

## From quantity to quality: Changing the strategy of Japan and its science and technology

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### Shifting the strategic priority from quantity to quality

A certain sense of stagnation is looming over Japan as we face various issues, including the economic standstill and an aging society with a falling birthrate. When you come to a standstill at an individual level or at an organizational level, it is advisable to confirm and carry out basic policies and strategies thoroughly while envisioning your future direction. This author believes that our nation should aim at “high quality” as a basic policy across the board, including the field of science and technology. In these past few decades, Japan has been showing a tendency to place its strategic priority on scale or magnitude of quantity. Here in this article, this author advocates that now is the time to shift the priority from quantity to quality.

### The current state of our nation

In this section, two topics that seem to symbolize the current state of our nation will be taken up. The first topic is about our nation's GDP. Recently, people are speculating that Japan's status might fall from the second largest to the third in the world. Japan has long been identified as the world's second largest economic power in its people's mind, and this is why the looming change is making headlines. As a rule of thumb, the greater the population, the larger the GDP. So it is no wonder that, in terms of GDP, Japan will be exceeded by China, whose population is ten times as large as Japan's. The real problem with the GDP is that Japan's international ranking in terms of GDP per capita has kept falling and is already out of the top 20. This statistical reality seems to be consistent with Japanese people's perception of the increased difficulty in their livelihood, as GDP per capita is directly linked to the living standard of the people.

The second topic concerns our nation's achievements at the recent Vancouver Winter Olympics. Japan sent a big delegation including 94 athletes to the Olympics and won three silver medals and two bronze medals, or five medals in total. Many other Japanese athletes were also celebrated as top eight winners. It seemed that Japan achieved a certain level of excellence as a whole on the strength of its wealth of athletes. And yet, it also left the impression that, in terms of internationally outstanding athletes, Japan has fewer of them when compared to neighboring South Korea, which won 16 medals, including six gold medals, with almost half the number of selected athletes.

What kind of impression could be formed from the above two observations? If we likened our nation to a department store, the impression could be described as follows: The department store is an all-round department store which has maintained the industry's second largest position in terms of sales for many years. It has a wealth of goods and enjoys a satisfactory reputation in terms of both the quality of goods and attitudes of staff. However, it lacks any outstanding strength that could otherwise distinguish it from other competitors. Its profitability ratio is also low. Busi-

ness performance has been deteriorating and employees' wages as well as morale have kept falling. And yet, the department store cannot take any drastic measures. In recent years, some emerging department stores have been rapidly growing and gaining such momentum that they threaten to seize the time-honored No.2 slot in terms of both sales and profits sooner or later.

### Strategies to be taken

The above-mentioned perception seems to be applicable to the field of science and technology. When we discuss science- and technology-related issues in Japan, our arguments also tend to focus on volume or scale. For example, there is a lot of talk about the number of research papers, saying that Japan has been surpassed by China in this regard. But it is not surprising when we take into account the difference in populations. What matters is the quality of research papers. While Japan produces excellent research papers, it still lags behind leading countries in the US and Europe in terms of the relative citation index, which reflects the average quality of research papers in each country.

In these few decades, our nation has avowed itself as the world's second largest economic power. Based on such self-acknowledgement, scientific and technological policies have been also considered by making comparisons with US policies. As a result of this, a full set of independent systems has been realized to some extent. And yet, issues have been left unresolved in terms of quality and performance. In particular, judging from the decline in industrial competitiveness in recent years as well as the deterioration in GDP per capita, it is questionable whether scientific and technological achievements have appropriately led to development of the national economy through the creation of innovations.

The global trends concerning populations and economies make it self-evident that our nation is losing its special country status in terms of scale. Japan has no option but to shift its strategic priority from quantity to quality, whether it likes or not.

First of all, bold reforms and investments will be required for the construction of R&D systems of which the scale is not large but of which the quality is extremely high. Secondly, prioritized investments will be required for the establishment of fields with distinguished competitiveness. In addition, collaboration and sharing with overseas partners will need to be actively promoted while aim for self-sufficiency will have to be abolished in order to realize these ambitions with limited resources.

### High quality R&D systems to be constructed

There are various issues involved in enhancing the quality of R&D systems. For example, the following issues need to be addressed: structures and management of R&D organizations at independent administrative institutions and other institutions, funding for research projects, human resources in charge of research works, and related management, internationalization, and busi-

ness-academia collaborations. Due to the limited space in this article, this author will take up only one issue among many others which have not received sufficient discussion and efforts despite their importance. This is the problem concerned with human resources in charge of the management of R&D projects.

In contemporary R&D projects, organizational responses play more important roles such as developing and managing large-scale facilities/equipment or promoting partnerships with other institutions both at home and abroad. If it were not for appropriate management of planning, financial affairs, procurement, personnel affairs, intellectual properties, project administration, evaluations, international responses, facility/equipment administration and so forth, it would be difficult to conduct excellent research works. R&D institutions need to be overhauled in terms of their organizations, personnel structures and management processes so that personnel with professional capabilities can manage these institutions and achieve high performance.

Professional personnel for the management of R&D projects are needed in our nation's various R&D systems such as funding agencies other than R&D institutions. We need to establish such assignments as a respected career in society and create an environment in which many doctoral degree holders can pursue and flourish in this new career path.

#### **Competitive fields to be established through prioritized investments**

When budgets for the fiscal year 2010 were compiled, the Green Innovation (hereafter referred to as "GI") was defined as the most important policy issue at the Council for Science and Technology Policy. GI is a concept which pays attention to one issue to be solved (i.e. the realization of a low carbon society) and thus it is not based on classification by research area. This author believes that focusing on GI is absolutely necessary for the following reasons:

- (1) Realization of a low carbon society is our nation's most important issue.
- (2) Realization of a low carbon society is also a common global issue. Therefore, it is our nation's international responsibility to take the lead in this initiative.
- (3) Since the global market related to GI will surely expand, it will be of great industrial significance to ensure competitiveness in this field.
- (4) Our nation's science and technology relatively excel in the environment and energy fields related to GI. Therefore, we can expect to establish a competitive advantage in this area.

We need to work on GI as a national commitment in a unified manner. Accordingly, the Council for Science and Technology Policy is now formulating action plans for GI and Life Innovation, etc. in cooperation with other government offices and ministries with an eye to budgets for the fiscal year 2011. From now on, it will be advisable to construct a platform where representatives from industry, academia and government can discuss strategies concerning important issues to connect each exit plan to the relevant basics. It will also be desirable to establish a framework to ensure that discussions at the above-mentioned platform can be reflected as a basis to formulate each action plan.

Needless to say, it is necessary to take measures in order to ensure a wide range of high quality research works to be conducted at universities and other institutions in a framework of free-ideas-based research, while, at the same time, promoting prioritization in the area of policy-oriented R&D such as GI. In this way, innovative seeds will be created and various options will be-

come available so that we can prepare for an uncertain future.

#### **Proactive response to globalization**

As for the globalization, there are also various issues such as open innovations, international expansion of GI and other prioritized areas, international collaboration in improving research facilities and so forth. In this article, this author would like to focus on the mobilization of human resources among many other issues. In recent years, with the mobilization of human resources beyond national boundaries, i.e., the brain circulation having advanced, our nation is about to be left behind. Global competition to attract excellent researchers has been intensifying. Under such circumstances, Japan has also been taking measures to accept foreign researchers. As a recent example, under the World Premier International Research Center Initiative (or the so-called WPI Program) of the Ministry of Education, Culture, Sports, Science & Technology, the research base formation has been advancing with the aim of attracting excellent researchers from around the world. Under this initiative, a great number of young human resources including post doctoral researchers have been recruited not only at home but also from abroad, but acceptance of principal investigator (PI)-class senior researchers has not yet shown substantial progress. This delay has been influenced or caused by problems with living environments, including child education and work opportunities for spouses. From now on, it will be necessary to select certain regions to intensively promote the internationalization of both research bases and their surrounding regions through the implementation of special international zones and other institutional reforms.

On the other hand, there is another serious problem: the number of Japanese people—especially young ones—who go and stay abroad for a certain period for the purpose of overseas study or research has been on a declining trend. Research experiences at US universities or other institutions which attract talented people from around the world not only provide opportunities to improve research capabilities but also play an important role in constructing networks of talented people around the world. In this era of ever-intensifying globalization, it will be difficult to enhance our nation's research level if we cannot cultivate human resources capable of proactively participating in international cooperative activities. From now on, it will be necessary to enrich overseas assignment systems and reform personnel systems so that young people can easily go abroad and their overseas experiences can receive recognition.

#### **Now is the time to translate discussions into actions**

Many of the above-mentioned issues have been already under discussion for some time. Now is the time to translate these discussions into decisive actions. Our nation does not have that much time left.

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