

3-1. Japan

Japanese S&T Indicators as a Tool for S&T Policy

Prof. Fujio Niwa, GRIPS, Japan

3.1 Japanese S&T Indicators as a tool for S&T Policy

Table 1 Contents

First let me start the Japanese presentation. The title is “Japanese S&T Indicators as a Tool for S&T Policy.” It is of course based on the concept which I mentioned. What I would like to introduce first is a short history of S&T indicator development in Japan, and secondly I would like to refer to examples of indicator analyses. And thirdly I would

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| 1. Introduction |
| 2. Short History of S&T Indicator Development |
| 3. Survey of Research and Development |
| 4. Examples of Indicator Analyses |
| 5. S&T Policy |
| 6. Concluding Remarks |

like to explain Japanese S&T policy. Finally, as closing remarks I would like to introduce some ideas on the relationship between S&T indicators and S&T policy.

Short History of S&T Indicator Development

Table 2 Short History of Japanese Indicator Development

First I would like to talk about a short history of science and technology indicator development. This slide shows a very short history of indicator development. In 1984, development of “Japanese Science Indicator System,” at the beginning “Japanese Science Indicators,” was initiated by the Science and Technology Agency, STA. The STA organized a research committee. Its chairperson was Prof. Kaya, professor at Tokyo University, and I was one of members of this research committee. In 1988 the National Institute of S&T Policy, NISTEP, was founded. One of the major missions of this institute was to develop Japanese S&T indicators, and I was in charge of development of these indicators. In 1991 the first report of JSIS, Japanese Science and Technology Indicator System, was published. After that, Reports of S&T Indicators were published about every three years. In between so-called Reports of Data Updated were published since three years seemed to be too long.

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| 1984: Japanese Science Indicator System (JSIS) was initiated by the Science and Technology Agency (STA) in September. |
| 1988: The National Institute of S&T Policy (NISTEP) was founded. |
| 1991: The first report of JSIS was published. |
| 1994, '97 '00 and '04: The second, third, fourth, and fifth reports were published respectively. |
| 2001, '02 and '05: The reports of Data Updated were published respectively. |

Table 3 Objectives of Japanese S&T Indicators

I would like to introduce some discussions in the research committee of S&T indicator development. We asked ourselves what the objectives of Japanese S&T indicators were. So we discussed many things many times. The table shows one of our conclusions. We thought there had to be three types of objectives, that is, the typology of the objectives of S&T indicators. First, the indicators can be used to comprehend the status quo of Japanese S&T activities. So we called this Reporting Type. Indicators of the second type can be used to set goals. We named this Judgment Type. Later I will explain examples of Judgment Type that is the GIST (General Indicator of Science and Technology). Indicators of the third type can be used to formulate or evaluate S&T policy. This is Evaluation Type.

- **First**, JSIS should be used to comprehend the status quo of the country's scientific and technological activities.=> **Reporting Type**
- **Second**, it should be used to set goals which are attained within a certain time period.=> **Judgment Type**
- **Third**, it should be used to formulate and evaluate alternative policies.=> **Evaluation Type**

In the first report we decided to adopt Reporting Type, because it is a basic one. So a characteristic of the first report of indicators was Reporting Type. But in the second edition we developed GIST, which was Judgment Type. So in the second edition Judgment Type indicators were added to the report. Nowadays, Evaluation Type is a characteristic of the report to some extent, though it is not a major characteristic. I think that is the result of great efforts made by Mr. Tomizawa and Professor Hirano. I think the recent report has these kinds of characteristics.

Table 4 Criteria for Indicator Selection

At the same time we discussed the criteria for indicator selection. We studied the existing indicators of that time, which were the NSF indicators and OECD indicators, and they did not seem to be logical and systematical. That was our impression. In the Japanese case we believed the indicators should be devised logically and systematically, not arbitrarily and fragmentarily. That was the first point. Then according to this point we discussed to make the criteria for indicator selection clear. We called the criteria "statements". There were four statements, but only the first statement was very important. At least we thought so. The first statement was that the system should be designated to grasp not only R&D activities but also S&T activities as a whole. This was a strong criticism of the existing reports of that time. We thought that we could derive the second, third, and fourth statements from the first statement.

The indicators should be derived **logically and systematically, not arbitrarily and fragmentarily.**

- **Statement I.** The system should be designed to grasp not only R&D activities but also S&T activities as a whole.
- **Statement II.** Classification scheme of objectives should be built into the scheme of activities.
- **Statement III.** R&D activities should be described not in terms of input/output relations, but in terms of infrastructure/impact.
- **Statement IV.** Due consideration should be given to stock and subjective indicators as well as flow and objective indicators.

After discussions of this kind we concluded a system was necessary for the indicators. The Figure 1 is a rough structure of Science and Technology Indicator System. In the middle, R&D activities are located. Indicators in R&D Infrastructure directly support R&D activities. Indicators in S&T Infrastructure indirectly support R&D activities. Societal Infrastructure supports R&D activities more indirectly. The upper part is called Infrastructure Part, while the lower part is called Impact Part. R&D Results is a direct impact of R&D activities, which are their outputs. S&T Contribution is an outcome of R&D activities. Social Acceptance of S&T is impact of R&D activities. So this is a kind of a logic model. We also assumed feed back loops among indicator layers, but the main flow is from the top to the bottom. According to Webster, "Cascade" is defined as a series of small waterfalls or as something arranged in a series or succession of stages so that each stage derives from or acts upon the product of the preceding stage." The flow of the system analogizes to a cascade. Therefore, we called the indicator system a cascade one.

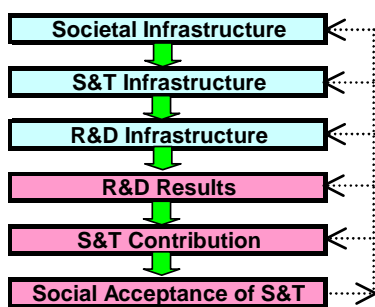


Figure 1 S&T Indicator System

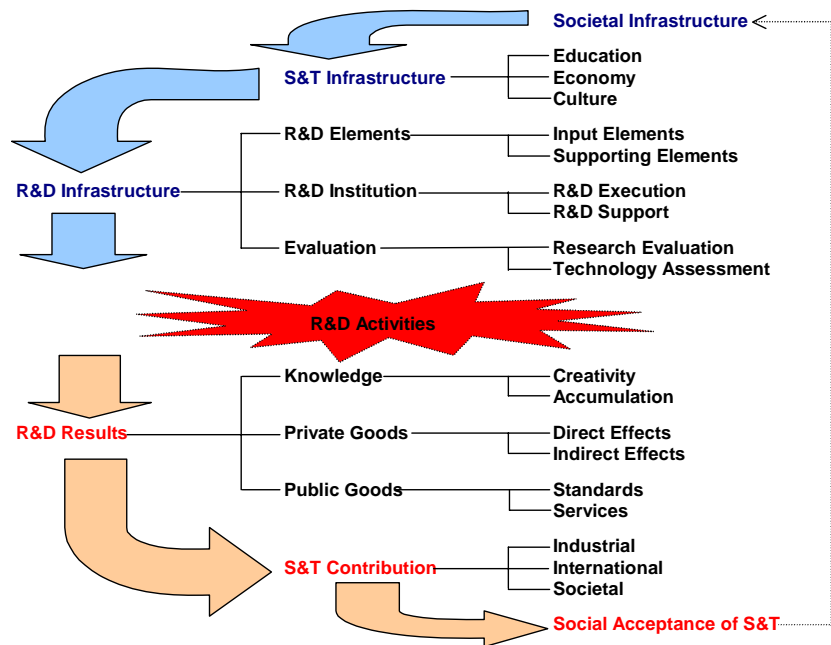


Figure 2 Detailed Structure of S&T Indicator System

The Figure 2 shows the details of the cascade structure of science and technology indicators in Japan. Each individual indicator belongs to an appropriate category, as R&D expenditures belong to "Input Elements" of "R&D Elements." Indicators of paper publication and paper citation belong to "Creativity" of "Knowledge." Indicators of patent registration and paper citation belong to "Direct Effects" of "Private Goods." These parts of the system are very important, while the parts at both ends of the system are not so important from the viewpoint of science and technology.

This is the book cover of the Science and Technology Indicator Report published in 2004. Its subtitle is “A Systematic Analysis of Science and Technology Activities in Japan.” This subtitle indicates that the contents of the report are based on the S&T Indicator System.

Table 5 Contents of the Report

Part I Global S&T Trends, and the Position of Japan

International Trends, Performance of Japan's NIS

Part II Knowledge Base, Human Resources and Training

Human Resources, Researchers, Development of Human Resources

Part III Knowledge Production

R&D systems, R&D Performance, Transformation of Knowledge Production, Government Role, Universities, R&D in the Business Sector

Part IV Science & Technology and Society

Innovation and the Japanese Economy and Society, Public Interest in S&T

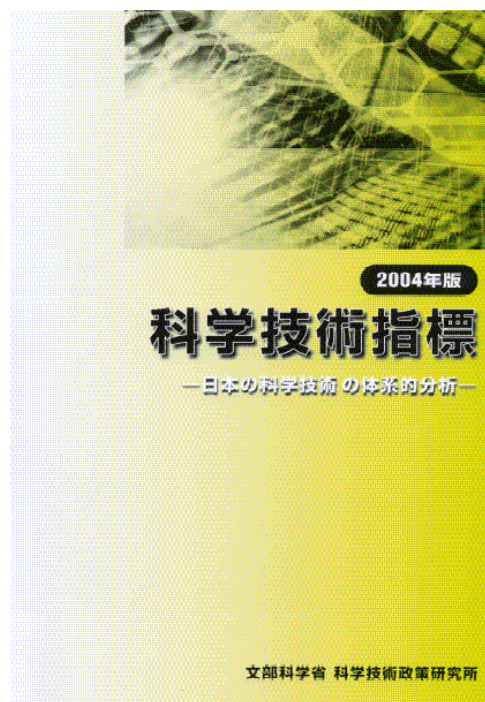


Figure 3 S&T Indicator Report 2004

This report consists of four parts and 30 chapters. The title of Part I is “Global S&T Trends and the Position of Japan”. The title of Part II is “Knowledge Base, Human Resources and Training.” When you look at all the part titles and chapter subtitles, you can understand what the key concepts are. They are knowledge, knowledge-based economies, and knowledge-based society. These key concepts must be related to the key concept of the current Japanese S&T policy. That is the Second S&T Basic Plan. Its concept is wisdom. Knowledge is a source of wisdom, and knowledge is a result of wisdom. Because the newest report has close relationships with the policy, the report has a role to evaluate science and technology policy. As I mentioned before, this is the result of great efforts made by Mr. Tomizawa and Prof. Hirano.

Table 6 Impacts of S&T Indicators

The Table 6 indicates how our science and technology indicators are used. Most frequently they are used in newspapers, both in trade papers and in ordinary papers. In particular, the GIST, General Indicator of S&T, was cited in an editorial of Yomiuri Newspaper. It is the most popular newspaper in Japan. White papers also deal with many results of S&T indicators. The Japanese team of S&T Indicator development submitted some results of S&T indicator analyses to the related communities in Japan. We also submitted our results to international communities, such as NESTI, National Experts of S&T Indicators in OECD, and STEPAN, S&T Pacific and Asian Network of UNESCO.

- **Newspapers**
Trade papers, ordinary papers
- **Whitepapers on S&T**
- **Related communities**
Academy, administration, industry
- **International communities**
NESTI (OECD), STEPAN (UNESCO), etc.

Table 7 Features of S&T Indicators

Now I would like to summarize the features of Japanese S&T Indicator System. That is my personal view. From my viewpoint there are three dimensions. The first is clear and structured objectives. The second is various analyses. The third is contents. In all of these dimensions we can find improvements of

- **Clear and structured objectives**
Systematic framework: Cascade system
- **Various analyses:** comparisons, pair-wise, and multivariate analyses, and others
Development of General S&T Indicator (GIST)
- **Contents:** appropriate methods of presentation: flow chart, radar chart, and others
Adequate interpretation

Japanese S&T indicators. Therefore, we can recognize evolutions of S&T indicators in Japan. The first dimension is clear and structured objectives as I mentioned. We discussed the objectives of the Japanese S&T indicator development, and based on them we developed the cascade system. Furthermore we added a Judgment Type indicator since its second edition. The recent report has characteristics of Evaluation Type. In the second dimension, we used various analyses. The simplest one is comparison. Comparison is analysis of a single indicator. Time trend comparison, international comparison, and sectional comparison are frequently used. We used pair-wise analysis several times. Later I am going to show examples of pair-wise analysis. We think that pair-wise analysis is very useful and powerful. The most complicated analysis is multivariate analysis. Its example is General S&T Indicator, GIST. The third dimension is contents. After many trials and errors we developed appropriate methods of presentation, such as flow charts, radar charts, and others. Needless to say, we analyzed background of what the indicators indicated over a long time. Therefore, we have much more adequate interpretations today compared to the past.

Examples of Indicator Analyses

Now I would like to introduce examples of indicator analyses. I do not have enough time to introduce many examples. Therefore I would like to introduce only typical examples of indicator analyses. This diagram is entitled Ratio of R&D Expenditures to GDP. Please look at Japanese ratio. It has been located at the top since 1990. The current value of Japan is over 3.0, which is a target of S&T policy of many developed countries. This is an example of single indicator analysis. What is a single indicator in this case? It is the ratio of R&D expenditures to GDP. But needless to say it consists of two indicators, R&D expenditures and GDP.

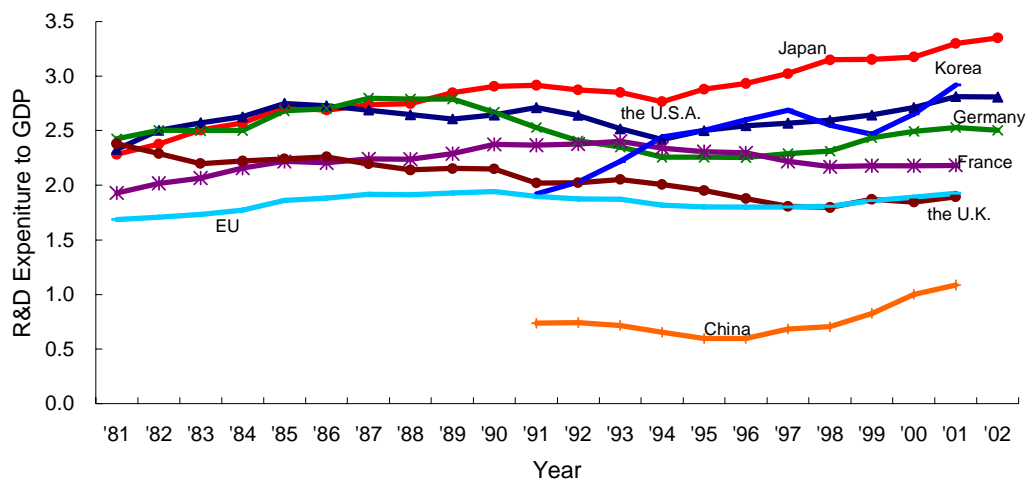


Figure 4 Ratio of R&D Expenditures to GDP

Now I would like to introduce pair-wise analysis. The x-axis indicates GDP, and the y-axis R&D expenditures. Please look at Japanese ratio and US ratio. What do you think about these trends? In the case of Japan the ratio is over 3.0, while in the case of the USA it is under 3.0. We can assume GDP to be an indicator of economic development, and R&D expenditure to be an indicator of S&T effort. In the case of the USA, both have grown mutually. We can find a so-called positive feedback. That means GDP, economic development, supports S&T activities. S&T activities support or stimulate economic development. This is a kind of positive feedback or a virtuous circle. Japan indicates a different trend from the USA. Even though the ratio is over 3.0, R&D expenditures, or S&T activities cannot contribute to economic development, because GDP has not increased in spite of increase of R&D expenditures. I think this figure indicates not only dynamic relationships between R&D activities and economic development, but also problems behind them. Therefore, it can show power of the pair-wise analysis. Furthermore, when we look at this, we are stimulated to analyze its background in detail.

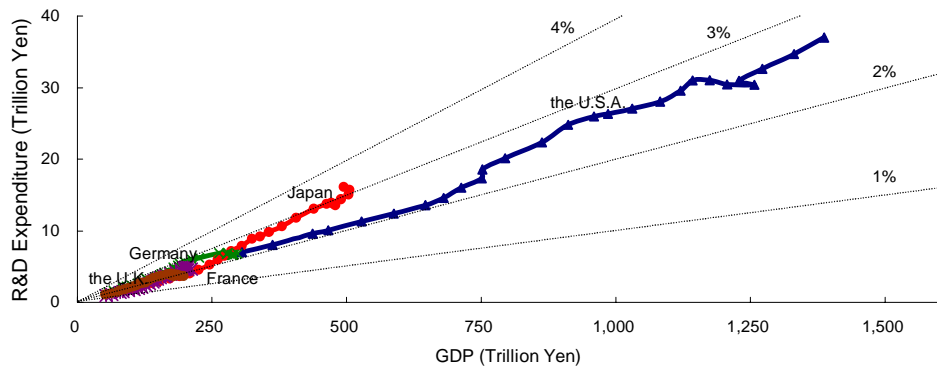


Figure 5 R&D Expenditure vs. GDP

The Figure 6 indicates the second example of pair-wise analysis. The title is S&T Output Quality. In this case I used two indicators. The first is “Scientific Output Quality.” What is scientific output quality? This is measured by the number of paper citation divided by the number of paper publication. Therefore, this can indicate scientific quality of each country. In the y-axis I used “Technological Output Quality.” This indicator shows patent citation over patent registration. We assume this indicator can indicate technological output quality. The diagonal is an even line which indicates the ratio of 1:1. Please look at the positions of Japan, USA and European countries. This figure can show characteristics of each country's S&T activities very clearly. In the case of Japan, it can be called technology-based innovation. On the contrary, the characteristics of the USA and European countries can be called science-based innovation. The figure or the result of pair-wise analysis can clearly show the S&T characteristics, which are very understandable. Therefore, pair-wise analysis is very useful and powerful. That’s why we frequently tried this analysis.

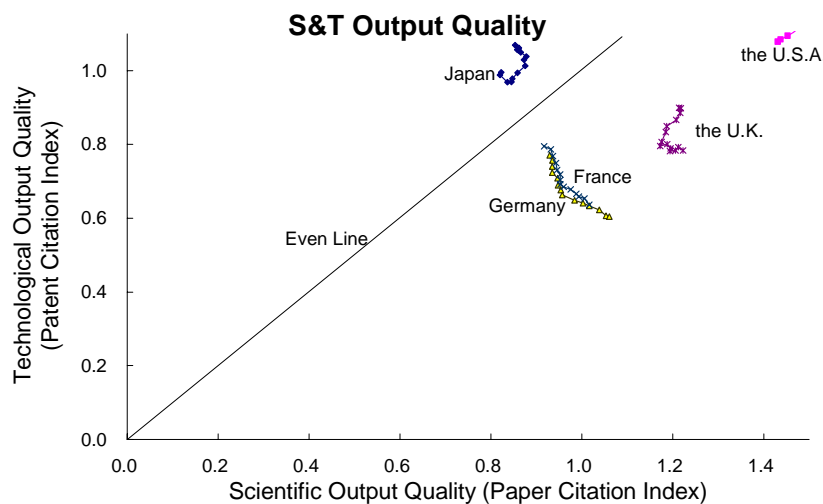


Figure 6 S&T Output Qualities

As the third example of the indicator analysis, I would like to introduce development of General Indicator of Science and Technology, GIST. The reason why we intended to develop this indicator is as follows. S&T activity today is extremely complicated and multifaceted. Therefore, many detailed indicators are needed if we are to try to describe it quantitatively. But there remains the difficult problem of how to understand the whole. In the case of economy, in the past we used GNP or GDP as an indicator which could reflect a sort of the whole economic situation. But in the case of science and technology there was no single indicator like GNP or GDP. In such a situation, we “cannot see the forest for the trees.” Under this condition we tried to integrate a large number of S&T indicators into a small number of indicators as a measure of a country's total S&T activities. This was developed by the team of Mr. Tomizawa and me. We hope we can see the forest as well as the trees.

The Table 8 shows “Used Data.” The dataset has a three-dimensional structure. We covered five developed countries, namely, Japan, the USA, Germany, France, and the UK, because we assumed there existed common S&T structure and characteristics in these countries. We used 12 S&T indicators. The most central and difficult problem here was which S&T indicators should be adopted as variables. Mr. Tomizawa selected indicators very carefully and modified them for this purpose. The period was 20 years from 1981 to 2000. The Table 9 shows the 12 indicators we used.

Table 8 Used Data

<p>Three-dimensional Structure</p> <ol style="list-style-type: none"> 1. Countries: Japan, the U.S.A., Germany, France, and the U.K. Developed countries: existence of the common S&T structure among them 2. Variables: 12 S&T Indicators. A central problem here is which S&T indicators to adopt as variables. 3. Period: 1981-2000 (20 years)

Table 9 S&T Indicators Used

<ol style="list-style-type: none"> 1. BachSci: No. of bachelors of science 2. BachEng: No. of bachelors of engineering 3. RdPersn: No. of R&D scientists & engineers 4. RdExpen: R&D expenditure 5. TImport: Technology imports 6. Paper: No. of scientific papers 7. PaperCi: No. of scientific paper citations 8. PatDome: No. of domestic patents 9. PatExtr: No. of external patents 10. TExport: Technology exports 11. ValueAd: Value added in the manufacturing industry 12. HighTec: High-tech product output

The Figure 7 shows the results of the GIST analysis. In this case please remember that the population ratio of America, Japan, and each European country is roughly 4:2:1, that is, 4 for the population of the USA, 2 for Japan, and 1 for each of European countries. Before 1990, the ratio of GIST was roughly 4:2:1. But when you look at the recent trends, the gap between the USA and the other countries has been expanded since 1990. For example, in 2000 the ratio was not 4:2:1 but 6:2:1. Furthermore it seems that the gap between the USA and the other developed countries will continue to increase in the future. I would like to hear your comments.

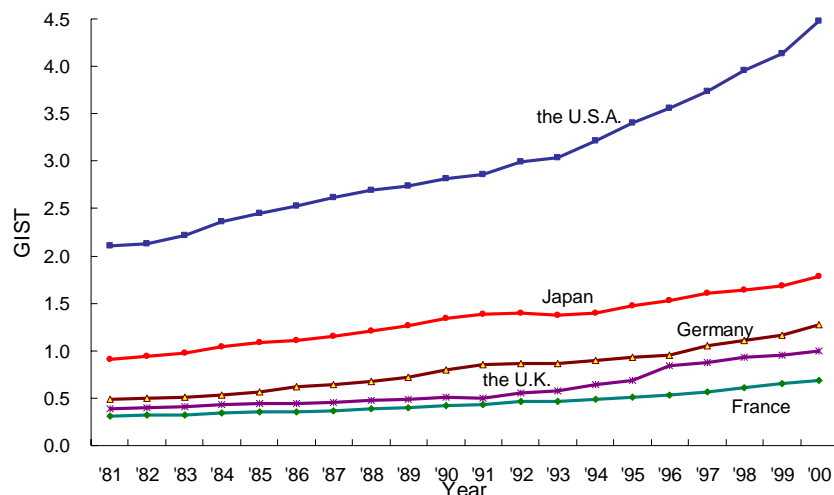


Figure 7 General Indicator of S&T

Wong: What is the weights used for the variables of GIST? Is it equally weighted?

Niwa: Thank you very much for your very good question. The answer is no. We applied principle component analysis, PCA, to this case. All weights are different, and they are decided based on Person correlation coefficients.

Japanese S&T Policy

Now I would like to introduce Japanese science and technology policy. First, this slide shows the recent short history of Japanese S&T policy. In 1995 the S&T Basic Law was enacted. And in 1996, according to the Basic Law, the S&T Basic Plan was decided by the cabinet. In 2001 the second S&T Basic Plan was decided by the cabinet.

Table 10 Short History of S&T Policy

1995: the S&T Basic Law
1996: the 23rd Recommendation by CST on the S&T Basic Plan
2000: Administrative Reform of Government Independent Agencies the 26th Recommendation by CST on the S&T Basic Plan
2001: the S&T Basic Plan by the Council for S&T Policy
2004: Reform of National Universities

Table 11 is the content of the S&T Basic Law. Chapter 1 describes general provisions, objectives, and so on. Chapter 2 consists of only one article, that is, Article 9, which is the so-called S&T Basic Plan Provision. According to the Provision the Cabinet of the government must make the S&T Basic Plan periodically, every five years. The period of five years is required under the Complement Law. The contents from Chapter 3 to Chapter 5 show how the government must promote S&T activities.

Table 11 Contents of the Basic Law

Chapter 1: General Provisions (Articles 1 - 8)
Chapter 2: S&T Basic Plan (Article 9)
Chapter 3: Promotion of R&D (Articles 10 - 17)
Chapter 4: Promotion of International Exchange (Article 18)
Chapter 5: Promotion of Learning on S&T (Article 19)

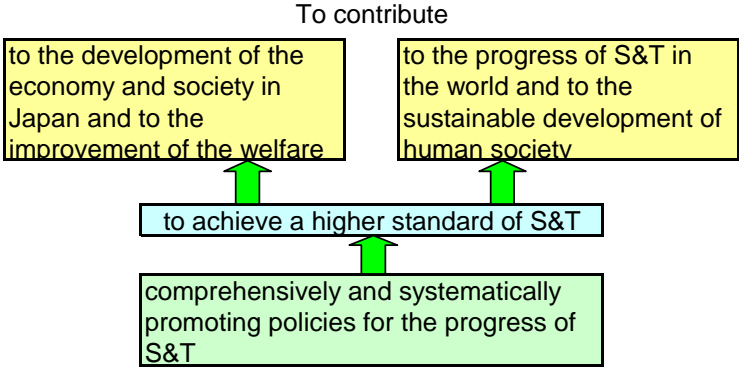


Figure 8 Objective Structure of the Article 1

Now I would like to introduce objectives of the Law. The Article 1 says “The objectives of this law are to achieve a higher standard of S&T, to contribute to the development of the economy and society in Japan and to the improvement of the welfare of the nation, as well as to contribute to the progress of S&T in the world and to the sustainable development of human society, through prescribing the basic policy requirements for the promotion of S&T (excluding those relevant only to the humanities in this law) and comprehensively and systematically promoting policies for the progress of S&T.” I think it is very difficult to understand. So I would like to show my analysis of the objectives of the law in Figure 8. According to the Law, we have two objectives. The left one is the improvement of the welfare, which is a domestic target. The right one is contribution to the sustainable development of human society, which is international contribution.

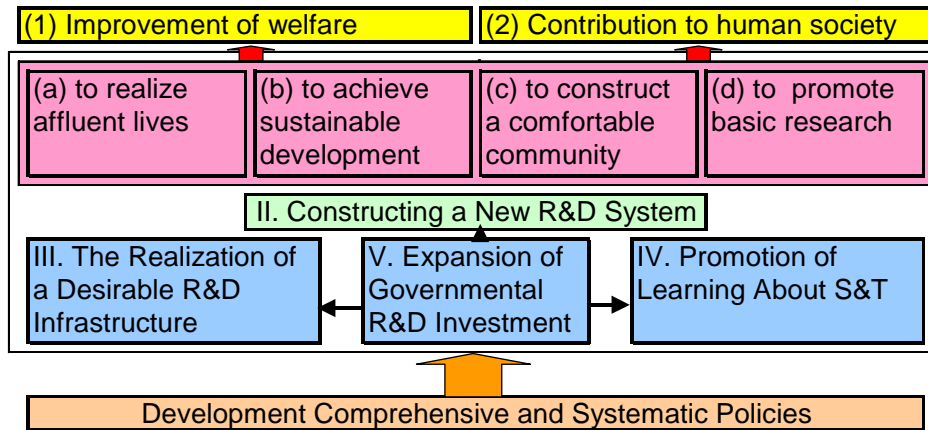


Figure 9 Objective Structure of the 1st Basic Plan

Table 12 Contents of the 2nd Basic Plan

I. Our Nation's Objectives at the Beginning of the 21st Century
II. Basic Policies for Promoting S&T
III. Expansion of the Governmental Investment; Effective and Efficient Allocation of Resources
IV. Strategic Prioritization for S&T
V. Reform of S&T System
VI. Internationalization of S&T Activities
VII. Steady Enforcement of the S&T Basic Plan and the Role of the Council for S&T Policy, Cabinet Office

Figure 9 shows the structure of the objectives of the 1st Basic Plan. The top layer shows the objectives set under the Law. The first one is improvement of welfare, and the second one is contribution to human society. The second layer shows the objectives of the first plan.

This is my favorite interpretation. When you study the Basic Plan, you can understand these may be objectives of the S&T policy. In the 1st Basic Plan there were no prioritized areas. That means this figure appeared to be well structured. In reality it was not so well structured.

In the 1st Basic Plan there were no prioritized areas. That means this figure appeared to be well structured. In reality it was not so well structured.

Table 12 is the contents of the 2nd S&T Basic Plan in 2001. It was made in response to the criticism of the first plan. I think the second plan was better structured. The objectives were declared in Chapter I. Chapter II shows basic policies for promoting S&T. Chapter III shows expansion of the governmental investment. Chapter IV explains strategic prioritized areas.

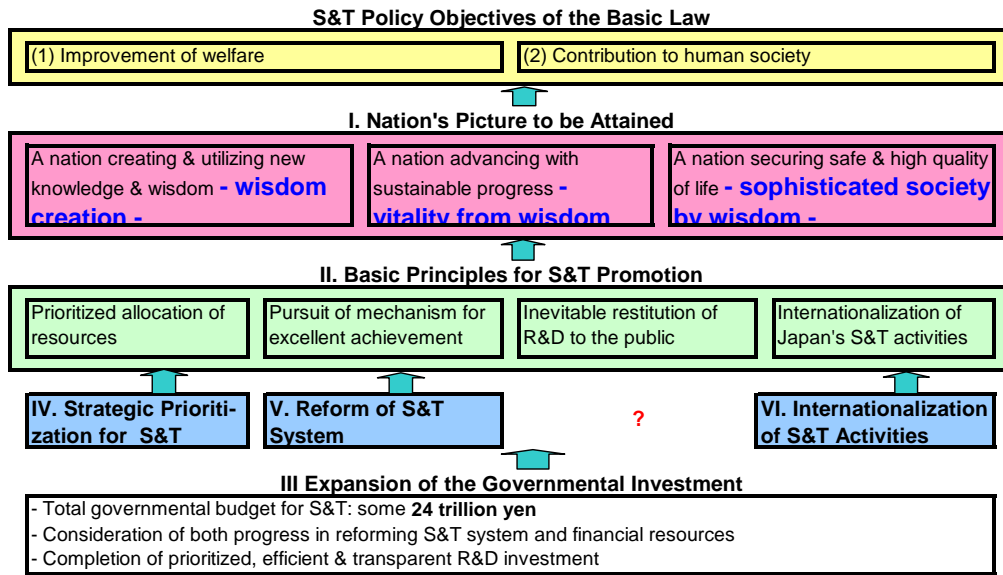


Figure 10 Objective Structure of the 2nd Basic Plan

Figure 10 is a structure of the 2nd Basic Plan based on my analysis. The first layer shows the domestic and international policy objectives of the Basic Law. The second layer is nation's picture to be attained. The first picture is "a nation creating and utilizing new knowledge and wisdom," which is called "wisdom creation." Therefore, these can be assumed as objectives of the Basic Plan. The layers under the second one show measures to realize the objectives. In the case of third principle, there were no concrete measures to return R&D results to the public. Roughly the 2nd Basic Plan appears to be better structured compared to the first Basic Plan. But in detail, it is not so well structured. For example, it is not so easy to understand the relationships between different components of different layers, although the relationships between layers are clear.

Figure 11 is a draft of the objectives of the 3rd S&T Basic Plan. This is a proposal made by Professor Abe. He is one of very influential members of CSTP, Council for Science and Technology Policy. This structure has three ideas and six goals. Each idea is broken down into two goals. I highly evaluate this kind of proposal because this is the first trial to structure the Basic Plan, in particular the next basic plan, which is the 3rd S&T Basic Plan.

I would like to introduce the administrative structure for science and technology policy in Japan. One of the most important organizations is the Council for S&T Policy, CSTP. CSTP assists the prime minister to realize a comprehensive strategy. CSTP must make Basic Plan, and CSTP leads overall coordination between MEXT and other ministries. MEXT must support CSTP strongly.



Figure 11 S&T Policy Goals

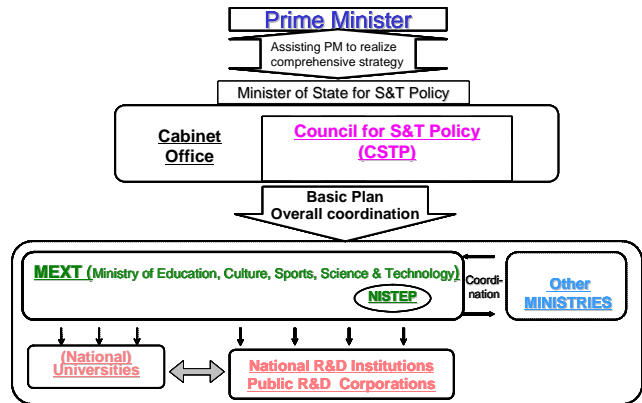


Figure 12 S&T Administrative Structure

Table 13 Features of S&T Policy

Let me now summarize the trends of S&T policy making in Japan. I classified them into two categories, that is, approaches and contents. It is my personal impression that there are three points in the case of approaches. They are science for policy and evidence based policy; broader involvement; and leadership and coordination of CSTP. As for science for policy, the Japanese Basic Plan is much more scientific or much more evidence based compared with the past. The second aspect is broader involvement, which means the size of participants in the policy making. The number of these people has become larger than the past. The third aspect is the function of CSTP. CSTP was transformed from CST, Council for S&T in 2000. After the transformation CSTP's leadership and coordination grew stronger and more influential. So I think we can find evolutions in all three aspects of S&T policy making to some extent.

<p>Approaches</p> <ul style="list-style-type: none"> • Science for policy, evidence based policy • Broader involvement • Leadership and Coordination of CSTP <p>Contents</p> <ul style="list-style-type: none"> • Systemization of target structure • Realization of targets • Evolution of evaluation
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Contents are the second dimension with which we evaluate the Japanese S&T policy making. Its first aspect is systemization of target structure. As I explained, the third Basic Plan will be much better systematized than the first one. In the aspect of realization of the targets, I would like to take the prioritized areas for example. In the first Basic Plan there were no prioritized areas. And in the case of the 2nd Basic Plan we have four prioritized areas, that is, life sciences, environment, nano technology and materials, information and communication technology. But the areas are broad and their focuses are not clear. In the case of the 3rd Basic Plan we expect them more concentrated. When the 1st Basic Plan was decided, it was

expected that the targets or objectives of the Basic Plan were strongly needed, and that the prioritized areas should be focused on small areas. The third aspect is the evolution of evaluation, which was strongly requested. Examples of evaluation dimensions are project evaluation, program evaluation, and policy evaluation. I think that they are not completely enough, but we have many experiences of project evaluation. Now we are challenging program evaluation and beginning policy evaluation, in particular ex ante evaluation. So this is a kind of evolution on evaluation. Evolution means that we have been making much improvement but it has not been completed yet. We have been gaining many experiences gradually or step-by-step. This is my personal evaluation on Japanese S&T policy making.

Concluding Remarks

As concluding remarks I would like to introduce the contributions of S&T indicators to S&T policy. First, Figure 13 shows a kind of logic model regarding S&T indicators. In Asian countries many people say science and technology development is a strong driving force of economic growth. For science and technology development, adequate S&T policy is necessary. And for adequate S&T policy, available S&T indicators are necessary. Therefore, this diagram shows a so-called logic model. In the Introduction Session of this international workshop, we pointed out this relationship between S&T indicators and S&T policy.

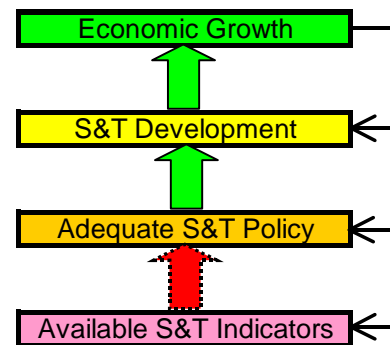


Figure 13 Logic Model

When we consider the relationship between S&T indicators and S&T policy, it is very useful to break down S&T policy making process. Figure 14 shows the S&T policy management cycle of policy making, policy execution, and policy evaluation. In each phase, S&T indicators contribute to the S&T policy cycle, although it is indirect contribution. The dotted line here means indirect contribution. Several indicators are useful directly for policy making but they are insufficient. The policy makers must gather new indicators. This is situation similar to the policy execution phase and the policy evolution phase. By the way in the last two fiscal years NISTEP conducted a review survey of the S&T Basic Plans. This review survey is located between S&T indicators and S&T policy. That is my impression. The review is merely review, and is not evaluation. But many results of the review survey must be used for policy making for the next basic plan. There are many data, whose results of analysis can be used for monitoring the existing Basic Plan. Needless to say, they must be utilized for the evaluation of the past and existing Japanese S&T policies. Therefore the figure can also show the relationship between the review survey and S&T policy in Japan. Furthermore I think the experience of NISTEP S&T indicator development contributed greatly to the review survey.

As a matter of fact the review survey adopted several indicators as well as several methods or presentations developed in the past. At the same time, the review survey developed new indicators, which can be added to the future indicator reports.

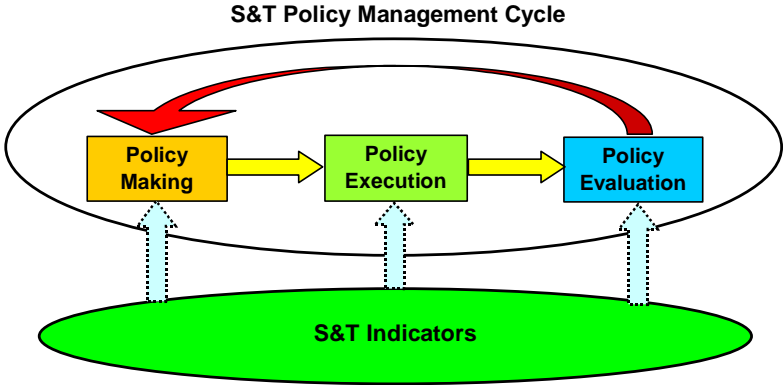


Figure 14 S&T Indicators and Policy

Table 14 Contribution of S&T Indicators to S&T Policy

Now I will summarize the contribution of S&T indicators to S&T policy. As I mentioned, S&T policy has two aspects, that is, approaches and contents. In the case of approaches the first item is science for policy. Our S&T indicators improved the scientific mind of people in charge of S&T. As a result it has become more scientific for policy. This shows that S&T indicators are influential factors of science for S&T policy in Japan. Secondly indicators can be useful for discussion. That means the participants can be more deliberative. Therefore they are also influential to successful discussion. Needless to say, based on quantitative analysis, CSTP can give full play to its leadership and coordination. Based on this, CSTP’s leadership and coordination are greatly strengthened.

Approache	
• Science for	← scientific
• Broader	← deliberative
• Leadership and Coordination of	←
• participant	
• based on quantitative	
Contents	
• Systemization of target	
• Realization of	
• Evolution of	
• ← based on quantitative	

The second aspect is about contents. The aspect of “Contents” consists of systematized target structure, realization of targets and evolution of evaluation. In all items, needless to say, their contents are to a greater or lesser extent improved by quantitative analysis based on S&T indicators. These are not direct feedback, but indirect contribution.

Finally, I would like to propose some mutual collaboration on S&T indicator analysis and policy analysis. Please remember this diagram shown in the Introduction Session. As I mentioned, ANSTEP wants to contribute to S&T indicator analysis and national policy analysis. In the case of S&T indicators, according to my understanding both Japan and Korea publish science and technology statistic reports and science and technology indicator reports. On the contrary, in Korea and Singapore we could not find any S&T indicator reports. If this is my misunderstanding, would you please correct it? Now in the case of S&T policy Japan and Korea commonly have Basic Law. Based on the Basic Law we have the Basic Plan on S&T. In the case of China and Singapore, I could not find this kind of Basic Law. If there are misunderstandings, please correct errors. I think this kind of mutual understandings would be necessary for our future collaboration in S&T indicator analysis and national policy analysis.

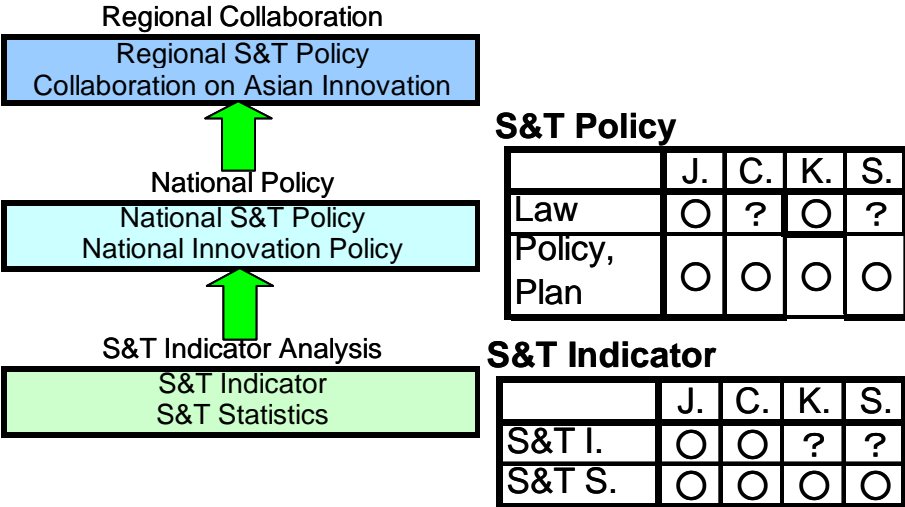


Figure 15 Future Collaborations on S&T Indicators

Thank you very much for your great patience to listen to my Japanized broken English. Any questions or comments?

Q&A

Gao: Concerning the law on S&T, we do have some laws in China.

Niwa: What is the name of the law?

Gao: Basically the law which is similar to the Basic Law in Japan is called S&T Advancement Law. I do not know how to translate it more exactly. We started last year a process to modify this law. Perhaps in October, this month, it will be submitted to the State Council for review, then to the Congress. This month we will review the revisions of the edition. They will give some evaluation on that until it is suitable for submission to the congress. But there is a law. I think it was actually enacted in 1993.

Niwa: Thank you very much for the information. I would like to pass it on to Mr. Ogata. He is in charge of updating ANSTEP homepage.

Gao: After it is modified, and then perhaps next year it will be approved by the national congress.

Niwa: Thank you very much.

Gao: I am very interested in what you called integrated indicators. One of the questions is about the reference you mentioned in your paper. You mentioned the EU follows us in “Key Figures 2003.” I would like to know the reference.

Niwa: In my paper I presented the exact year of “Key Figures.” But just now I don’t remember exactly when composite indicators were mentioned in “Key Figures” for the first time.

Ijichi: If I remember correctly, the working paper was published in 2002. These results are used for “Key Figures.” But also the other S&T indicators are developed in the EU.

Niwa: Did you find composite indicators in the recent “Key Figures” ? I did not find.

Ijichi: No.

Gao: There are two things that influence composite indicators. One is the investment of R&D. The other is the performance of the R&D.

Ijichi: I think the reason why composite indicators are not included is some people are reluctant to include composite indicators. In particular, politicians like this kind of indicator because it is very easy to use. But policy makers in Brussels and also the statisticians are very reluctant.

Gao: Why I ask you that question is that in China we have the long- and medium-term strategy planning. Before that we did some strategy research. On this research the Minister of MOST asked us to develop composite indicators. They tried to know the competitiveness of China’s S&T, and said, “ Just give me the indicator.”