respectively, in the world ranking.

However, the Asian-Pacific region is characterized as the region where the difference between the maximum and minimum values of IDI among the countries is the largest, as shown in *Table 3*. In 2008, for example, their range between max. and min. was 6.60, larger than the range in other regions. Looking into the details of the countries' differences, we find that this reflects the difference between South Korea (maximum, world rank third) and Papua New Guinea (minimum, world rank 151st). Among the indicators, the elements of IDI, I picked internet users and mobile cellular subscriptions as the important ones and found that the Asian-Pacific region's performance in these two indicators was better than only Africa. The number of internet users per 100 inhabitants in 2010 in the Asia-Pacific area was 21.9, whereas the number was 65 in Europe and 55 in the Americas.

Concerning mobile cellular subscriptions per 100 inhabitants in 2010, the number in the Asia-Pacific region was higher than only Africa's, though its growth rate was the highest. The low numbers in these indicators are observed among low- and lower-middle-income economies of the region. Though the high-income economies in the region enjoy the growing benefits of the information society, the question to be tackled now in this region is how to reduce this divide within the region.

How Can We Take Full Advantage of ICT?

In order to take full advantage of the utility of ICT, it is to be noted that what matters most for productivity impact is not acquiring ICTs but rather the use that is made of them. Business firms' intangible assets, which are increasingly important for gaining productivity such as management skills in achieving changes and innovation through the re-organization and streamlining of existing business processes like inventory control, accounting services, order tracking, etc., are to be implemented with the help of ICTs, and thus ICTs can act to expand the effect on growth possibly brought about by intangible assets. To reduce the digital divide mentioned above in the Asia-Pacific region, we should address such a close link between intangible assets and ICTs, since the existence of rich, high-quality intangible assets is apparently a prerequisite to expansion of the use of ICT.

Software is a typical intangible asset and its value as an asset can be maximized with ICT.

Mr. Hongeuk Kim, a Korean software engineer who has been working in Japan for about ten years, is now running a software company in Japan. A graduate from a Japanese engineering school who speaks perfect Japanese, he got interested in a business opportunity in the area of e-receipts in Japan several years ago. As e-commerce expands in Japan, his intuition has been proved correct. This is an example of a positive link between an intangible asset (software) and ICT. He is now interested in the potential of e-books in Japan. He is probably right in saying that e-books constitute a new trend in the software business in Japan, since there are many magazines like *Japan SPOTLIGHT* interested in producing e-publications.

It is wonderful to see how many Asian software engineers like Mr. Kim are gaining popularity in Japan, since ICT is one of the contemporary technologies encouraging open innovation, for one of the benefits of ICTs is to open a wide range of possibilities of communication at different levels. Specifically, business will be achieved more through a firm-to-firm or an individual-to-individual communication by ICTs beyond borders.

Among companies collaborating in innovation activities, of all firms in OECD countries, Japanese and South Korean firms, in particular SMEs, are not in the group of high collaboration in innovation.

Collaborating in innovation is to be encouraged in Asian-Pacific firms. That could be another solution for reducing the digital divide in the region. JS

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