

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 intergrated 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 II¹⁾, followed by the discussion in Section III²⁾ on the two major regional development plans, namely, National Capital Region Basic Development Plan and Kinki Region Basic Plan. Section IV³⁾ profiles the development of the Tsukuba Science City, while Section V⁴⁾ 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

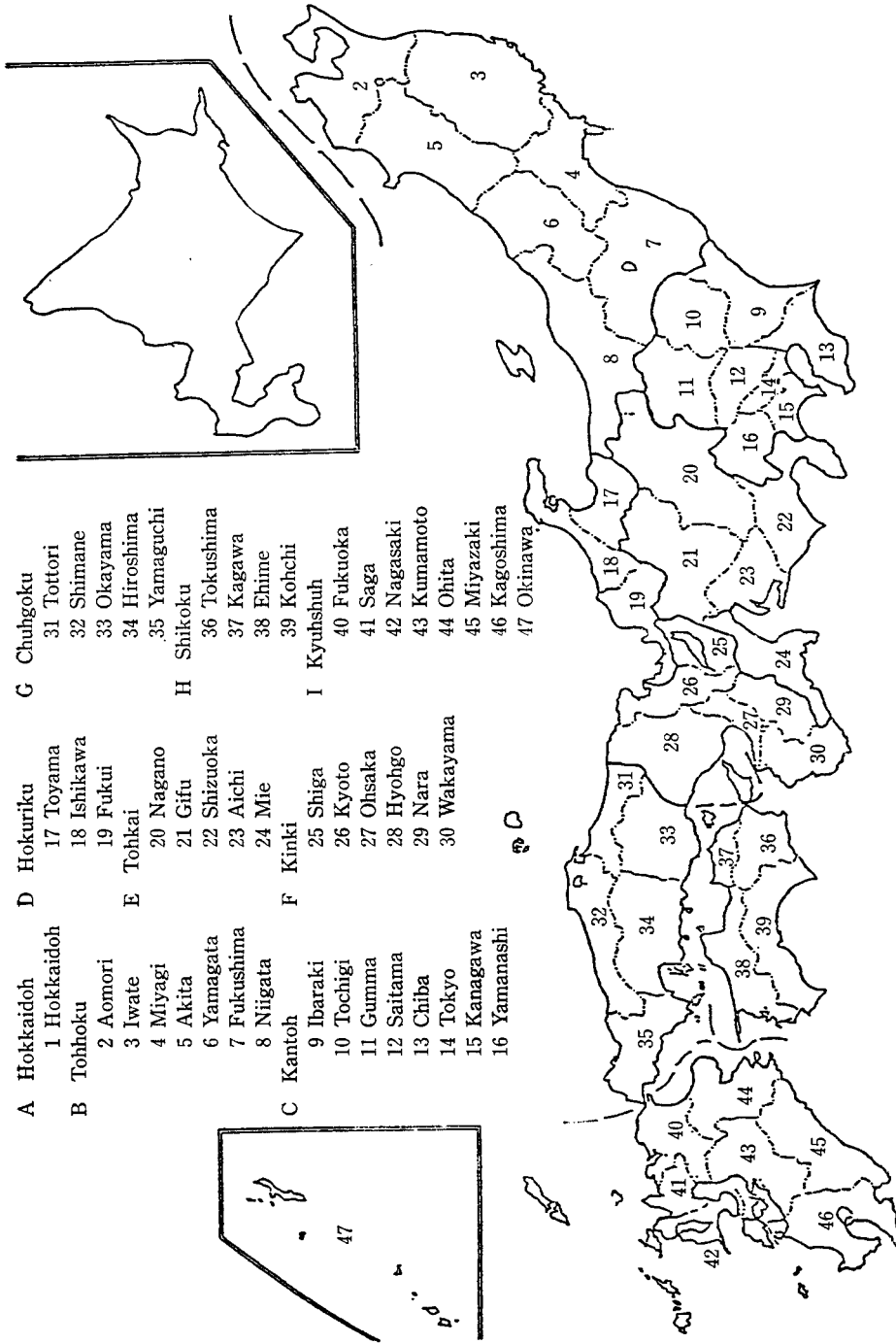
One can geographically divide Japan into nine regions as shown by Figure 1. The Kantoh region includes Tokyo which is the largest metropolitan area in Japan, and is therefore often called the National Capital region. The Kinki region comprehends the second largest metropolitan area, Ohsaka, while the 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

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(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.

1. Comprehensive National Development Plan of 1962 (The First Plan)

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.

2. The New Comprehensive National Development Plan of 1969 (The Second Plan)

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

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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 over-populated 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.

4. The Fourth Comprehensive National Development Plan of 1987 (The Fourth Plan)

The National Land Agency published in November, 1984, an interim report for the National Land Council. The interim report subtitled "A Better Japan in the 21st Century" was used by the Council as the basis for drawing up the forthcoming Fourth Comprehensive National Development Plan for the period 1987-2000.

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

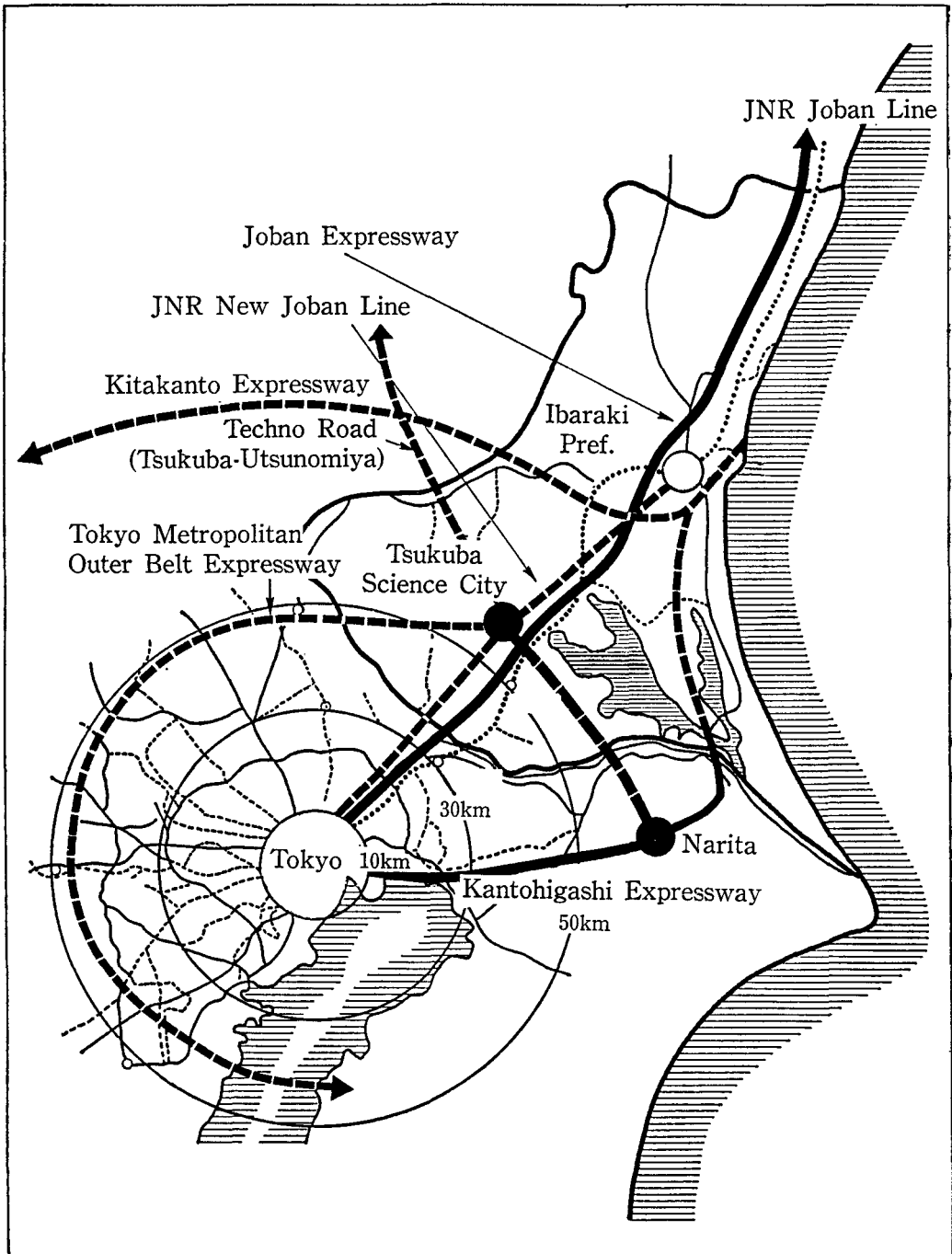
Three Kinki Region Basic Plans (KRB Plans) have been formulated as a series for the region covering eight prefectures, that is, the region consisting of the six-prefecture Kinki region (as shown in Table 1) and in addition Fukui and Shiga prefectures. The First, Second and Third KRB Plans were launched 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 region⁶⁾, 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

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 hectares⁶⁾ 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 bodies⁷⁾ 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.

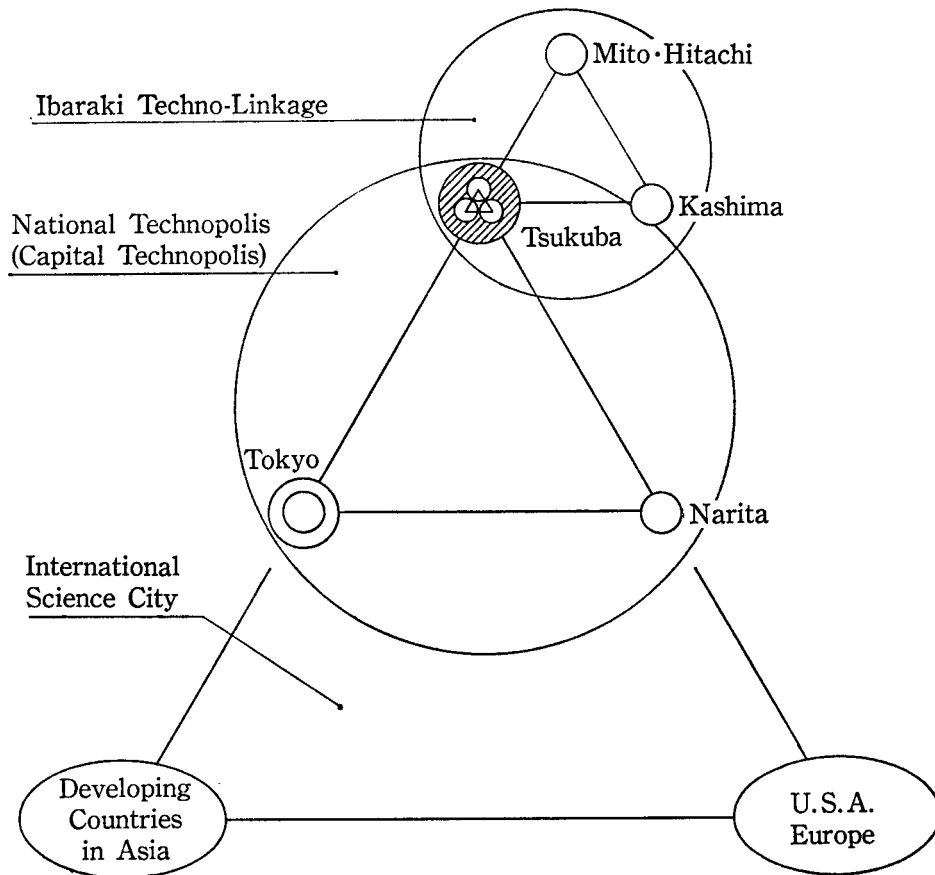
2. Three Major Expected Achievements

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 Technopolis" although it is not an officially designated technopolis by the national government. 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



(Source) Ibaraki Prefectural Government (1985)

Figure 3 Conceptual Framework of Techno-Linkage

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 infrastructure 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 Tsukuba Science City, particularly 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 investment 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 TECHNOLIS 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 Law⁸⁾ 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 "technopolitainers"⁹⁾ 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 technopolitainers 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.

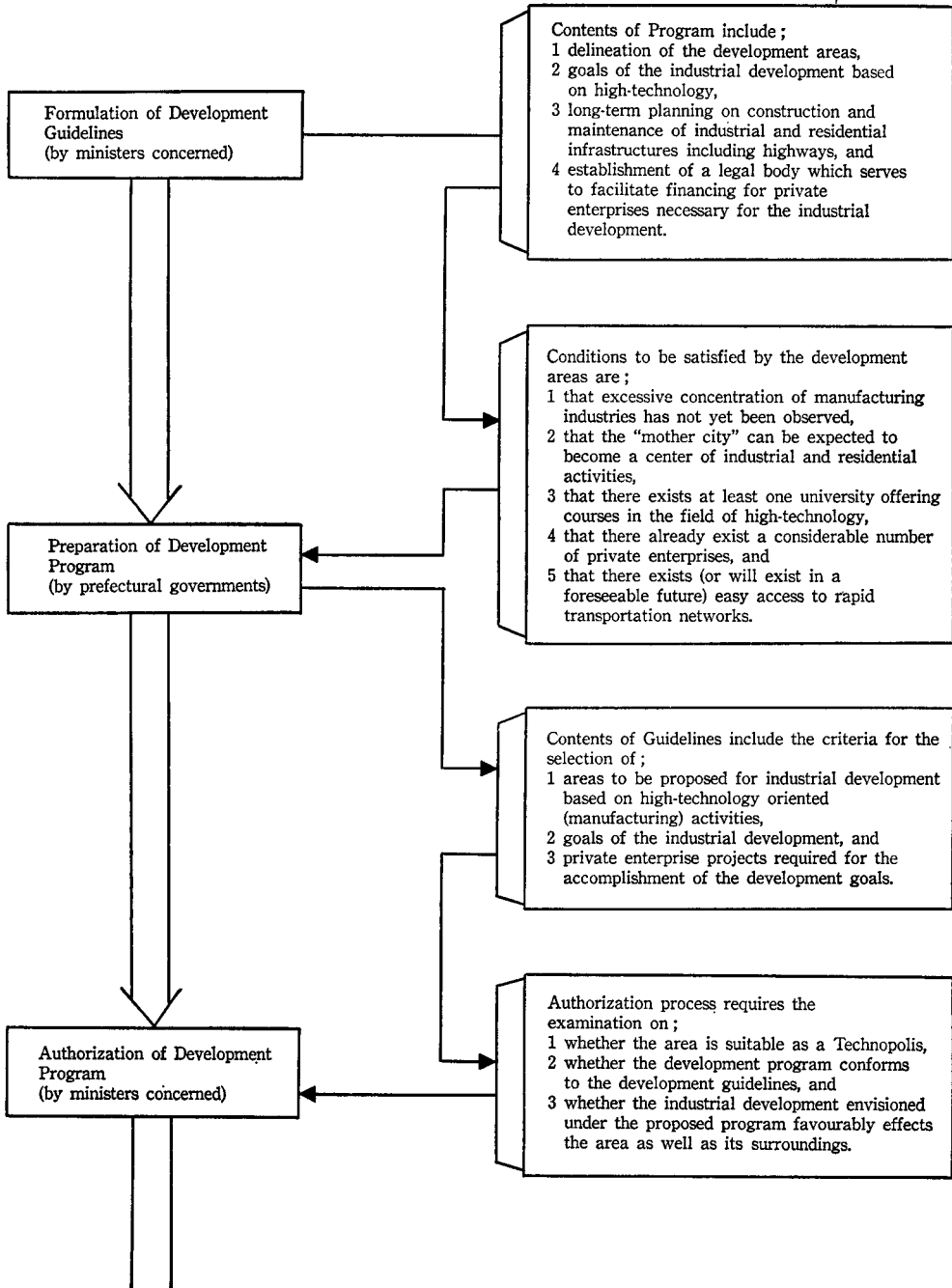
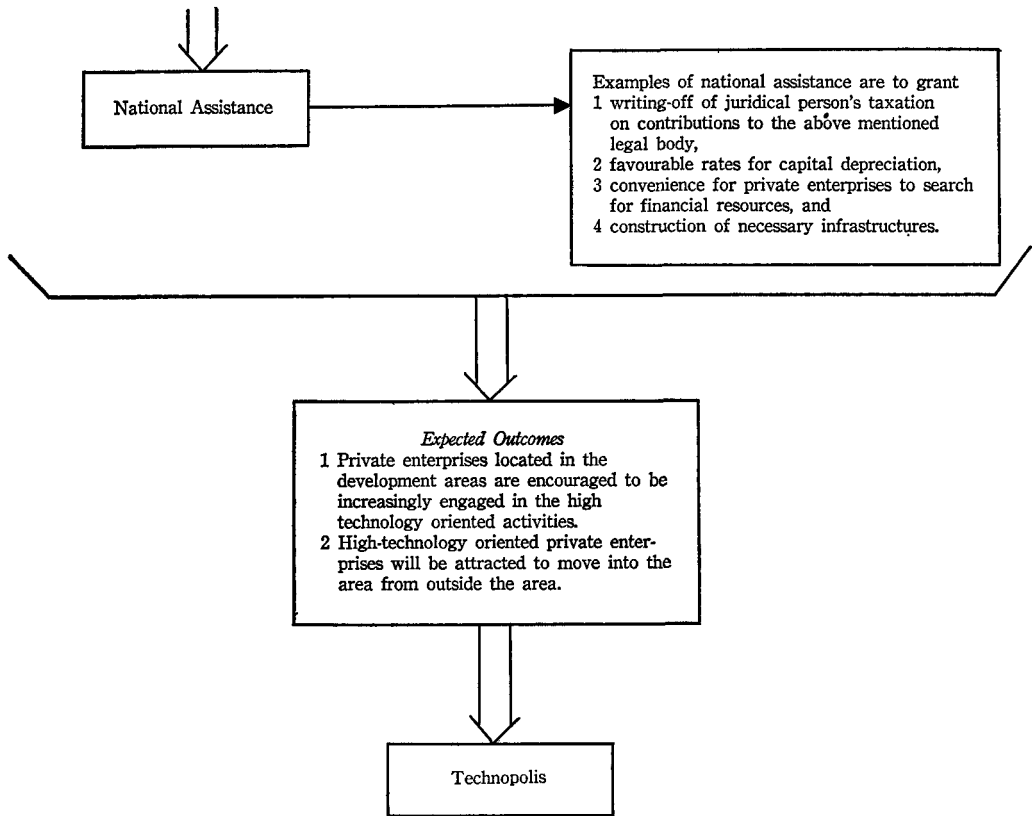


Figure 4 Skeleton of Technopolis Law (1983)

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(Source) Constructed based on Ministry of International Trade and Industry (1984)

Figure 4 (Continued)

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 prefectural 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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Table 1 Development Programs for Technopolises

Host Prefecture	Name of Technopolis (Mother City)	Principal University	Strategic Industrial Sectors	Development Strategy to Strengthen R&D Capacity
1. Hokkaidoh	Hakodate (Hokodate)	Hokkaidoh University	Marine-related industries; industries utilizing natural resources; cold district development industries	Expansion of the Hakodate Industrial Research Institute; establishment of the Hokkaidoh Prefectural Center of Industrial Technology
2. Akita	Akita (Akita)	Akita University	Electronics; mechatronics; new materials; industries utilizing natural resources; biotechnology; energy resource development	Expansion of the Akita Prefectural Institute of Industrial Technology
3. Niigata	Nagaoka (Nagaoka)	Nagaoka College of Science and Technology	Advanced systems industries; urban industries (design, fashion); industries utilizing local natural resources	Establishment of the Nagaoka Center for the Promotion of Regional Technological Development and the Nagaoka Center for Information Studies
4. Tochigi	Utsunomiya (Utsunomiya)	Utsunomiya University	Electronics; mechatronics; fine chemicals; new materials; computer software	Establishment of the Utsunomiya Technopolis Information Center
5. Shizuoka	Hamamatsu (Hamamatsu)	Shizuoka University, Hamamatsu College of Medicine	Optoelectronics industries; advanced mechatronics; "home-sound culture" related industries (electronic musical instruments)	Establishment of the Institute for Research on Electronic Machine Technology and the Institute for Research on Medical Appliance Technology; expansion of the Shizuoka Prefectural Industrial Research Institute
6. Toyama	Toyama, Takaoka	Toyama University, Toyama College of Medicine and Pharmacology	Mechatronics; new materials; biotechnology (medical, etc.); information industries	Relocation of the Toyama Prefectural Institute of Industrial Technology; establishment of the Center of Research on Life Sciences and the Center for Exchange in Advanced Technology
7. Okayama	Kibikohgen (Okayama)	Okayama University, Okayama College of Science	Biotechnology; electronics; mechatronics (medical and pharmaceutical industries)	Reorganization of the Okayama Prefectural Institute of Industrial Technology; establishment of the Center for Research on Biotechnology

Table 1 (Continued)

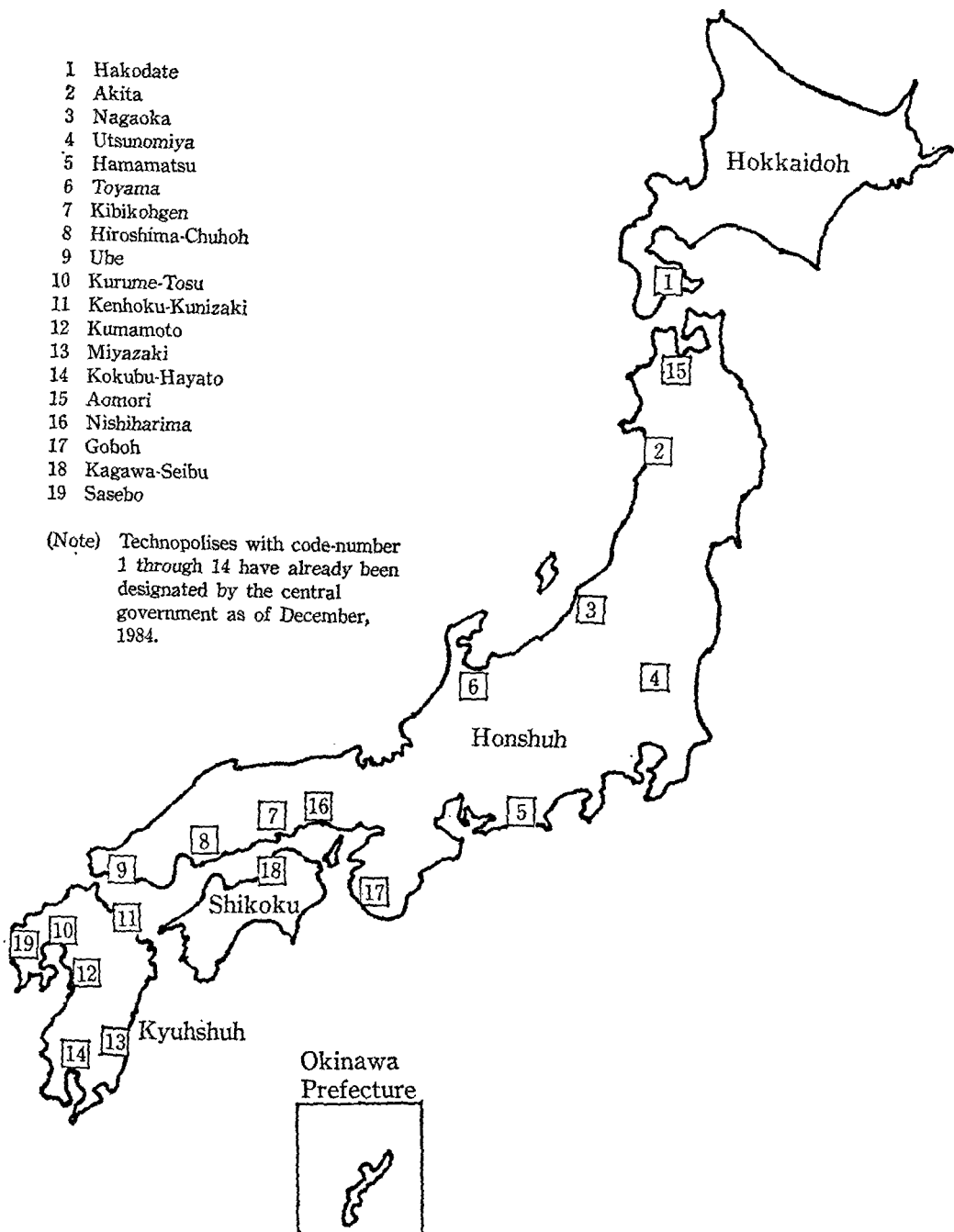
Host Prefecture	Name of Technopolis (Mother City)	Principal University	Strategic Industrial Sectors	Development Strategy to Strengthen R&D Capacity
8. Hiroshima	Hiroshima-Chuoh (Kure)	Hiroshima University	Electronics; mechatronics; new materials; biotechnology	Establishment of the Center for Research on Frontier Technologies; expansion of the Hiroshima Prefectural Industrial Research Institute
9. Yamaguchi	Ube (Ube)	Yamaguchi University	Electronics; mechatronics; new materials; ocean development; biotechnology	Expansion of the Yamaguchi Prefectural Industrial Research Institute; establishment of the Yamaguchi Prefectural Institute of Industrial Technology and the Institute for Research on New Materials
10. Fukuoka, Saga	Kurume-Tosu (Kurume)	Kurume College of Engineering, Kurume University	Mechatronics; fine chemicals; fashion; "next generation" bioindustries	Establishment of the Information Center for the Promotion of Local Industry
11. Ohita	Kenhoku-Kunizaki (Ohita, Beppu)	Ohita University, Ohita College of Medicine	Electronics, mechatronics, bioindustry, computer software	Establishment of the High Technology Research Institute and the Training Center; expansion of Ohita Prefectural Industrial Research Institute
12. Kumamoto	Kumamoto (Kumamoto)	Kumamoto University, Kumamoto College of Engineering	Applied machinery industry; biotechnology; electronic equipment; information systems industry	Establishment of Center for Research on Applied Electronics Machinery Technology; expansion of the Kumamoto Prefectural Industrial Research Institute
13. Miyazaki	Miyazaki (Miyazaki)	Miyazaki University, Miyazaki College of Medicine	Electronics; mechatronics; new materials; biotechnology; techno-green industry; industries utilizing local resources	Establishment of the Joint Research and Development Center; expansion of the Miyazaki Prefectural Industrial Research Institute
14. Kagoshima	Kokubu-Hayato (Kagoshima)	Kagoshima University, Kyushuh Gakuin University	Electronics; mechatronics; new materials; biotechnology	Establishment of the Center for Research on the Development of Fine Ceramics Products and the Kagoshima Prefectural Institute of Industrial Technology

Table 1 (Continued)

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

(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)



(Source) Japan Industrial Location Center (1982)

Figure 5 Location of Technopolises

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Table 2 Number of Constituent Localities, Population and Area for Technopolises

Code- Number	Name	Number of Constituent Localities				Population (1,000 persons)		Area (km ²)		Number of Mother Cities		Type of Technopolis
		Cities	Towns	Villages	Total	Mother City	Total	Mother City	Total	Cities	Towns	
1	Hakodate	1	3	0	4	320	380	350	960	1	0	Northern-region type Technopolis
2	Akita	1	2	0	3	285	305	460	910	1	0	Airport-adjacent Technopolis
3	Nagaoka	1	0	0	1	180	180	260	260	1	0	Shinano river techno-valley
4	Utsunomiya	2	2	0	4	378	470	310	570	1	0	Garden-city type Technopolis
5	Hamamatsu	3	2	0	5	491	619	250	650	1	0	International techno-information city
6	Toyama	2	4	0	6	305	569	210	730	2	0	Japan-Sea side Technopolis
7	Kibikohgen	3	5	0	8	546	660	510	1,380	1	0	Life science community
8	Hiroshima-Chuoh	3	2	0	5	235	611	150	680	1	0	Innovation city
9	Ube	4	4	0	8	169	409	210	1,050	1	0	Phoenix Technopolis
10	Kurume-Tosu	2	5	0	7	217	334	120	310	1	0	Techno-cultural garden city
11	Kenhoku-Kumizaki	4	13	2	19	360	779	360	1,230	2	0	Constellating Technopolis
12	Kumamoto	2	12	2	16	526	739	170	960	1	0	Greenery composite city
13	Miyazaki	1	6	0	7	265	357	290	870	1	0	Sun Technopolis
14	Kokubo-Hayato	2	12	0	14	505	652	290	1,320	1	0	Airport-adjacent Technopolis
	Subtotal (1~14)	31	72	4	107	4,782	7,069	3,940	11,880	16	0	
	Average (1~14)	2.2	5.1	0.3	7.6	342	505	281	849	1.1	0	
15	Aomori	1	1	0	2	288	310	690	824	1	0	Techno-habitation city
16	Nishiharima	4	21	0	25	446	835	270	2,422	1	0	Driving city toward the 21st century
17	Goboh	2	6	4	12	401	500	210	954	1	0	Hygeian garden city
18	Kagawa-Seibu	4	7	0	11	317	591	195	567	4	1	Inland-Sea side cultural garden city
19	Sasebo	1	1	0	2	251	265	250	287	1	0	Marine Technopolis
	Total (1~19)	43	108	8	159	6,485	9,570	5,555	16,934	24	1	
	Average (1~19)	2.3	5.7	0.4	8.4	341	504	292	891	1.3	0.05	

(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.

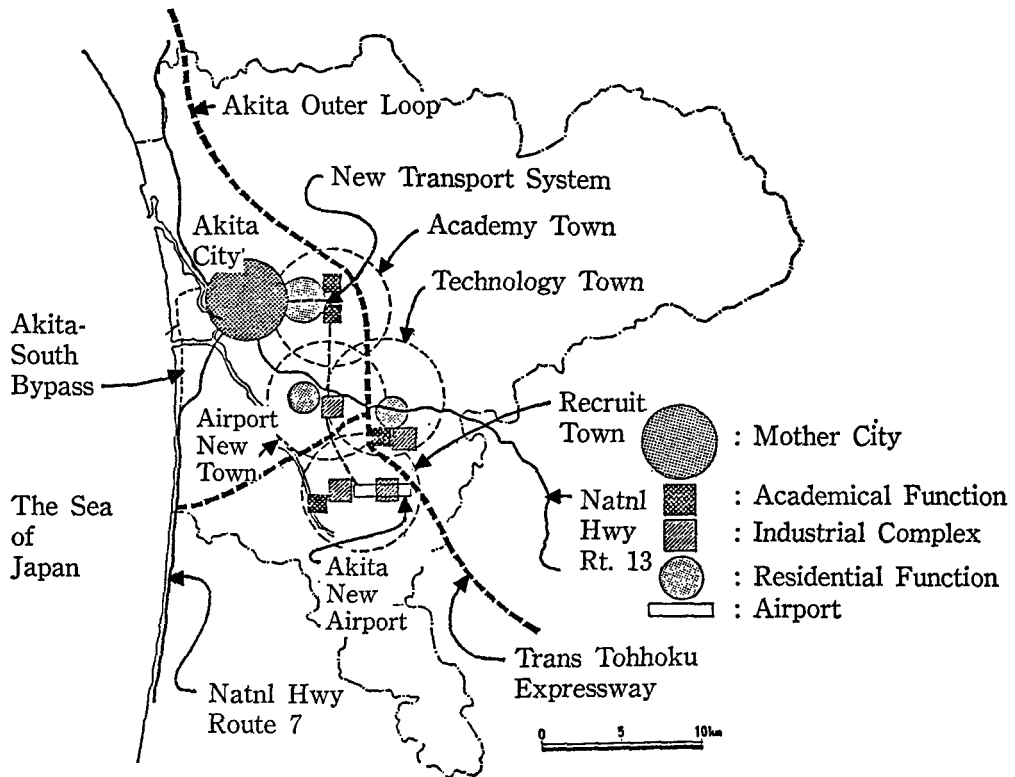
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(Note) Natnl Hwy: National Highway

(Source) Constructed based on Japan Industrial Location Center (1982)

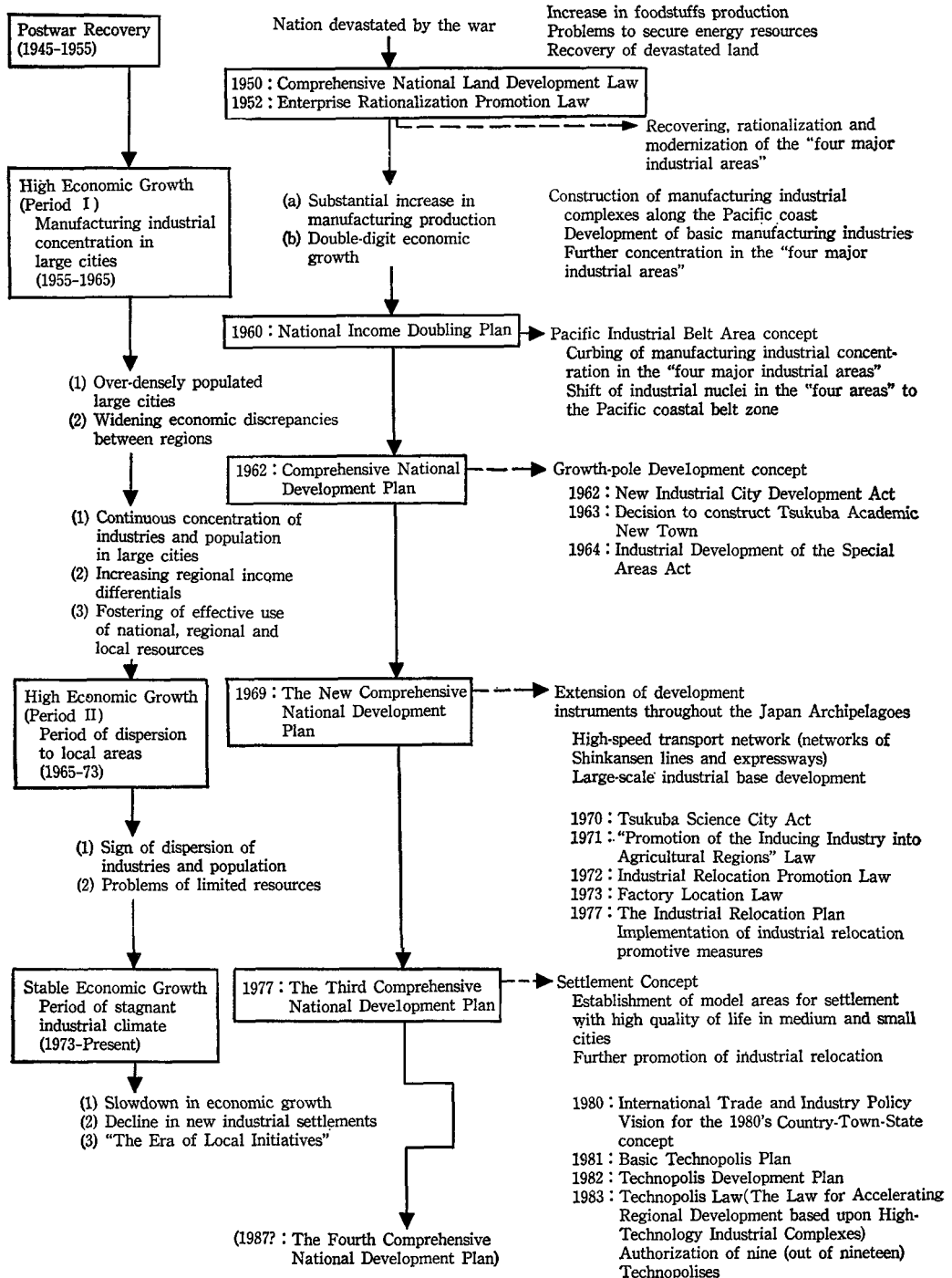
Figure 6 Akita Technopolis (Development Program)

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.

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Table 3 Genealogy of the Post-war National and Regional Development Policies in Japan



(Source) Constructed based on Nagamine (1982)

NOTES

- 1) Section II has benefited from National Land Agency (1979, 1983), Nagamine (1982), Ministry of Construction (1983) and Asahi Evening News (1984).
- 2) Section III has benefited from Nagamine (1982) and Ministry of Construction (1983).
- 3) Section IV is based on Taketoshi (1984). This section has also benefited from Tanakadate (1983), Anderson (1984), Hakone (1984), Ibaraki Prefectural Government (1984, 1985) and Tsukuba International Festival Association (1985).
- 4) Section V has benefited from Ministry of International Trade and Industry (1980), Aoki (1982), Fujita (1982), Iwao (1983), Japan Industrial Location Center (1982, 1985), Kaneko (1982), Sase (1982), Lohr (1984) and Desmond (1986).
- 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.

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