REGIONAL ECONOMIC POLICIES:
THROUGH DEVELOPMENT OF HIGH
TECHNOLOGY ORIENTED INDUSTRIES

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I INTRODUCTION

The technology development policy of a nation used to have a tendency to be practiced separately from both urban management policy and regional economic policy. Recently, it has been increasingly recognized that, in order to pursue more effectively the primary aims of each of these three policies, they should be incorporated into an integrated comprehensive plan. The Tsukuba Science City has been developed based on this understanding, and is now growing rapidly as the largest R&D center in Japan.

Meanwhile, on the same principle, the Technopolis Development Plan has been designed to adapt existing regional economic structures to progressing technological advancement. The Technopolis Development Plan aims at the socio-economic growth of less-developed regions in Japan through the promotion of production activities of high-technology oriented industries in specific areas of such regions.

This descriptive paper furnished in places with explanatory quotations from various references, focuses on taking a general view of spatial implications of the Tsukuba Science City and Technopolis Development Plan in the framework of the historical context of the national and regional development plans officially formulated in the postwar period of Japan. For this purpose, the outlines of the four consecutive

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Comprehensive National Development Plans are succinctly described in Section II, followed by the discussion in Section III on the two major regional development plans, namely, National Capital Region Basic Development Plan and Kinki Region Basic Plan. Section IV profiles the development of the Tsukuba Science City, while Section V provides a sketch on the national project of Technopolis Development. In Section VI are shown policy backgrounds underlying various national and regional development plans implemented during the period of the past quarter century.

II NATIONAL DEVELOPMENT PLANS

One can geographically divide Japan into nine regions as shown by Figure 1. The Kantoh region includes Tokyo which is the largest metropolitan area in Japan, and is therefore often called the National Capital region. The Kinki region comprehends the second largest metropolitan area, Ohsaka, while the Tohkai region includes the third largest metropolitan area, Nagoya, which is the central nucleus of Aichi prefecture. Therefore, Kantoh, Kinki and Tohkai regions area referred to as the three largest metropolitan regions.

Looking at the change in the pattern of spatial population distribution, the rapid inflow of population to the three largest metropolitan regions has been continuously observed since the end of 1940s. This process has resulted in (1) the excessive concentration of population in the three largest metropolitan regions and (2) significant economic retrogression in remote rural areas. The simultaneous existence of both overpopulational and depopulational problems are, however, closely related to the structural characteristics of the whole national economy. This has made it extremely difficult for prefectural and municipal governments to solve those problems merely through their own local policies without any matching policies supported by the central government. The movement of residential and industrial activities out of the three largest metropolitan areas, therefore, has been uninterruptedly regarded as one of the most important planning objectives for the nation's urban and rural policies throughout the post war period.

Under such circumstances, four Comprehensive National Development Plans have been designed in serial order and approved by the Cabinet (except the last one), based on the Comprehensive National Land Development Law of 1950 (Act No. 205, 1950). The aim of this law is to integrate effectively different development policies designed to cope with various issues of cities, regions, housing, land use, industrial location, transportation, welfare and education, and the like into a single consistent national plan for the purpose of realizing the spatial decentralization objectives.

The First Plan of the series was determined in 1962. Its primary aim was to tackle the issues of both excessive concentration of population in the three largest metropolitan areas and rapid decline of population in remote rural areas, and
(Note) Letters A through I run for regions and numbers 1 through 47 for prefectures.

Figure 1 Regions and Prefectures
eventually in a long-run perspective to achieve a balanced spatial population distribution over regions. Though this basic planning aim has also been maintained with the Second, Third and Fourth Plans, the instrument for the implementation of the planning aim significantly varies over the four Comprehensive National Development Plans.

Compactly identifying the principal features of each of the first three Plans, the concept of “regional growth pole centers” was adopted as a key notion in the First Plan. In the Second Plan, “large-scale development projects” were encouraged to be undertaken together with the improvement of the “nationwide high-speed transportation network.” The Third Plan’s focus is centered upon the amelioration of the nation’s “habitation framework” to search for a reasonable harmony between people and their surrounding natural, historical and cultural environments.


The intention of the First Comprehensive National Development Plan was to restrain population and industry from concentrating in large metropolitan areas by curbing the construction and expansion of new factories especially in the three largest metropolitan areas. At the same time, the plan aimed to remove some of the existing government offices, educational institutes and firms out of those metropolitan areas.

In order to activate industrial centers in less-agglomerated areas, regional development strategy based on the growth pole theory was applied to the First Plan. As a part of this development approach, the New Industrial City Development Act was enacted in 1962. As stipulated by this Act, fifteen New Industrial Cities were designated as regional growth poles during the period from 1964 through 1966. The governors of each prefectures with designated New Industrial Cities made development plans for the Cities as to industrial factory sites, population changes, land use pattern, highways, harbors and housing. The central government provided special financial assistance by, for example, increasing subsidies. Meanwhile, the Industrial Development of the Special Area Act was enacted in 1964 with almost the same scope and contents as the New Industrial City Development Act. Based on this Act, six Industrial Development Special Areas were designated.


Progressed development were generally observed to some extent under the First Plan in both New Industrial Cities and Industrial Development Special Areas. Nevertheless, the income differential among regions was not so significantly reduced as had been initially expected, and the concentration of population to the three largest metropolitan areas had continued throughout the First Plan period. This persistent trend of urban growth led to the formulation of the New Comprehensive National Development Plan in 1969. The principal strategies underlying the Second Plan
REGIONAL ECONOMIC POLICIES (Kawashima and Taketoshi)

were (1) to construct a nationwide transportation network of express motorways and a high-speed national railways (Shinkansen) system and (2) to implement large-scale industrial development projects.

Various other measures were also taken to relocate industries from overpopulated areas to less-agglomerated areas. By means of this kind of approach, interregional income discrepancies started to become somewhat narrower during the Second Plan period.

3. The Third Comprehensive National Development Plan of 1977 (The Third Plan)

It was expected with the Second Plan that the improved transportation network and large-scale industrial projects would facilitate rapid economic development in specific regions outside the three largest metropolitan areas. However, the original goals of the Second Plan could not be satisfactorily attained because of insufficient arrangement of new industrial areas which were supposed to serve as leading development nuclei for regional economy. To substitute for the Second Plan, the Third Plan was formulated. This Plan set forth a “habitation (or settlement) framework” systematically to develop and improve desirable environments for human living. Consequently, the Plan placed its emphasis on the solid creation of social and economic milieux which would allow people to enjoy a high quality of life, which are stable, healthy and cultural with a recognisable and appealing local identity and with a harmony maintained between people and nature.


The report predicts that the industrial and trade structure of Japan will orient toward increased production of smaller sized and higher value-added commodities with less pollution problems and with fewer imports of raw materials and energy resources. It also predicts that, even with these fundamental changes in the structure of industry and trade, the Japanese economy will perhaps be able to keep growing, at an annual real growth rate of around four percent, primarily based on increased investment in the high-technology industrial sectors.

The report warns against the excessive centralization in the Tokyo metropolitan area of business, administration, information, and culture and learning opportunities, by arguing that Ohsaka and Nagoya metropolitan areas have to do more to develop themselves as strong regional centers. It points out that more express motorways,
Shinkansen lines, airports for wide-bodied jet planes and modern telecommunication facilities are required for efficient and systematic connection between different regions.

In addition, the report explicitly speaks of urgent issues: (1) the need for the development of necessary facilities and human resources in order to cope with the further internationalization of Japan, (2) the possibility of a significant increase in the share of Japan's total public works appropriations going into operation and maintenance of such aging social infrastructures as old roads, bridges and dams, and (3) the rapid aging of Japan's population as an inescapable social process.

III REGIONAL DEVELOPMENT PLANS

Almost all of the nine regions have had their own regional development plans, while specially designated areas have also had their own development plans and programs. Among the major regional development plans are the National Capital Region Basic Development Plan and the Kinki Region Basic Plan, while among the latter plans are the development plans for the Tsukuba Science City and Technopolis Areas. In the following, we first discuss the two Basic Plans. We then proceed with the discussion on the Tsukuba Science City and Technopolis Areas in the following Sections.

1. National Capital Region Basic Development Plan

A series of three National Capital Region Basic Development Plans (NCRBD Plans) have been formulated for the Kantoh region.

1–1. The 1958 Plan (The First NCRBD Plan)

The First NCRBD Plan was drawn up in 1958 which was made after the model of the Greater London Plan of 1944. The Plan covered the area within a 100 kilometer radius from the center of Tokyo city. Based on this plan, the following planning actions were carried out;

(1) Restrictions were imposed in densely built-up areas of the region on new construction and expansion of factories and universities, which were considered as major causes of excessive concentration of population and industry.

(2) Green belt zones (suburban zones) were set up around densely built-up areas to restrict urban sprawl phenomena.

(3) Industrial cities were set up outside the green belt zones, along with the establishment of the legal power in 1962 to expropriate land for industrial sites.

1–2. The 1968 Plan (The Second NCRBD Plan) and the 1976 Plan (The Third NCRBD Plan)

Due to the high growth of the Japanese economy during the period of the First
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NCRBD Plan, the urbanization process went on at a much faster speed than had previously been forecast. To contend with this economic climate, the Second NCRBD Plan was drawn up in 1968. This Plan shifted planning emphasis from physical restriction on urban growth to the promotion of “planned urban development” with careful consideration for the reasonable preservation areas of greenery.

In 1976, the Third NCRBD Plan was formulated, with the following recognition on urban change phenomena:

1. The population of the Tokyo metropolitan area would be likely to reach a level as high as 30 million.

2. Increasing population, coupled with an increasing number of households, would bring about further expansion of the urbanized areas in the Tokyo metropolitan area.

The basic intention of the Third NCRBD Plan is to limit the increase in residential and industrial activities in the central part of the Tokyo metropolitan area in order to improve the quality of urban life in Tokyo. In order to achieve this goal, the Plan has called for the development of new towns, a motorways network, a mass rapid transit system and water mains.

2. Kinki Region Basic Plan

Three Kinki Region Basic Plans (KRB Plans) have been formulated as a series for the region covering eight prefectures, that is, the region consisting of the six-prefecture Kinki region (as shown in Table 1) and in addition Fukui and Shiga prefectures. The First, Second and Third KRB Plans were launched in 1965, 1971 and 1978 respectively. As with the National Capital Region Basic Development Plans, the primary intention of the KRB Plans has always been to encourage the exodus of population and industry from built-up central urban areas to their surrounding suburban areas.

The Kinki region\(^9\), however, differs from the Kantoh region in the point that it has inherited a rich background in historic and cultural spheres. Thus, the development plans for this region have had to respect in principle the favourable attitudes of regional people toward historical and cultural preservation more keenly than those of other regions. Furthermore, the economic base of the region has been declining in recent years showing a remarkable contrast with the Kantoh region. This will certainly demand the formulation of the Fourth KRB Plan in the near future to revitalize the regional economy through the promotion of, for example, international-oriented activities and information-oriented industries.

IV DEVELOPMENT OF THE TSUKUBA SCIENCE CITY

1. Planning Characteristics as a National Project

It was decided in 1963 to develop an academic new town in Tsukuba area as a
(Source) Constructed based on Ibaraki Prefectural Government (1985)

**Figure 2** Transportation Network for Tsukuba
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national project. This regional development plan aims at (1) decentralization of
government functions from Tokyo and (2) promotion of higher levels of research and
educational activities in the Tsukuba Academic New Town covering 4,000 hectares and
located approximately 70 kilometers northeast of the central business district of
Tokyo as shown in Figure 2. This project will, when it is finished, bring into the
new town forty-six governmental bodies with six thousand researchers, five thousand
managerial, personnel and clerical officials and ten thousand students. The total
population expected to reside in the new town is about one hundred thousand, while
an additional hundred thousand are expected to live in its surrounding areas which
are presently being developed.

In 1970, the Tsukuba Science City Act was made into a law through which six
neighbouring municipalities have been designated to compose the Tsukuba Science
City serving as the central node of the Tsukuba Academic New Town. By 1980,
around four fifths of the forty-six governmental bodies with about nine thousand
jobs had already been relocated to the new town from the central part of Tokyo. The
population level of the Tsukuba Science City was about one hundred and twenty-five
thousand in 1980.

2. Three Major Expected Achievements

Among the major expected achievements accruing from the implementation of
the development plan for the Tsukuba Science City are as follows.

2-1. National Technopolis as the Largest R&D Center in Japan

Generally speaking, industries in Japan are becoming more and more R&D
oriented. In these circumstances, Tsukuba can be considered as a "National Techno-
polis" although it is not an officially designated technopolis by the national govern-
ment. At the same time, Tsukuba is certainly anticipated to contribute also to
regional economic growth.

In this context, Ibaraki Prefecture is now preparing the "Techno-Linkage Plan",
as described by Figure 3, to make the best use of Tsukuba's potential resources,
both in software and hardware types, available in the prefecture. The immediate
strategy to meet this purpose is to promote high-technology oriented investment in
Tsukuba. The Tohkodai Research Park has, for example, already attracted excellent
companies in the field of electronics and bio-chemicals including Intel Japan and
Teisan (L'air Liquide's subsidiary). The Tsukuba Research Consortium has been,
on the other hand, established as a new type of joint R&D activities. Simultaneously,
the best example of public-private cooperation can be expected to be observed here
in the Tsukuba Science City in the sphere of regional economic development. It
should be noted, however, that similar methods might not always be applicable to
other stagnating regions because of the fact that easy access to Tokyo and Narita is

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Tsukuba's another major locational attraction.

2-2. Planned Urban Environment with Good Infrastructure

The Tsukuba Science City is well-provided with infrastructure while most other Japanese cities are suffering from insufficient urban environments due to relatively poor urban infrastructure. For example, sewers are installed in 100% of the Tsukuba New Town Area, and parks are provided at the level of ten square meters per inhabitants Tokyo as compared with 8.4 m² in Paris. Because Tsukuba is a large-scale experimental city, various types of the most advanced urban facilities are also provided such as CATV, a vacuum disposal system and a district heating/cooling system.

This high level of urban infrastructure in Tsukuba serves as an important factor to prevent urban sprawl and to attract private building investment. It also offers a comfortable environment for those residents moved from Tokyo which is a good
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inducement for companies to locate here. In other words, the well-developed infra-
structure in Tsukuba provides its residents with urban amenity agglomeration economies.

However, we have also to look at the shadow side in the development of the
city. For example, if the population should not increase as planned.
Current population in the New Town Area is about 33,000 against the planned
population of 100,000. This fact has resulted in the following problems.

(1) High maintenance costs for unutilized infrastructure: Every year, the national
government has given the municipalities subsidies of 3 billion yen ($18.8
million) for maintenance for ten years (1976–1985) in addition to 2 billion
yen ($12.5 million) for the development of surrounding areas.

(2) High land prices which discourage people from acquiring housing land in the
New Town Area.

(3) Low demand for new facilities: The lack of enough demand for the district
heating/cooling system, for example, tends to make deficits as well as to
become economically obsolete when new technology is developing rapidly.

Another drawback is the financing of infrastructure. This kind of huge invest-
ment in the advanced provision of high-level infrastructure in such a short period
was made possible only because the development plan of Tsukuba is a national
project. More technically speaking, it was financed by the loan borrowed through
the Housing and Urban Development Corporation. The costs for the development of
infrastructure are allocated to each site of individual government institutes when
they start to buy their sites from the Corporation. In this scheme, difficulties are
obviously expected at a time of financial squeeze at national government level.

3. Problems to be Tackled

3–1. Municipal Issues

The Tsukuba Science City was welcomed, at the outset, as a splendid regional
strategic city. However, several problems soon arose concerning the land acquisition.
As a matter of fact, the first plan aiming to provide 4,000 ha for the New Town
Area, required the acquisition of farmland and a considerable number of housing sites.
It was thus rejected after strong objection from farmers. Eventually, the final plan
turned out to require 2,700 ha for the New Town Area, and the Area was developed
mainly along the borders of the six adjacent municipalities where the land was
available in the form of unproductive forest. This particular form of development has
led to current unfavourable situations hindering an effective urban management.
Namely, the New Town Area is divided into six different municipalities, and no
single authority has so far been established to manage comprehensively the whole
New Town Area as one spatial entity.

It should also be noticed that 900 ha out of 2,700 ha are provided through the
Land Consolidation Projects in order to persuade landowners. This is because the Land Consolidation Projects return a considerable part of the land to its initial landowners, after some reduction for infrastructure site and costs, in such a way that development values are accrued to them. In the New Town Plan, those lands are designated as residential areas, but speculative holding of land has deterred the population from increasing as planned.

Another type of problem is that the locational movement of national research institutes into the Tsukuba Science City has not so far contributed to a significant increase in either local employment opportunities or municipal tax bases. Slow growth of population has also discouraged the supply of such agricultural production as eggs and vegetables which farmers had expected to produce. These economic problems are to be solved by inducing private investment.

3–2. Slow Growth of Population

Among possible causes for slow population growth in the Tsukuba Science City are as follows.

(1) Economic Factor: It was only in 1980 that all the planned research institutes started their operation. Therefore, the private sector has not yet been able to respond fully to the operation of such research institutes. In addition, industrial sites have not been prepared to effectively induce private investment because manufacturing industries were assumed incompatible with a research environment at the initial stages of the implementation of the Plan. But it is not the case nowadays, and Ibaraki Prefecture now intends to provide another 400 ha of industrial sites in addition to the currently available 300 ha.

(2) Social Factor: Many researchers seem to be satisfied with the city life in Tsukuba. Nevertheless, it is often pointed out that those people who have already acquired their own houses in Tokyo or who have education problems with their children tend to become so-called weekend-commuters and that they are reluctant to settle in Tsukuba.

(3) Urban Management Factor: The Tsukuba Science City is not a city in a legal sense. Due to the physical urban apparatus of the city which spreads over multiple municipalities, several problems have already arisen. For example, some children cannot go to the primary school nearest to their houses because the school is located in a different administrative area from the one with which they are registered. Meanwhile, some urban services such as water supply and waste disposal, are provided by the union of municipalities concerned. However, this kind of unification attempt is not sufficient to solve fundamental problems hindering an effective urban management. In light of this, an effort has been made to unify the six municipalities into one functionally administrative city, but has not yet been successful because of the objection from a very few town leaders against such an effort.
V TECHNOPOLIS PLAN FOR REGIONAL DEVELOPMENT

The Basic Technopolis Plan was conceived in 1981. In accordance with this concept, the Technopolis Development Plan was formulated in 1982 and the Technopolis Law was enacted in 1983.

1. Technopolis Development Plan

The Technopolis Development Plan can be regarded as an innovative instrument to activate economic and social performances in the relatively lagged regions. The Plan, setting the year 1990 as its target deadline for the completion of general implementation of the Plan, aims at the creation of a new type of regional center in which industrial, academical and residential activities are closely and complementarily associated with each other in both functional and spatial dimensions. Such a new type of regional center shall be called Technopolis and will be established in and around the already existing “mother city” with the population of 150,000 or more. From this mother city, the industries can enjoy high levels of urban agglomeration economies and “technopolitaners” can enjoy high levels of urban agglomeration amenities.

Putting it more concretely, the most strategic regional development element for the creation of Technopolises resolves itself into the construction of high-technology oriented industrial complexes composed of electronics, mechatronics, robotics, biotechnology and/or new materials industries. Such industrial complexes are anticipated to function as key bases to enable the economy of the Technopolis area to become self-propelling. At the same time, the Technopolis area itself is anticipated to supply to immigrating high-technology oriented industries (1) necessary location sites with reasonably developed infrastructures for efficient production activities and (2) desirable software infrastructures for creative research activities.

The academic activities envisaged in the Plan are universities, colleges, research institutes and laboratories which can provide business enterprises located in Technopolises with high levels of scientific and technological knowledge and research stimulation. As to residential activities, Technopolises are supposed to offer amenity-oriented environments for managerial, technical and scientific personnel, their families and other technopolitaners to enjoy a pleasant daily-life.

The Plan is designed, in addition, to draw out local initiatives in the sense that the implementation of the Plan rests mainly with (1) the municipal and prefectural governments concerned and (2) the vitality of the private sectors which have already been or will be located in the Technopolis area. By drawing out local initiatives, it is expected that various kinds of both available and potential resources of Technopolis areas will be wisely utilized.
Contents of Program include:
1. delineation of the development areas,
2. goals of the industrial development based on high-technology,
3. long-term planning on construction and maintenance of industrial and residential infrastructures including highways, and
4. establishment of a legal body which serves to facilitate financing for private enterprises necessary for the industrial development.

Conditions to be satisfied by the development areas are:
1. that excessive concentration of manufacturing industries has not yet been observed,
2. that the "mother city" can be expected to become a center of industrial and residential activities,
3. that there exists at least one university offering courses in the field of high-technology,
4. that there already exist a considerable number of private enterprises, and
5. that there exists (or will exist in a foreseeable future) easy access to rapid transportation networks.

Contents of Guidelines include the criteria for the selection of:
1. areas to be proposed for industrial development based on high-technology oriented (manufacturing) activities,
2. goals of the industrial development, and
3. private enterprise projects required for the accomplishment of the development goals.

Authorization process requires the examination on:
1. whether the area is suitable as a Technopolis,
2. whether the development program conforms to the development guidelines, and
3. whether the industrial development envisioned under the proposed program favourably effects the area as well as its surroundings.

Figure 4 Skeleton of Technopolis Law (1983)
It should be, however, noted that the Plan stands on the principles of (1) minimal new public investment necessary to the infrastructure improvement for the supply of location sites for high-technology oriented industries and (2) efficient utilization of already existing physical infrastructures.

2. Technopolis Law

The outline of the Technopolis Law is described by Figure 4. As indicated in its flow-chart, the development program for each Technopolis is to be prepared by the prefectual government based on the Technopolis Development Guidelines set by the central government. The development program is required to clearly identify (1) geographical boundaries of the Technopolis, (2) goals for the development of the high-technology industrial complex in the Technopolis, (3) long-term planning on construction, provision and maintenance of infrastructures for industrial and residential activities, and (4) characters of legal body in charge of the promotion
of necessary financing for business enterprises engaged in high-technology oriented production activities in the Technopolis.

The development programs proposed by prefectural governments are to be evaluated by the central government before the formal authorization is made. Once the development program is formally authorized, the central government goes into action to assist the designated Technopolis by approving (1) write-off of juridical person's taxation on contributions to the above mentioned legal body and (2) application of favourable taxation scheme to the deduction for the amount of capital depreciation. The central government also makes efforts to facilitate required financing to private enterprises and to construct indispensable infrastructures for the development of the Technopolis.

3. Designated Technopolises and Their Development Programs

By December of 1984, development programs for fourteen Technopolises had been granted authorization by the central government, while five other programs still remain unauthorized. From Table 1 showing basic features of the nineteen development programs, one can see the following;

(1) There are one Technopolis (Kenhoku-Kunizaki) with twin mother cities and another are (Kagawa-Seibu) with quintuple mother cities while the remaining seventeen Technopolises have only one mother city.

(2) Every Technopolis has at least one university or college in its territory.

(3) Among the unique examples of strategic industrial activities are “cold district development” industry for Hakodate, “urban (design and fashion)” industry for Nagaoka and Kurume-Tosu, “home-sound culture (electronic musical instruments)” related industry for Hamamatsu, “ocean and marine development” industry for Ube, Kagawa and Nagasaki, and “health, leisure and welfare” industry for Nishiharima and Goboh.

As to the geographical location of nineteen Technopolises, Figure 5 shows that there are one Technopolis in Hokkaidoh, eleven in Honshuh, one in Shikoku and six in Kyuhshuh. Meanwhile, the average population of those Technopolises is half a million as shown by Table 2, while the population size ranges from 0.2 million of Nagaoka to 1.2 million of Kibikohgen.

One of the examples of the designs for internal spatial allocation of Technopolises is shown by Figure 6 for Akita Technopolis. It should be kept in mind that there exist a technology town, an academy town and an “urban agglomeration amenity oriented” town within the Technopolis.

VI CONCLUSION

In this paper, we have examined the basic features of the Tsukuba Science city
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<th>Host Prefecture</th>
<th>Name of Technopolis (Mother City)</th>
<th>Principal University</th>
<th>Strategic Industrial Sectors</th>
<th>Development Strategy to Strengthen R&amp;D Capacity</th>
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<td>1. Hokkaidoh</td>
<td>Hakodate (Hokkaido)</td>
<td>Hokkaidoh University</td>
<td>Marine-related industries; industries utilizing natural resources; cold district development industries</td>
<td>Expansion of the Hakodate Industrial Research Institute; establishment of the Hokkaidoh Prefectural Center of Industrial Technology</td>
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<tr>
<td>2. Akita</td>
<td>Akita (Akita)</td>
<td>Akita University</td>
<td>Electronics; mechatronics; new materials; industries utilizing natural resources; biotechnology; energy resource development</td>
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<td>Utsunomiya University</td>
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<td>Hamamatsu (Hamamatsu)</td>
<td>Shizuoka University, Hamamatsu College of Medicine</td>
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<td>Toyama (Toyama, Takaoka)</td>
<td>Toyama University, Toyama College of Medicine and Pharmacology</td>
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<td>Okayama University, Okayama College of Science</td>
<td>Biotechnology; electronics; mechatronics (medical and pharmaceutical industries)</td>
<td>Reorganization of the Okayama Prefectural Institute of Industrial Technology; establishment of the Center for Research on Biotechnology</td>
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<td>Host Prefecture</td>
<td>Name of Technopolis (Mother City)</td>
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<td>8. Hiroshima</td>
<td>Hiroshima-Chubu, Hiroshima University</td>
<td>Electronics; mechatronics; new materials; biotechnology</td>
<td>Establishment of the Center for Research on Frontier Technologies; expansion of the Hiroshima Prefectural Industrial Research Institute</td>
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<td>9. Yamaguchi</td>
<td>Ube, Yamaguchi University</td>
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<tr>
<td>11. Ohita, Kunizaki, Ohita University, Ohita College of Medicine</td>
<td>Electronics, mechatronics, bioindustry, computer software</td>
<td>Establishment of the High Technology Research Institute and the Training Center; expansion of Ohita Prefectural Industrial Research Institute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Kumamoto</td>
<td>Kumamoto, Kumamoto University, Kumamoto College of Engineering</td>
<td>Applied machinery industry; biotechnology; electronic equipment; information systems industry</td>
<td>Establishment of Center for Research on Applied Electronics Machinery Technology; expansion of the Kumamoto Prefectural Industrial Research Institute</td>
<td></td>
</tr>
<tr>
<td>13. Miyazaki</td>
<td>Miyazaki, Miyazaki University, Miyazaki College of Medicine</td>
<td>Electronics; mechatronics; new materials; biotechnology; techno-green industry; industries utilizing local resources</td>
<td>Establishment of the Joint Research and Development Center; expansion of the Miyazaki Prefectural Industrial Research Institute</td>
<td></td>
</tr>
<tr>
<td>14. Kagoshima</td>
<td>Kikunshu-Hayato, Kagoshima University, Kyushu Gakuin University</td>
<td>Electronics; mechatronics; new materials; biotechnology</td>
<td>Establishment of the Center for Research on the Development of Fine Ceramics Products and the Kagoshima Prefectural Institute of Industrial Technology</td>
<td></td>
</tr>
</tbody>
</table>
Table 1 (Continued)

<table>
<thead>
<tr>
<th>Host Prefecture</th>
<th>Name of Technopolis (Mother City)</th>
<th>Principal University</th>
<th>Strategic Industrial Sectors</th>
<th>Development Strategy to Strengthen R&amp;D Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>15. Aomori</td>
<td>Aomori (Aomori)</td>
<td>Hirosaki University</td>
<td>Mechatronics; biotechnology</td>
<td>Local Product Research Institute; Research Institute for High Technology Industry; center for Life Science Studies</td>
</tr>
<tr>
<td>16. Hyogo</td>
<td>Nishiharima (Himeji)</td>
<td>Himeji College of Technology</td>
<td>High technology mechanics; health and welfare industries</td>
<td>Center for Life Science Studies</td>
</tr>
<tr>
<td>17. Wakayama</td>
<td>Goboh (Wakayama)</td>
<td>Wakayama University</td>
<td>Health-leisure industrial complex; fine chemicals</td>
<td>Center for Sports Science</td>
</tr>
<tr>
<td>18. Kagawa</td>
<td>Kagawa-Seibo (Takamatsu, Sakaide, Marugame, Zentsuji, Utatsu)</td>
<td>Kagawa University</td>
<td>Marine resource development industry; precision machinery industry producing measurement control devices</td>
<td>Center for Experimental Studies; Institute for Quality of Life</td>
</tr>
<tr>
<td>19. Nagasaki</td>
<td>Sasebo (Sasebo)</td>
<td>Nagasaki University</td>
<td>Machinery industry related to the marine resource development and energy resource development; mechatronics</td>
<td>Research Center for Marine Energy; Center for International Cooperative Research Projects</td>
</tr>
</tbody>
</table>

(Note) Technopolises with code-number 1 through 14 have already been designated by the central government as of December, 1984.
(Source) Constructed based on Kaneko (1982)
1 Hakodate
2 Akita
3 Nagaoka
4 Utsunomiya
5 Hamamatsu
6 Toyama
7 Kibikobgen
8 Hiroshima-Chuboh
9 Ube
10 Kurume-Tosu
11 Kenhoku-Kunizaki
12 Kumamoto
13 Miyazaki
14 Kokubu-Hayato
15 Aomori
16 Niishihama
17 Goboh
18 Kagawa-Seibu
19 Sasebo

(Note) Technopolises with code-number 1 through 14 have already been designated by the central government as of December, 1984.

(Source) Japan Industrial Location Center (1982)

Figure 5 Location of Technopolises
<table>
<thead>
<tr>
<th>Code-Number</th>
<th>Name</th>
<th>Number of Constituent Localities</th>
<th>Population (1,000 persons)</th>
<th>Area (km²)</th>
<th>Number of Mother Cities</th>
<th>Type of Technopolis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hakodate</td>
<td>1 2 0 4</td>
<td>1 2 3</td>
<td>1 4 6</td>
<td>1 0</td>
<td>Northern-region type Technopolis</td>
</tr>
<tr>
<td>2</td>
<td>Akita</td>
<td>1 2 0 3</td>
<td>2 2 3</td>
<td>2 2 3</td>
<td>1 0</td>
<td>Airport-adjacent Technopolis</td>
</tr>
<tr>
<td>3</td>
<td>Nagaoka</td>
<td>1 0 0 1</td>
<td>1 0 0</td>
<td>1 0 1</td>
<td>1 0</td>
<td>Shinano river techno-valley</td>
</tr>
<tr>
<td>4</td>
<td>Utsunomiya</td>
<td>2 2 0 4</td>
<td>2 2 3</td>
<td>2 2 3</td>
<td>1 0</td>
<td>Garden-city type Technopolis</td>
</tr>
<tr>
<td>5</td>
<td>Hamamatsu</td>
<td>3 2 0 5</td>
<td>3 2 3</td>
<td>3 2 3</td>
<td>1 0</td>
<td>International techno-information city</td>
</tr>
<tr>
<td>6</td>
<td>Toyama</td>
<td>2 4 0 6</td>
<td>2 4 3</td>
<td>2 4 3</td>
<td>2 0</td>
<td>Japan-Sea side Technopolis</td>
</tr>
<tr>
<td>7</td>
<td>Kibikogen</td>
<td>3 5 0 8</td>
<td>3 5 3</td>
<td>3 5 3</td>
<td>1 0</td>
<td>Life science community</td>
</tr>
<tr>
<td>8</td>
<td>Hiroshima-Chuho</td>
<td>2 3 0 5</td>
<td>2 3 3</td>
<td>2 3 3</td>
<td>1 0</td>
<td>Innovation city</td>
</tr>
<tr>
<td>9</td>
<td>Ube</td>
<td>4 4 0 8</td>
<td>4 4 3</td>
<td>4 4 3</td>
<td>1 0</td>
<td>Phoenix Technopolis</td>
</tr>
<tr>
<td>10</td>
<td>Kurume-Tozu</td>
<td>4 5 0 7</td>
<td>7 7 3</td>
<td>7 7 3</td>
<td>1 0</td>
<td>Techno-cultural garden city</td>
</tr>
<tr>
<td>11</td>
<td>Kenboku-Kunizaki</td>
<td>2 4 0 6</td>
<td>19 22 19</td>
<td>2 4 3</td>
<td>3 0</td>
<td>Constellating Technopolis</td>
</tr>
<tr>
<td>12</td>
<td>Kumamoto</td>
<td>2 3 0 16</td>
<td>16 22 16</td>
<td>1 0</td>
<td>1 0</td>
<td>Greenery composite city</td>
</tr>
<tr>
<td>13</td>
<td>Miyazaki</td>
<td>1 4 0 7</td>
<td>7 22 7</td>
<td>7 22 7</td>
<td>1 0</td>
<td>Sun Technopolis</td>
</tr>
<tr>
<td>14</td>
<td>Kokubo-Hayato</td>
<td>2 4 0 14</td>
<td>14 22 14</td>
<td>1 0</td>
<td>1 0</td>
<td>Airport-adjacent Technopolis</td>
</tr>
<tr>
<td></td>
<td>Subtotal (1~14)</td>
<td>31 72 4 107 4,782 7,669 3,940 11,860</td>
<td>16 0</td>
<td>16 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average (1~14)</td>
<td>2.2 5.1 0.3 7.6 342 505 281 849</td>
<td>1.1 0</td>
<td>1.1 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Aomori</td>
<td>1 1 0 2</td>
<td>2 2 2</td>
<td>2 2 2</td>
<td>1 0</td>
<td>Techno-habitation city</td>
</tr>
<tr>
<td>16</td>
<td>Nishihirama</td>
<td>4 21 0 25</td>
<td>25 46 356</td>
<td>25 46 356</td>
<td>2 0</td>
<td>Driving city toward the 21st century</td>
</tr>
<tr>
<td>17</td>
<td>Gozoh</td>
<td>2 6 0 12</td>
<td>12 40 100</td>
<td>12 40 100</td>
<td>1 0</td>
<td>Hygienic garden city</td>
</tr>
<tr>
<td>18</td>
<td>Kagawa-Seibu</td>
<td>4 7 0 11</td>
<td>11 71 101</td>
<td>11 71 101</td>
<td>1 0</td>
<td>Inland-Sea side cultural garden city</td>
</tr>
<tr>
<td>19</td>
<td>Tsukuba</td>
<td>1 1 0 2</td>
<td>2 2 2</td>
<td>2 2 2</td>
<td>1 0</td>
<td>Marine Technopolis</td>
</tr>
<tr>
<td></td>
<td>Total (1~19)</td>
<td>43 108 8 159 6,485 9,570 5,555 16,934</td>
<td>24 1</td>
<td>24 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average (1~19)</td>
<td>2.3 5.7 0.4 8.4 341 504 292 891</td>
<td>1.3 0.05</td>
<td>1.3 0.05</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Note) 1. Population level is the one as of October 1, 1980.
2. The level of population and size of area for mother city of Technopolises with more than one mother city, are those of the largest (in terms of population) mother city of each Technopolis.

(Sources) Bureau of Statistics, Prime Minister's Office, Population by Prefecture, City, Town and Village; Summary Sheets for 1980 Population Census, Tokyo, December 1980.
Japan External Trade Organization, Technopolises, Now in Japan, No. 34, 1983.

Japan Industrial Location Center, High-technology and Regional Development: Supervision toward the Twenty-first Century, Tokyo, 1985 (in Japanese).
and Technopolis Development Plan as well as those of some other major national and regional development plans. Table 3 shows these plans and their policy backgrounds in way of genealogical reviews.

One of the most striking planning aspects furnished in this table is that the decentralization policies have been persistently adopted until now in both national and regional development plans throughout the postwar period in Japan regardless of the constantly changing socio-economic climate of the nation. The important questions that we should not forget to raise, however, are (1) whether the time will come or not in Japan when the planning emphasis has to be shifted from decentralization policy to centralization policy, and (2) if so, when it will be.
Table 3 Genealogy of the Post-war National and Regional Development Policies in Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>Policy/Program</th>
<th>Description/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>Comprehensive National Land Development Law</td>
<td>Recovering, rationalization and modernization of the &quot;four major industrial areas&quot;</td>
</tr>
<tr>
<td>1962</td>
<td>Enterprise Rationalization Promotion Law</td>
<td>Construction of manufacturing industrial complexes along the Pacific coast</td>
</tr>
<tr>
<td>1960</td>
<td>National Income Doubling Plan</td>
<td>Pacific Industrial Belt Area concept</td>
</tr>
<tr>
<td>1962</td>
<td>Comprehensive National Development Plan</td>
<td>Growth-pole Development concept</td>
</tr>
<tr>
<td>1963</td>
<td>New Industrial City Development Act</td>
<td>Extension of development instruments throughout the Japan Archipelagoes</td>
</tr>
<tr>
<td>1964</td>
<td>Decision to construct Tsukuba Academic New Town</td>
<td>High-speed transport network (networks of Shinkansen lines and expressways)</td>
</tr>
<tr>
<td>1970</td>
<td>Tsukuba Science City Act</td>
<td>Large-scale industrial base development</td>
</tr>
<tr>
<td>1971</td>
<td>&quot;Promotion of the Inducing Industry into Agricultural Regions&quot; Law</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>Industrial Relocation Promotion Law</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>Factory Location Law</td>
<td></td>
</tr>
<tr>
<td>1977</td>
<td>The Third Comprehensive National Development Plan</td>
<td>Settlement Concept Establishment of model areas for settlement with high quality of life in medium and small cities</td>
</tr>
<tr>
<td>1980</td>
<td>The Fourth Comprehensive National Development Plan</td>
<td>Further promotion of industrial relocation</td>
</tr>
<tr>
<td>1981</td>
<td>Basic Technopolis Plan</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>Technopolis Development Plan</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>Technopolis Law(The Law for Accelerating Regional Development based upon High Technology Industrial Complexes)</td>
<td>Authorization of nine (out of nineteen) Technopolises</td>
</tr>
</tbody>
</table>

(Source) Constructed based on Nagamine (1982)
NOTES
2) Section III has benefited from Nagamine (1982) and Ministry of Construction (1983).
5) The Kinki region here consists of the eight-prefecture region covered by the KRB Plan.
6) The area changed to 2,700 hectares at the later planning stage.
7) Thirty-two research institutes and two universities are included in these forty-six governmental bodies.
8) This law is officially called “The Law for Accelerating Regional Development based upon High-technology Industrial Complexes.”
9) Technopolitans are those who are residing and/or working in Technopolises.

REFERENCES
Japan External Trade Organization, Technopolises: Now in Japan, No. 34, 1983.
Japan Industrial Location Center, High-technology and Regional Development: Supervision toward the Twenty-first Century, Japan Industrial Location Center, Tokyo, 1985 (in Japanese).
Kohmoto, T., “Tsukuba as A Research Center,” Environmental Studies for Tsukuba, Environmental Studies Group of the University of Tsukuba, Ibaraki, 1983 (in Japanese).
REGIONAL ECONOMIC POLICIES (Kawashima and Takehoshi)


