A 'MULTI-FUNCTION-POLIS' FOR AUSTRALIA*

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MITI has proposed a $5-10 billion 'Multi-Function-Polis' in Australia. The functions would include high technology, recurrent adult education, resort and leisure, and cultural exchange. It would become a forum for international technological and cultural exchange in the Pacific Rim region.

Keywords: Japanese technopolis concept, MITI, high technology, Pacific Rim, regional development policy, information intensity

INTRODUCTION

Early in 1987, the Japanese Ministry of International Trade & Industry (MITI) proposed the establishment of a $5-10 billion 'Multi-Function-Polis' in Australia.[1] This futuristic cosmopolis is hoped to become a forum for international technological and cultural exchange in the Pacific Rim Region, as well as a model for new industries and lifestyles for the 21st century. The multi-functions include high technology, recurrent adult education, resort and leisure, and cultural exchange. Media writers have since dubbed the concept a 'high technology city'.

MITI's reasons for wishing to locate the new city on a 'scenic site on one of the coasts of Australia' include:[2] the opportunity for such Australian-Japan collaboration to open the doors to the 'Pacific Age' and to help build a multi-faceted and multi-layered economic relationship between the two countries;[3] climate; little time difference between the two countries; Australia is English speaking; and land prices are much lower in Australia.[4]

When the idea was first put to the Federal Government at a Ministerial Meeting in January, 1987, by MITI Minister Mr. Hajime Tamauro, reaction was cool.[5] Perhaps it was considered a distraction from more important trade matters. Since then, interest has been growing and most of the State Governments are developing proposals to host the city.[6] In

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June, 1987, the Japanese and Australian Governments agreed to a 'pre-feasibility' study on the building of a multi-function-polis.[7] This study was carried out within MITI in Japan and a report was released in September, 1987.[8]

Since the MITI document outlining the multi-function-polis concept linked it to the 1988 World Expo in Brisbane with its theme of 'Leisure in the Age of Thechnology', Brisbane or the Gold Coast were considered the most likely sites.[9] However, Japanese officials have stressed that all Australian cities are possibilities as a site for the project.[10]

This discussion paper was prepared to help further investigations into the feasibility of such a cultural and technological interchange facility in Queensland. It examines the technopolis concept and explores its possible relations to the multi-function-polis concept.

ORIGINS AND HISTORY OF THE TECHNOPOLIS CONCEPT IN JAPAN

While the word technopolis was originally used in 1969 by Calder to refer to modern society generally,[11] the Japanese concept is more precise. In Japan a technopolis is a community (polis means city) based around high technology research oriented, knowledge-intensive industries. Originally mooted in 1980 by MITI,[12] the technopolis concept suggested the creation of cities which would organically integrate three formerly diverse elements:[13]

a) high technology industry (e.g., electronics)
b) science (science and engineering departments of universities, research institutes, laboratories)
c) comfortable life environment (residences, social and cultural facilities)

The technopolis concept grew out of a question posed by MITI in 1979: could Silicon Valley be recreated or cloned in Japan?[14]A lot of other countries also posed this question — often naïvely.[15] Technology parks tended to be seen as the answer. The eventual Japanese answer was the technopolis program which Tatsuno grandly regards as "a uniquely Japanese synthesis of East and West — an eclectic mixture of Silicon Valley's industrial parks, English garden cities, and Japanese castle towns".[16] By 1983 MITI enacted the Law for Accelerating the Regional Development Based Upon High Technology Industrial Complexes, — (i.e., the Technopolis Law) to help promote the construction of technopolises in a number of areas.[17] The nineteen Technopolis Regions now designated will eventually form a network of regional high technology cities throughout Japan.[18]

According to Tatsuno, the aim of the technopolis program is to "blend science, technology, and traditional Japanese culture into new communities that emphasise the development of creative, well-rounded

people''.[19] MITI expects the technopolises to become greenhouses of creativity in the 21st century — the focal points for advanced research in sunrise industries such as biotechnology, ceramics, elecronics, new materials, robotics, computers, and software.

As a mechanism of regional development policy, the technopolis program aims to disperse industrial growth from the heavily populated Tokyo-Osaka megapolis to the new technopolis regions.[20] From this perspective the technopolis program is not a totally new idea. In the 1960s there was some effort by the Japanese government to decentralise heavy manufacturing and petrochemical industries to coastal areas. Large amounts were spent on heavy infrastructure such as ports and highways, but the scheme failed because of costs, pollution and the oil crisis.[21]

There is also considerable precedent for the careful planning of cities and regions by the central government in Japan's history. In this sense the technopolises can be regarded as the latest initiative in a long tradition of city building which includes the ancient capitals of Nara and Kyoto, as well as the feudal castle towns of Osaka, Kamakura and Edo (Tokyo).[22]

LOGIC AND RATIONALE UNDERLYING THE TECHNOPOLIS PROGRAM

With a view to a possible 'Japanizing' of a phenomena such as Silicon Valley, the technopolis program arose out of a systematic evaluation of Silicon Valley's strengths and weaknesses, plus lessons learned from the Tsukuba Science City experience in Japan. Nishioka and Takeuchi regard the concept as a way of integrating the different views on high technology industry and regional development.[23] The technopolis program is a systematic approach involving long term planning, 'bottom-up', consensus-making, and broad industry-government co-operation at the local and regional level.[24] Emphasis is on the development of a 'soft' infrastructure of people, technology, information and communications. Such infrastructure helps facilitate information flow appropriate to technological development.[25] It includes building a working partnership among businesses, universities, and local governments pursuing a common strategy.

Tatsuno regards the technopolis concept as a synthesis of three streams of thought — the first two providing the framework, while the third provides the inspiration and drive.[26] First is MITI's long term national R&D strategy designed to lead Japan into the 21st century. This emphasises the need for Japan to develop original, creative technologies in knowledge-intensive, high value added industries in order to compete in the future with the 'new Japans' as well as with the USA and Europe. According to Blakely,[27] MITI takes the view that such new, creative technologies will flourish best in non-metropolitan environments. In

other words, the major cities in Japan are regarded as too large and non-conducive to the development of new ideas. MITI is boldly saying that "new leading technologies require new venues for their development".[28] The fact that many of the growth areas of the US are non-metropolitan lends some support for this strategy.[29]

Second is Japan's regional development programs, and the need to modernise sunset industries located in regional areas. However, the emphasis on soft infrastructure is a major difference between technopolis and previous programs. Third is Silicon Valley's process of innovation based on entrepreneurial new ventures supported by: industrial parks; research universities; and soft infrastructure consisting of a large pool of highly skilled engineers and scientists, venture capital market, investment banking, management consulting firms, support services, and well developed informal networks of people.

New venture businesses are expected to eventually form the economic core of the technopolises.[30] This partly reflects a lesson learned from earlier experience with regional industrial policy. That is, indigenous development needs to form the basis of any regional economic development strategy.[31]

The technopolis concept also represents part of a new approach to industry and technology policy in Japan. A shift in the focus of national policy from promoting specific industries to fostering creativity and the process of innovation[32] — a shift from centralised policies to regional high technology strategies. Government's new role may become that of anticipator, catalyst, strategist, cultivator and advisor — a combination think tank and consulting firm.[33]

Although the technopolis program builds on the Silicon Valley and Tsukuba experiences, it differs from both in a number of ways. Compared to Silicon Valley, the technopolis program represents a more balanced approach to high technology development.[34] As well as industrial parks and R&D projects, it also emphasises a comfortable living environment of housing, parks, and sport and cultural facilities. Furthermore, Silicon Valley happened spontaneously; the technopolises are planned.

Tsukuba Science City, begun in 1963, is located in a remote area about 60 kilometers north of Tokyo. The technopolis program is distinctly different. First, Tsukuba focuses on basic research in science only. It includes a new university, various government research laboratories and private research institutes. High technology industry as well as a congenial, comfortable, diverse life environment are notably lacking. The technopolis program emphasises these as well as a focus on applied research in technology. Japanese academics interviewed at Tsukuba by the author in 1983 privately expressed the view that Tsukuba could not be regarded as a great success.

Secondly, Tsukuba was started with a large budget from scratch in a remote area. Technopolises will utilise existing facilities where possible and each will have more modest budgets than Tsukuba enjoyed. The

technopolis program is not intended to disperse high technology industry to highly remote areas. Instead, it stresses the existence of a 'mother city' of at least 150,000-200,000 population within or nearby a proposed Technopolis Region. This can be the source of social and cultural facilities, and services for people working in the new high technology or science-based activities.

Thirdly, Tsukuba was a purely national initiative. The technopolis program depends mainly on regional and local initiative. Finally, Tsukuba emphasises the intellect, whereas the technopolis program emphasises well-rounded creative people, in the hope that some of the latter will be entrepreneurial and adept at initiating new high technology venture businesses.

MECHANISMS FOR TECHNOPOLIS ESTABLISHMENT

While MITI laid down the basic guidelines that would determine its selection of technopolis sites, the implementation of the technopolis program was very much a 'bottom up' process relying upon local initiative. Competition amongst the prefectures (states) for selection as a technopolis site was encouraged, and was intense. Each prefecture was forced to look closely at itself — to identify its future strategic industries in the context of present resources and possibilities. Each prefecture had to assess its labour force, transport and communication networks, plant investment trends, agricultural income, urban services, local R&D industrial siting incentives, universities, training programs, environmental controls, prospects of attracting high technology firms from elsewhere, and prospects of strengthening local industry through technology transfer or new ventures.[35]

MITI criteria for the selection of technopolis sites included the following features:[36]

- Proximity to a 'mother city' of 200,000 or more that would provide the urban services.
- Proximity to an airport or bullet train station.
- An integrated complex of industrial sites, academic institutions, and housing.
- An improved information network.
- A pleasant living environment conducive to creative research and thinking.
- Participatory or 'bottom up' planning.
- Completion of the basic plan by 1990.

By late 1985, 19 technopolis sites were chosen from 40 possible regions. Each technopolis was responsible for developing a regional R&D strategy based on its strategic industries. This R&D strategy includes: concentrating public and private research in the technopolis zones, promoting hybrid technologies, upgrading local universities, establishing technology centres, forming joint R&D projects, and providing R&D funding.[37]

Since the core of the technopolis concept is the 'soft' infrastructure of people, information, financing, and services, the technopolises are pursuing a variety of strategies to develop these resources.[38] Technopolis offices have been set up to co-ordinate the efforts of local universities, industry associations, and local government. Most of the technopolises are building 'technology centres' or 'Techno-Centers' which will become incubators for joint R&D and new venture business.

Non-profit 'Technology Promotion Associations' have been formed to provide services for the incubators. Special retraining programs as well as information and incentives are available for people returning from the large cities.[39] Mechanisms, by the technopolises for attracting companies from major cities and abroad involve all levels of government. These include industry invitation campaigns, industrial parks, tax incentives, low interest loans, and R&D subsidies.

Of course, 'hard' infrastructure is not being ignored. Each technopolis is expected to cost about $1 billion and much of this is construction cost to be funded locally. Construction includes new university complexes, new roads, upgrading airports, technology centres, and industrial/research parks.

Within the overall MITI guidelines for technopolis planning, each region has its distinctive approach. For example, Hiroshima and a few of the others have adopted the Tsukuba idea of building an academic new town as the focal point of their technopolises. Of course, strategic industries also vary from region to region.

Toda points out that both R&D activities and industrial activities in the technopolises can each be classified into two distinct types.[40] The first kind of R&D activity is 'transfer type', whose objective is the transfer of existing high technology knowledge or products to industries located in and nearby the technopolis. Another sort of R&D is 'frontier type', whose objective is to create new technology based on original ideas. Industrial activities consist of 'introducing type', i.e., high technology industries attracted to the region; and secondly, 'fostering type'. The latter involves objectives of making existing industries more technology intensive and innovative, and the fostering of new venture businesses. The technopolis regions differ in their relative emphasis on each of these four types of activities.

In order to link the technopolises to each other and to the major cities, Nippon Telegraph and Telephone (NTT) is developing a nationwide network of fibre optic cables and communication satellites.[41] This Information Network System (INS) is expected to fully digitalise and upgrade Japan's telephone service with the latest information processing techniques by 1995.

SUCCESS OR FAILURE FACTORS AND CRITICAL EVALUATION

An initial difficulty faced by the analyst attempting to evaluate the technopolis program is that it is too early. The Japanese regard it as

a very long term program; the technopolises are not expected to take off until the 21st century.[42] At the moment the technopolises are building consensus by organising their soft infrastructure, i.e., networks of people, joint R&D projects, and industry associations, but there are few tangible results so far.[43] One foreign critic notes that the idea of the technopolis is powerful, but the direct effects may not be impressive because of weak central government funding.[44]

Tatsuno assesses the technopolis program in tems of some of the likely key factors behind the success of Silicon Valley and other US high technology regions. In terms of the emergence of strong, imaginative local leadership, the technopolises are faring well, but there is plenty of room for improvement in connection with Tatsuno's other factors. Regional research universities are weak because of rigid hierarchies and little external interaction. National R&D projects are big company and big city oriented. Industry-government linkages at the local and regional level are not strong. None of the technopolises have yet achieved that 'critical mass' of talented people that makes Silicon Valley work. Land speculation could turn the technopolises into high-priced showpieces. A strong venture capital market is absent, although many of the technopolises are forming government-sponsored venture capital consortia managed by representatives from local industries, universities, and banks. Finally, Japan's education system is not oriented to turning out innovative, creative, independent people. Since the nurturing of creative people is regarded as crucial to the success of the technopolis program, this failure to reform Japan's school system is, in Tatsuno's view, "probably the major weakness of the Technopolis program."[45]

A basic rationale of the technopolis program, namely that new technologies will flourish best away from the huge metropolitan areas, is open to conjecture. While there is some evidence from the innovation literature that new technologies are best nurtured in new firms,[46] it is not clear that these firms should be located in new, remote venues. Can new high technology activities be successfully generated in areas that have generally only experienced traditional industries?

The notion of 'critical mass' or agglomeration economies is important in innovation. High technology firms need convenient access to talented people, specialised services, customers, suppliers, and rival firms. Indeed, one of the initial criticisms of the technopolis program in Japan was that MITI chose 19 sites instead of the one or two it originally intended.[47] It is possible that with such a diluted effort, none of the sites will reach the critical mass necessary for takeoff.

High technology is a highly information-intensive activity.[48] Information is gathered from a variety of sources, many of which are external to the individual firm. New information is created from R&D, as well as from other phases of the innovative process, such as marketing and customer feedback. Much of this information flows via informal channels and personnel mobility.

Major cities have comparative advantage generally over smaller centres in terms of the concentration of information sources. Some argue that new developments in telecommunications may increasingly bypass the need for physical contact, thus diminishing the informational comparative advantage of larger centres. However, this may not be so for some types of information and some types of activities.[49] Technology generation and transfer would seem to be areas where informal networks and personnel face-to-face communication are impor nt.[50]

At present most private sector R&D in Japan is conducted in and around the large metropolitan areas.[51] Agglomeration economies and informational comparative advantage provide some rationales for this. However, there is some evidence in the US and Europe that the very large cities are losing their innovative potential *vis-à-vis* medium sized centres.[52] If this trend is valid, for advanced economies generally, and if it continues, the technopolises may be well placed to capitalise on it in the 21st century.

Modern economies are becoming more information-intensive; an information society would appear to be emerging.[53] In this context the development of soft infrastructure of talented people, technology, communications, new institutions and services is likely to be increasingly crucial to economic development generally. Such soft infrastructure may not be very expensive to develop in terms of direct injections of central government money. Here the technopolis program would appear to be on the right track, although much more needs to be done in connection with educational reforms, creating a private venture capital market, creating links with national R&D projects, and facilitating the inter-organisational movement of people.

Finally, those individual technopolises that manage to successfully encourage 'frontier type' R&D and 'fostering type' industrial activities are more likely to achieve self-sustained, Silicon Valley-like growth than areas pursuing alternative strategies of 'transfer type' R&D and 'introducing type' industrial activities.

IMPLICATIONS FOR THE MULTI-FUNCTION-POLIS PROPOSAL

This section will compare and contrast the technopolis concept with the multi-function-polis (MFP) concept. In doing so, some possible implications of the technopolis experience for the MFP proposal will be highlighted. An initial difficulty in examining the relationship between the MFP concept and the technopolis concept is that the former is still an ideal concept subject to further development and refinement, while the latter is an actuality.[54] Still, the preliminary outline of the MFP concept by MITI[55] provides a starting point for the analysis here.

In the broad sense there are considerably similarities between the two concepts. Indeed, the MFP concept has been developed based on the

technopolis concept.[56] Both spring from MITI; both are about new cities with a high technology, futuristic orientation; both are about blending science, technology, a pleasant living environment, and culture into new communities that emphasise creativity; and both involve long-run, 10-15 year planning horizons aimed at the 21st century. Accordingly the MFP concept can probably be regarded as a kind of "offshore technopolis" — an evolutionary development on the international scene arising from the internal technopolis experience in Japan.[57] Like technopolis, the MFP is expected to become an incubator for next generation technologies.

Although the two concepts are broadly similar, there are differences. For a start, objectives are different.[58] Technopolis is a regional development initiative within Japan; MFP is an international initiative for the Pacific Rim region. MITI regards one of the roles of the MFP as facilitating "technological exchanges for the Pacific Rim countries."[59] Accordingly, particularly if leading edge American interest is attracted, the MFP proposal is consistent with the new Japanese strategy of becoming more involved in international joint ventures and collaborative R&D projects.[60]

If the MFP is successful in becoming a centre of international technological exchange and collaboration, the issue of who owns the new technologies produced will become important. Accordingly, special institutional arrangements for allocating patent and other rights to new technologies will need to be a part of the MFP concept.

A major difference is the resort emphasis of the MFP. The resort function and associated recurrent adult education functions appear to have more emphasis than the high technology function in the MFP concept. Of course the technopolis program also emphasises a comfortable living environment, but not to the extent of a leisure resort.

So far the MFP concept has been very much a 'top down' exercise emanating from MITI in Tokyo. However MITI does envisage the creation of a Japan-Australia forum to actually carry out the project.[61] Some Australian initiative will be required before it can be said that the MFP concept resembles the technoplis concept in the sense of 'bottom up' involvement. For Australia, the MFP could potentially become a catalyst toward a more technologically-intensive trading relationship with Japan. In the past, Australia has successfull broadened and deepened trade with Japan.[62] As Japan's economy structurally shifts to a high technology focus, there is need for Australia to do so again.[63] Factors providing the foundation for such an opportunity include the existing trade relationship, inter-governmental awareness, Japanese language proficiency in Australia, and Australia's comparative advantage in basic science — as well as the catalytic potential of the MFP.

If the 'bottom up' approach which has worked so well for the technopolises is to be utilised in the implementation of the MFP, then Australia needs to begin developing some firm ideas about how it wants

to proceed. Australian input into the development of the MFP concept could include possible participants, ways in which local people might be involved, funding arrangements, and overall implementation.[64] There is some evidence that this process is beginning in Australia.[65]

The proposed Japan-Australia forum that is meant to propel the scheme is seen, in the original MITI, MFP proposal, as being comprised of business firms from both countries. In contrast the technopolises rely on regional government (prefecture) initiative. Reliance on business initiative is more compatible with the traditional MITI approach.[66]

A further difference between technopolises and the MFP is that the latter could be a new city requiring large funding. If this occurs, the MFP resembles the Tsukuba concept. The technopolises, by contrast, make maximum use of existing facilities, and do not require Tsukuba-like funding.

Another difference between the two concepts is that the MFP will face additional problems of communication associated with the need to integrate different cultures. Some of the technopolises are seeking to attract foreign firms. In this sense they will face somewhat similar problems as the MFP. According to MITI, two further differences between the concepts are that the MFP is more a city of the future than the technopolis concept, and the MFP will accommodate the new lifestyles of the 21st century.[67] Another difference is that the MFP is also meant to accommodate international cultural exchange.

The implementation of the MFP project could draw on the technopolis program experience in further ways. Site selection, for example, could use some of the same criteria, although the 'mother city' probably should be one of the Australian capital cities. This would be consistent with the international orientation of the MFP. Location next to a smaller capital (i.e., not Sydney or Melbourne) would be consistent with the thrust of the technopolis program.

Once a site, or sites, have been selected, an emphasis on strategic policy development and soft infrastructure as well as building a working partnership among businesses, universities and governments will help facilitate the project. The major difference between a technopolis and the MFP, here, is that the latter will emphasise national and international components (as well as local and regional ones) in the soft infrastructure and working partnership.

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