Japan's Investment in Human Resources & Innovation: Searching for Ways to Increase Productivity

Author Miho Takizawa

By Miho Takizawa

Achieving a New Normal in the Post-Corona Age

The Cabinet approved the Basic Policy on Economic and Fiscal Management and Reform (Outline) 2020 on July 17, 2020. Faced with the demands of a world undergoing major changes as a result of the new coronavirus pandemic, the outline envisions a new, post-corona future and identifies three goals to be pursued to transform society for the future. Those objectives are: a society in which individuals shine, and everyone can feel fulfilled wherever they are; an inclusive society in which everyone can feel a purpose to their life, with no one left behind; and a country that is trusted and respected, and deemed indispensable to international society.

To achieve a new normal in the post-corona age, the outline presents five main policies. One of those is to "Strengthen investment in 'people' and innovation". Specifically, this is expressed as promoting stepped-up investment in intangible assets in three areas – digitalization, the creation of human capital, and innovation will be the key to future growth. The outline also calls for "thorough implementation of wise spending through budget formation that takes a stronger multi-year approach, with an emphasis on evidence-based policy making (EBPM) that gives budget priority to effective measures that are backed by evidence and the collection of data", emphasizing the importance of data-based analysis.

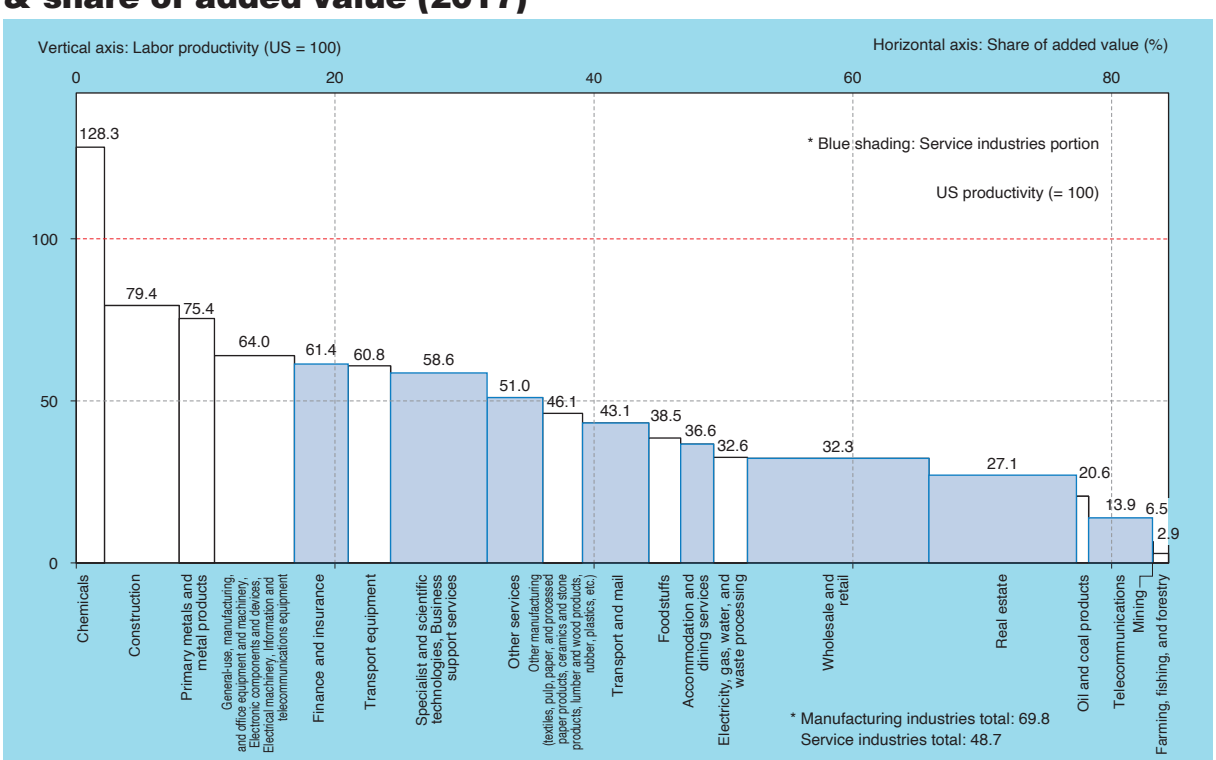
In this article, I will present various data to demonstrate the current situation with regard to Japan's productivity, innovation, and investment in human capital, and consider measures to achieve economic growth through enhanced productivity.

Japan's Productivity

With a declining birthrate and aging population, increasing productivity is indispensable to maintaining and expanding Japan's

CHART 1

Japan's productivity by industry (added value per work hour) & share of added value (2017)



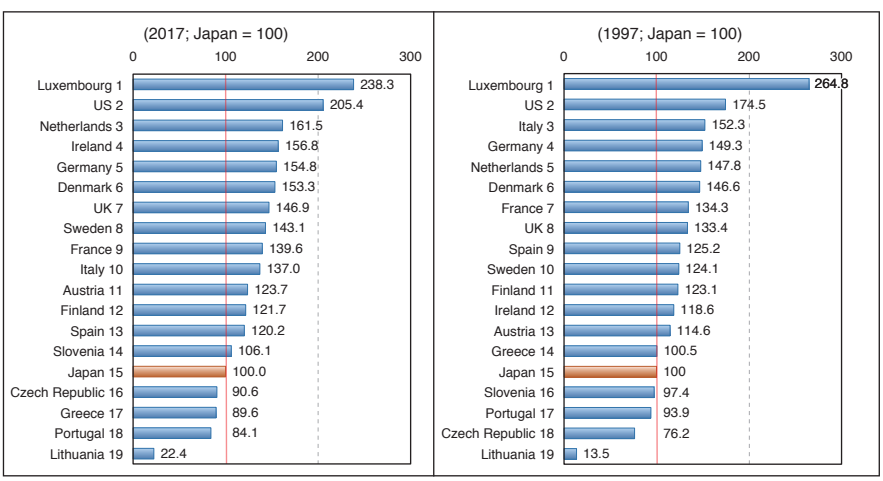
Source: Japan Productivity Center, "International Comparison of Labor Productivity (2017)"

economic activity. This raises the question of how Japan's productivity compares with that of other countries. Since 1981, the Japan Productivity Center has published an International Comparison of Labor Productivity (domestic productivity, calculated as gross domestic product per employed person per hour) based on OECD and World Bank data. The most recent results, published in 2019 and based on OECD data for 2018, show that Japan's hourly labor productivity (added value per work hour) was $46.8 (¥4,744 / purchasing power parity (PPP) equivalent basis), which was slightly more than 60% of the figure for the United States ($74.7 / ¥7,571) and ranked 21st of the 36 OECD member countries. Looking at Japan's labor productivity on a nominal basis, although there was a 1.5% increase from 2017, Japan's ranking was unchanged, and among the seven major countries, data going back to 1970 (the oldest available) show that Japan has continuously ranked last. Looking at labor productivity as added value per person, for 2018 the figure for Japan (added value per employed person) was $81,258 (¥8.24 million), which was somewhat below the United Kingdom ($93,482 / ¥9.48 million) and Canada ($95,553 / ¥9.69 million), and only 21st among the 36 OECD member countries.

This shows that for Japan as a whole, the amount of added value per work hour and per employed person is the lowest among the seven major countries. On this point, what are the results when we compare by specific industries? *Chart 1* shows a comparison of Japan's labor productivity by industry for 2017. The chart uses the average level of labor productivity by industry in the US as 100, and shows Japan's labor productivity by industry (amount of value added per hour [2011 basis], vertical axis) and share of added value (horizontal axis). The industries with the result unshaded are manufacturing industries, and the results for service industries are shaded in blue. This shows that the only industry for which Japan's labor productivity is higher than that of the US (a figure above 100) is chemicals, and for most industries Japan's level is below that of the US. In particular and with the only exceptions being finance and insurance, specialized and scientific technologies, business support services (research and development services, advertising, leasing services, etc.), and other services (including the personal services of laundry, barbers, beauticians, and bathing), productivity in tertiary industries is less than half that of the US, and at 48.7 the figure for service industries as a whole was below half the level of the US.

CHART 2

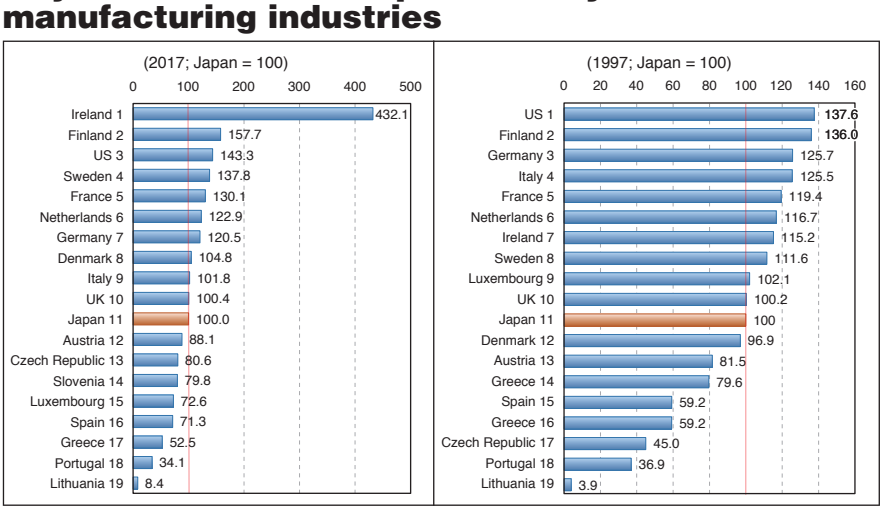
Major countries' labor productivity – service industries



Source: Japan Productivity Center, "International Comparison of Labor Productivity (2017)"

CHART 3

Major countries' labor productivity – manufacturing industries



Source: Japan Productivity Center, "International Comparison of Labor Productivity (2017)"

Chart 2 shows a comparison with European Union countries as well as the US. This shows labor productivity for all service industries for 2017 and 1997, with Japan used as a benchmark of 100. The first thing we can see is that the gap between the US and Japan in labor productivity for service industries is growing (with Japan at 100, the US went from 174.5 in 1997 to 205.4 in 2017). Second, although Japan's rank was unchanged from 1997 to 2017 at 15th, the gap with the US and many European countries is widening. *Chart 3* shows the same comparison for all manufacturing industries. Japan's rank from 1997 to 2017 remains the same at 11th. One difference from service industries, though, is that except for a few countries the gap is not widening.

There are, however, certain things that need to be taken into account in this type of international comparison. For example, comparisons of productivity for service industries, which do not deal in the exchange of goods, need to be adjusted for international differences in service "quality" and when making measurements there are no indicators sufficiently able to account for differences in quality. Nevertheless, it would probably be difficult to account for the large differences in productivity between Japan and the US indicated above (and for services in particular) as being entirely due to differences in quality.

Practically speaking, there is a pattern in international differences in productivity that cannot be ignored, and this is an issue for Japan's economy that needs to be addressed quickly.

Japan's Innovation

Having demonstrated Japan's low productivity, we will next look at data to assess trends in "innovation", the source of productivity enhancement and economic growth. The leading survey for trends in innovation in Japan is the Japanese National Innovation Survey (J-NIS), carried out by the Ministry of Education, Culture, Sports, Science and Technology's National Institute of Science and Technology Policy (NISTEP). This survey covers private sector companies with 10 or more employees (with some industries excluded), and has been carried out five times since 2003. The following is a summary of the results of the latest survey, carried out in 2018.

The 2018 survey covered the three-year period from 2015 to 2017 and was designed to ask about innovation activities that had been "implemented" and "achieved". For example, with regard to innovation activities (all activities that had been undertaken with the expectation of producing innovation for the company), 38% of companies carried out activities. In addition, as the size of the company becomes larger, the implementation rate tends to rise, with 36% of small companies, 47% of medium-sized companies, and 60% of large companies responding that they had carried out innovation activities. Another feature is that the implementation rate for manufacturing industries (47%) is higher than for service industries (37%). In terms of the specific details of their innovation activities, 68% of companies that carried out innovation activities selected "Yes" for "Employee training activities". This was followed by the percentages of companies that responded "Yes" for "Acquisition or lease of building, equipment, machine, or other tangible assets" and "Engineering, design and other creative work activities".

Using this survey to determine the amount of input invested to achieve innovation, let us look at the percentage of companies that achieved the output of innovation. The percentage of companies having achieved innovation (having "New or improved goods or services which have been introduced on the market by your enterprise" or "New or improved business processes which have been implemented within your enterprise") was 34% of all companies. Again, we can also see that the achievement rate rises as the size of the company becomes larger. As a simple summary of the results, 38% of companies carried out innovation activities and 34% of companies achieved innovation, which suggests that most of the companies that carried out innovation activities achieved some form of innovation. It is also significant that 41% of manufacturing companies achieved innovation, which was again higher than for service industries' achievement rate of 32%.

Taking a closer look at the achievement of innovation, 12% of all respondents replied that they had achieved product innovation ("A new or improved goods and services which has been introduced on the market"). With regard to product innovation, it is possible to make time comparisons by referring to previous surveys. Compared with the three-year period from 2009 to 2011, the percentage of all respondents having achieved product innovation declined in the period from 2012 to 2014, and declined further in 2015-2017. The rate of decline in the achievement rate for product innovation was particularly large at medium-sized companies. The survey also analyzes the correlation between innovation and the age of the company, but does not show a difference in the number of years a company has existed between those that carried out innovation and those that did not.

Taking all of this together, we can surmise that close to 40% of the surveyed companies carried out innovation, and roughly one-third achieved some type of innovation. It is also clear that both the implementation rate and the achievement rate rise as the size of the company becomes larger, and that the rates for manufacturing industries are higher than for service industries.

How do these percentages of companies implementing innovation activities and achieving innovation in Japan compare with those of other countries? In the OECD report Innovation Indicators 2019, Japan ranks 27th of 38 countries in its percentage of innovative firms (companies implementing innovation activities continuously during the survey period, including abandoned activities) for the period 2014-2016, at 42%. The highest figure was for Switzerland, at 73%, and the US ranked 7th at 65%. Japan also ranked low in terms of the percentage of companies having achieved an innovation in a product or business process, coming in 27th of 38 countries at 38%. In this ranking, Canada was highest at 79%, and the US ranked 7th at 62%. Looking at the seven major countries, the percentage of companies in Japan implementing innovation and achieving innovation is the lowest, as with international comparisons of productivity (data for the percentage of companies implementing innovation in Canada is missing).

There is some criticism of the innovation surveys we have examined to this point, however, because the replies are made subjectively by persons within the responding company and are therefore not necessarily objective. Nevertheless, J-NIS is conducted according to an international standard (the "Oslo Manual; Guidelines for Collecting, Reporting and Using Data on Innovation"), so we can assume that a certain degree of international comparability is maintained.

Respective countries' data confirms that the more active a country is in terms of innovation activities, the higher its rate of innovation achievement. Why, then, are the figures for Japan so low? J-NIS asks about factors hampering innovation activities. For the three years from 2015 to 2017, the main factor hampering innovation was "Lack of skilled employees within your enterprise," with 61% of all respondent companies citing this as a factor. This was followed by "Different priorities within your enterprise" and "Uncertain market demand for your enterprise's ideas". On the other hand, the percentage of companies citing "Lack of credit or private equity by financial institutions or investors" was relatively low at 22%. This shows that a lack of capable human resources is the problem that needs to be addressed for the implementation of innovation activities.

Japan's Investment in Human Capital

Innovation can be seen as a useful means of achieving increased productivity and economic growth. Unfortunately, Japan's level of productivity and percentage of companies achieving innovation are the lowest among the seven major countries. Given that countries with high rates of innovation activities also have high rates of innovation achievement, invigorating innovation activity can be seen as what Japan should do first. As noted previously, however, there is a problem of a drastic shortage of capable human resources who are able to propose and implement businesses related to innovation (human capital).

The accumulation of this human capital requires a discussion of what needs to be done before an employee is hired and what needs to be done after they are hired. First, prior to employment, the importance of human resource training in the STEM (science, technology, engineering, and math) fields is recognized in countries around the world. In the US, for example, in anticipation of a future shortage of STEM-related human resources, elementary and secondary school teachers are being trained in the STEM fields. In the EU as well, targets were set 10 years ago to increase the number of college students graduating with strengths in the natural sciences and engineering. In Japan, on the other hand, the number of students entering university in the STEM fields is among the lowest among OECD countries.

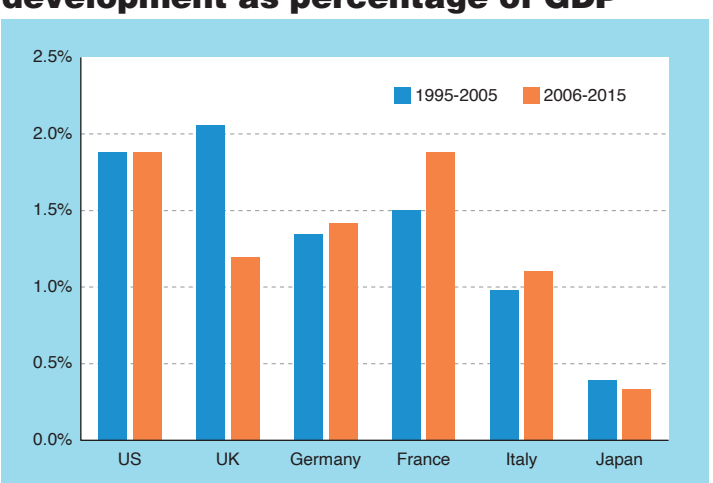
What is important for the development of human capital after hiring? For this, we have useful data for Japan's investment in human capital in the Japan Industrial Productivity (JIP) database. The JIP database estimates human resource investment as a sum of the expenses incurred for off-site training (Off-JT) and hours lost for off-site training (opportunity cost). *Chart 4* shows an international comparison of human resource investment as a percentage of GDP. As a percentage of GDP, Japan's human resource investment from 1995 to 2005 averaged 0.39%, and from 2006 to 2015 was only 0.33%, significantly lower than in other countries. It is also important to note that Japan's relative investment in human resources is declining. In contrast, human resource investment as a percentage of GDP was 1.9% in the US and roughly 1.4% in Germany, which is roughly five to six times the level in Japan.

In this article, I have used publicly available international data on investment in intangible assets compiled by INTAN-Invest for investment in human resources outside Japan. It is important to keep in mind that these international comparisons are generalizations based on limited data, and different methods of coverage are used for the US, Europe, and Japan. Some details are also left out because of space limitations; for example, because of limited data for Japan only the narrowest scope of human resource investment is counted for comparisons with other economically advanced countries. In addition, the JIP database has the problem of not including on-the-job training (OJT) as human resource investment. Using data for the percentage of overall work hours spent on OJT from the Corporate Awareness Survey Regarding Work Styles and Training conducted by the Cabinet Office in February 2018, we can estimate that as a percentage of macro added value, for 2015 Off-JT was 0.33% while OJT was roughly 11 times higher, at 3.76%.

Although these points need to be taken into account, it is important to recognize the fact that expenditures by Japanese companies for employee training are declining. This reduction in human resource investment after hiring is constraining Japan's accumulation of human capital, and could be part of the reason behind Japan's low percentage of companies implementing innovation activities relative to other countries.

CHART 4

Investment in human resource development as percentage of GDP



Note: Figures for Europe and the US are for all industries excluding real estate, public sector, medical, education, etc. Figures for Japan are for all industries.
Sources: Europe and the United States: INTAN-Invest, April 2020; Japan: JIP Database (2018)

Conclusion

Having fallen into a long period of stagnation, Japan is expected to face further economic deterioration from the spread of infections of the new coronavirus. To overcome this, innovation can be seen as a way to stimulate the economy. Japan's investment in research and development and in information and communications technology compares favorably with that of other countries, but data indicates that this is not leading to higher productivity or innovation. For this investment to yield results, it is essential to develop capable human resources who are able to incorporate and use these new technologies quickly. Policies to cultivate human resources with STEM backgrounds prior to hiring, and to promote and support investment in people within the company after hiring, need to be considered proactively going forward. JS

Dr. Miho Takizawa is a professor of the Department of Economics at Gakushuin University. She gained her Ph.D. in Economics from Hitotsubashi University. Her research interests include macroeconomics, productivity, and data analysis.