

Discussion Papers are preliminary materials circulated
to stimulate discussions and critical comments

DISCUSSION PAPER No. 45

**Factors underlying the Formation of
Industrial Clusters in Japan and Industrial
Cluster Policy: A Quantitative Survey**

Kentaro YOSHIDA*
Machiko NAKANISHI**

December 2005

Abstract

The purpose of this report is to use information provided by a questionnaire survey to analyze the factors and processes underlying the formation of industrial clusters in Japan. The study, based on questionnaire surveys, forms part of an "Industrial Cluster Project". The Japanese government has implemented policies for industrial clusters so as to enable Japanese industries to maintain competitive power in global markets, and to aid the self-sufficient expansion of local industries. The government's project goes under the heading "Industry Agglomeration for the Recovery of Local Industries with respect to so-called "Industry Clusters."

The authors aim to identify what expectations are held of government by the enterprises that make up industrial clusters. As part of our investigation, we used the results of a survey conducted by UNDP in 2004. Tsuji's study, published by the Osaka School of International Public Policy, surveyed 1198 small or medium sized manufacturing companies located in O ward, Tokyo and Higashi Osaka city, Osaka prefecture. The outcome of the present study, together with data from Tsuji's work on IT usage by SMEs in Japan, is meant to form the basis for policy design and implementation.

Keywords: Industrial Cluster Policy, Agglomeration, Innovation, IT

JEL classification: O14, R10, R58

* Research Fellow, Regional Integration Study Group, Inter-Disciplinary Studies Center, IDE
(Kentaro_Yoshida@ide.go.jp)

** Lecturer, graduate school of policy science, Ritsumeikan University, (machiko-n@hcn.zaq.ne.jp)

The Institute of Developing Economies (IDE) is a semigovernmental, nonpartisan, nonprofit research institute, founded in 1958. The Institute merged with the Japan External Trade Organization (JETRO) on July 1, 1998. The Institute conducts basic and comprehensive studies on economic and related affairs in all developing countries and regions, including Asia, Middle East, Africa, Latin America, Oceania, and East Europe.

The views expressed in this publication are those of the author(s). Publication does not imply endorsement by the Institute of Developing Economies of any of the views expressed.

INSTITUTE OF DEVELOPING ECONOMIES (IDE), JETRO
3-2-2, WAKABA, MIHAMA-KU, CHIBA-SHI
CHIBA 261-8545, JAPAN

©2005 by Institute of Developing Economies, JETRO

1. An investigation of the factors responsible for the formation of industrial clusters, and industrial cluster policy: outline of the study

(1) Aims of the research

In 2005, a research group was set up by the Institute of Developing Economies with the title “Comparisons of Industrial Concentrations in Asia and Other Regions – the Factors Responsible for the Development of Concentrations”. The research presented in this paper forms part of this study, and examines policies towards industrial clusters in Japan and the factors responsible for the formation of such clusters. The research examines the main constituents of policy in the regions of Japan and investigates the institutions responsible for the implementation of policy on industrial clusters. It investigates the present state of policy as well as the factors responsible for the formation of industrial clusters. The research also considers what may be the most effective policy for future development. Basic information was gathered by the authors, taking into account the research group’s intention to carry out international comparisons.

As examples typifying long-standing concentrations of small and medium enterprises in Japan, Ota ward of Tokyo and Higashi Osaka city were chosen as the main districts to be investigated. Under the auspices of UNDP, in 2004 research on information technology was undertaken in these regions with reference to 1198 small and medium size enterprises (hereafter SMEs). It is hoped that the results of the questionnaire surveys will provide insights into the policy-related knowledge and hopes of the small companies that form the

objective of policy, small and medium enterprises being in reality the chief constituents of industrial concentrations. In the report that presents the results of the research, reference is made to the wishes that companies have with regard to policies concerning the flow of information within the industrial concentration to which they belong. It is hoped that the findings of this project, together with the results of the study on industrial cluster policy and formation, will provide basic materials for identifying a more useful kind of supportive policy.

(2) Institutions to be studied

In 2001, the Ministry of Economy Trade and Industry (hereafter METI) announced its industrial cluster policy, which forms a central component of industrial policy in Japan. There are in fact two kinds of industrial cluster policy in Japan, one being METI's "Industrial Cluster Plan" (introduced in 2001) and the other being the "Project for Creating Knowledge Clusters" inaugurated in 2002 by the Ministry of Education, Culture, Sports, Science and Technology. Under the initiative of METI, the support being provided by these policies is being advanced collaboratively. Moreover local governments, too, are involved in industrial cluster formation, working in line with national industrial cluster policy. The present research into industrial cluster policy and the factors responsible for industrial cluster formation has conducted investigations with respect to publicly-administered

economic and industrial agencies throughout Japan and local government offices, these being the main institutions concerned with industrial cluster policy. Also targeted by the study were the nation-wide trade information centers of the Japan External Trade Organization (hereafter JETRO) which provide regeneration aid to locally-based small industries and enterprises.

METI, local government offices and the trade information centres of JETRO were chosen as the targets of the study for the following reasons. As the main source of policy support for the industrial cluster projects that are at present under way in various regions of Japan, METI has a good grasp of regional policy contexts and regional peculiarities. Local government offices, which cooperate closely with METI on the implementation of industrial cluster plans, are important policy-related institutions, and have a good grasp of the history and present circumstances of economic activity within the areas for which they are responsible. JETRO operates 35 trade information centres throughout Japan, and as an institution concerned with the actual implementation of policy measures, it maintains regular face-to-face contact with people who are able to articulate the needs of local enterprises. It has intimate knowledge of the enterprises that help to activate local economies, of the availability of information at local level, and of the circumstances of local economies and locally-based small industries. Moreover JETRO, as an independent administrative entity under law, occupies a position of neutrality with respect to companies and public institutions, and is an organization that develops projects for revitalizing local

economies. Taking into account these realities, JETRO is very well placed to gain a thorough understanding of the conditions within industrial clusters.

【 The objects for this survey 】

	Arranged	Collected	Collection Ratio
Ministry of Economics, Trade, and Industry Branches	24	23	95.8%
Local Government offices	49	37	75.6%
JETRO Trade Information Centers (Local Offices)	35	30	85.7%

Method: mailing
Carried out in August, 2005

【 Research outline for UNDP(2004) survey 】

	Arranged	Collected	Collection Ratio
SMEs in Higashi-Osaka and Ota-ward	6896	1198	17.4%

Method: mailing
Carried out in 2004 by Tuji study Osipp Osaka-University
The objective of the research is to grasp the usage of IT, its purpose, expectations, level of satisfactions of IT usage , intension of IT usage and IT investment. Finding problems for SMEs in introducing and utilizing IT and policy measures to be expected, we purpose to discuss policy making about IT development for SMEs in future.

2. Research into Industrial Cluster Policy and the Factors Responsible for Industrial Cluster Formation

1. Research Results

1.1 Industrial Cluster Projects in Japan

METI is at present implementing the following industrial cluster projects, by way of its agencies throughout Japan:-

1.Hokkaido region: Strategy for the Promotion of the Hokkaido Super Cluster; Bio and Information Industry Cluster;

2. Tohoku region (Aomori, Yamagata, Iwate, Akita, Miyagi, Fukushima) all six prefectures):
Industrial Project for Creation of Information, Bioscience and the Future;
3. Tohoku region (Aomori, Yamagata, Iwate, Akita, Miyagi, Fukushima): Project for
Promoting Industry for a Recycling Society;
4. Kanto region (Ibaraki, Tochigi, Gunma, Saitama, Chiba, Tokyo, Kanagawa,
Nigata, Yamanashi, Nagano, Shizuoka): Project for Regional Revitalization;
5. Capital Region (centering on Tokyo and Yokohama, and provinces such as Kazusa,
Tsukuba and Kashiwa): Fostering Bio-ventures: the Capital Region Bio Genome Network;
6. Capital Region (Tokyo, Kanagawa, Saitama, and Chiba prefectures): Capital Region
Information Venture Forum;
7. Tokai region (Aichi, Gifu and Mie prefectures): Project to Create New Manufacturing in
Tokai;
8. Tokai region (Aichi, Gifu and Mie prefectures): Project to Create Bio Manufacturing in
Tokai;
9. Hokuriku region (Toyama, Ishikawa and Fukui prefectures): Project to Create New
Manufacturing in Hokuriku;
10. Kinki region (Fukui, Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama prefectures):
Kinki Bio-related Industry Project;
11. Kinki region (Fukui, Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama prefectures):
Project for Promoting Lively Manufacturing;
12. Kinki region (Fukui, Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama prefectures):
Project for Promoting an Information-related Cluster;

- 13.Kinki region (Fukui, Shiga, Kyoto, Osaka, Hyogo, Nara and Wakayama prefectures):
Project for Promoting Advanced Use of Energy and the Environment;
- 14.Chugoku region (Tottori, Shimane, Okayama, Hiroshima, Yamaguchi): Project for
Creating a Recycling and Environment-conscious Society;
- 15.Chugoku region (Tottori, Shimane, Okayama, Hiroshima, Yamaguchi): Project to Create
Next-generation Nuclei of Industry;
- 16.Shikoku region (Kagawa, Kochi, Ehime, Tokushima): Shikoku Techno-bridge Plan;
- 17.Kyushu region (Fukuoka, Saga, Nagasaki, Kumamoto, Miyazaki, Oita, Kagoshima):
Kyushu Exchange Plaza for Environment-related and Recycling-related Industries;
- 18.Kyushu region (Fukuoka, Saga, Nagasaki, Kumamoto, Miyazaki, Oita, Kagoshima
entire region): Kyushu Silicon Cluster Plan;
- 19.Okinawa region: Promotion of Okinawa-type Industries.

1.2 The formation of industrial clusters

(1) Utilization of Local Resources

Some 87% of the METI agencies approached by us answered that local resources were being used by their respective regions (Table1). In concrete terms, the usage of local resources is reflected in the following quotations from METI responses: “an industrial concentration in world-class manufacture of vehicles, ships and industrial machinery supported by many companies in the machinery industry”; “a concentration of enterprises related to the semiconductor industry”; “a concentration of IT technology”; “a concentration of research seeding, forming the basis for new kinds of manufacturing”; and

“a concentration of small and medium size enterprises related to new kinds of manufacturing”.

So far as the formation of industrial clusters is concerned, there are many cases where effective use is being made of pre-existing concentrations of big industries and of small and medium size enterprises. Moreover there are also cases where attempts are being made to cater for the demands of modern society using the unique potential of particular localities. Examples include, “the three eco-towns that are engaging in types of urban development using the special characteristics of the region, centred on industries related to recycling and the environment” and “raising Kinki region’s potential in life science fields”. On the other hand, half of all our respondents active in cluster development are making use of the infrastructure already developed under the “Technopolis” and “Knowledge Location” plans (Table1).

Table1. Use of resources

Does the project about which you answered in No.1 have certain industry resources?			
METI Answer	TOTAL	YES	NO
TOTAL	23	20	3
	100%	87	13
Are previous industrial policies, such as Technopolis or Knowledge location, still in use?			
METI Answer	TOTAL	YES	NO
TOTAL	23	11	12
	100%	47.8	52.2

(2) Present awareness of industrial cluster formation

Some 56.8% of the local government offices which responded to our questionnaire survey said that industrial cluster formation was apparent in their territories. In the case of

the JETRO offices, this awareness increased to 76.7% of the respondents (Table2). As regards the question as to what developments can be interpreted as an industrial cluster, answers varied from region to region, but at national level, over half of the respondents were aware that an industrial cluster was some kind of industrial concentration associated with central government planning.

As regards recognising what fields of industry are covered by industrial clusters, METI offices identified biotechnology products, medical services, and products associated with public welfare (43.5% of respondents), electronic machinery and software (39.1%), and vehicles and machinery (26.1%). Local government offices by contrast reported that industrial clusters contain vehicles assembly and machinery (47.6% of respondents), biotechnology products, medical services, and products associated with public welfare (42.9%) and electronic machinery and software (23.8%). So far as the JETRO information centres were concerned, industrial clusters are associated with biotechnology products, medical services, and products associated with public welfare, electronic machinery and software, IT communications (34.8% of respondents for each of these three categories) (Table3). At national level, industrial clusters are understood to center on biotechnology products, medical services, and products associated with public welfare, as well as electronic machinery and software.

Table 2. Existence of Industrial Clusters

Are the firms in your prefecture currently forming an industrial cluster?			
(Local Government)		TOTAL	
TOTAL		37	16
		100%	43.2
(JETRO Local Office)		TOTAL	
TOTAL		30	7
		100%	23.3

Table 3. Category of the industrial Cluster

The Category that industrial Cluster in is									
METI Answer	TOTAL	Biology/Medical/Social Welfare	IT/Communication	Car/Machinery	Electronics Device/Software	Liquid Crystal Display	Energy	Environmental Recycling	Other
TOTAL	23	10	5	6	9	4	2	6	7
	100	43.5	21.7	26.1	39.1	17.4	8.7	26.1	30.4

Local Government Answer	TOTAL	Biology/Medical	IT/Communication	Car/Machinery	Electronic device	Liquid Crystal Display	Other
TOTAL	21	9	4	10	5	2	6
	100	42.9	19	47.6	23.8	9.5	28.6

JETRO Answer	TOTAL	Biology/Medical	IT/Communication	Car/Machinery	Electronic device	Liquid Crystal Display	Other
TOTAL	23	8	8	6	8	0	9
	100	34.8	34.8	26.1	34.8	0	39.1

(3) Preconditions for industrial cluster formation

Respondents were asked to identify the local preconditions for industrial cluster formation. Some 95.7% of METI offices identified as preconditions the existence of related industries, and universities and research institutions, while 69.6% (the next most numerous category) identified the presence of industries likely to form nuclei for growth. Local government offices also identified the existence of related industries, universities and research institutions (81.0% of respondents), universities and research institutions (71.4%) and the presence of industries likely to form nuclei for growth (47.6%). For their part, JETRO offices identified the presence of industries likely to form nuclei for growth

(43.5%), the existence of related industries (34.8%), and the availability of high-quality human resources (30.4%) (Table4). It is clear from the replies that the existence of universities and research institutions, of related industries, and of industries likely to form nuclei for growth were widely seen as effective preconditions for cluster formation. Moreover all three types of institution – METI offices, local government offices and JETRO information centers – saw the existence of industries likely to form nuclei for growth as an important factor. As regards fields of industry, for the manufacture of vehicles, general machinery, electronic machinery, and software, the existence of related industries and of industries likely to form nuclei for growth were seen as preconditions for cluster formation, whereas for biotechnology products, medical services, and products associated with public welfare, there was a strong tendency for the existence of universities and research institutions to be seen as a precondition for the development of a cluster. The following quotations from responses show why these various preconditions were identified by respondents.

First, as regards the importance of the existence of related enterprises, including leading companies, the following quotations are relevant: “In photovoltaic cell production, the big companies concentrated in the Kinki region account for over 40% of world output”; “In fuel cell and hydrogen production, leading manufacturers of solid high polymer-type fuel batteries for domestic co-generation equipment are already present, as are important manufacturers of hydrogen, and there are facilities for transport, storage, and conservation”; “many plant makers for biomass energy production are already present”; “so far as

second-generation battery production is concerned, not only are the major manufacturers already present, but there are also universities and research institutions with strong electrochemistry departments”; “companies with a good competence for development in basic and peripheral technology are present”; “in the environment-related field, the leading makers of environment-related equipment are present”. These and similar observations show the perceived importance, for cluster formation, of the pre-existence in the area of leading companies and top manufacturers. The reasoning here is that “because of the existence of companies likely to form nuclei for growth, an early concentration of related industries is a possibility”, and “for promoting the exchange of information, and for regulating the possibly conflicting interests of firms, it is essential that there already exists a “nucleus” company with negotiating power based on scale of operations and technology”.

Second, among the replies, there were frequent references to the importance of pre-existing companies likely to form nuclei for growth. Examples are “Sankyo Seiki Seisakusho was formed as a ‘spin-off’ company out of Seiko-Epson”; “Big companies already present, such as Toshiba, have functioned as magnets for the formation nearby of concentrations of small and medium size enterprises (locally-based industries) and have thus fostered the concentration of human resources”; “the existence of big companies has a strong influence on the formation of industrial clusters. The existence of one large firm can have a big impact on the local economy”. Moreover, the following quotations are also significant: “in the Project to Create New Manufacturing in Hokuriku, three workshops were set up: the Hokuriku Life Care Cluster workshop, the Hokuriku Micro-Nano Process

workshop, and the Hokuriku Advanced Complex Materials workshop. Of these workshops, two have been become energetic offices of key companies in the cluster”; “by linking with the concrete results of lively research development of this kind, companies likely to form nuclei for growth have acted as coordinators for the activities of related enterprises, a feature that is highly effective in the formation of an industrial cluster”.

Third, respondents have also pointed to the importance of universities and research institutions, as the following quotations make clear: “In the life science field, world-class centers of excellence such as Kyoto University, Osaka University, the Center for Developmental Biology, the National Institute of Advanced Industrial Science, and the Kansai center of the National Institute of Advanced Industrial Science and Technology (AIST) are all located in the region. What is more, companies that have considerable technological and financial power are locally present in the pharmaceuticals industry (in the form of leading manufacturers) and in industries such as chemicals and foods, while there are also small and medium size enterprises equipped with great technological competence. All this makes it possible to bring about industrial development that combines biotechnology as a core technology with other, peripheral technologies”. Other quotations indicate the importance of universities as places for fostering entrepreneurial activity: “The activities of Hokkaido University’s ‘Microcomputer Workshop’ provided the initiative that led to the beginnings of venture capital businesses in information-related fields such as software and system house development, and these led to the formation of Sapporo’s concentration of information industries. In this way, the existence of Hokkaido University was an important factor in the formation of the cluster”. Other quotations illustrate the

important contribution made by collaboration between university research laboratories and companies, especially with regard to business initiatives and technology: “It is apparent that there is a movement, aimed at making use of the research seeds sown by local universities and research institutions, to develop new enterprises with technology suitable for raising the added value of production”; “Many companies have moved into the area to make use of the facilities provided by Nihon University’s Worldwide Research Center for Advanced Engineering and Technology (NEWCAT) in Koriyama”; and “As part of Kobe’s Medical Industry City Plan, thanks to initiatives taken by the local government, 76 private research laboratories are now concentrated within the city”.

Other opinions, albeit minority views, were put forward. One response showed that there have been cases where links with financial institutions have helped to encourage growth: “In the region, local financial institutions have created links with facilities such as the Technology Advanced Metropolitan Area (TAMA) foundation. This has had important implications for cluster development and has contributed to the growth of companies within the cluster. It is to be hoped that this situation will be replicated in cluster areas elsewhere in Japan.” Another response offered the following observation: “A fundamental precondition for cluster formation is the presence within the region of existing companies and universities. But the more important still is the local presence of a leader (or someone with charisma). In Mie prefecture, this role is played by someone whom I shall call ‘Mr M’. For ten years, Mr M has worked enthusiastically on the plan for the formation of Medical Valley in the prefecture. Important contributors such as the industry associations and Mie

University have all relied on his ideas. Without him, there would have been no Medical Valley – and the Valley has been ranked the fifth most important bio-cluster in Japan”.

Table 4. Factors for Industrial Cluster

The existing precondition for cluster formation was

METI Answer	TOTAL	Industrial Zone	Nucleus Firm*	Support of Gov. Policy	University/Institutes	Human Resource Pool	Environment	Related Firm	Key person in the industry	Other
TOTAL	23	6	16	9	22	15	4	21	2	2
	100%	26.1	69.6	39.1	95.7	65.2	17.4	91.3	8.7	8.7
Biotechnology/Medical/Social Welfare	10	2	6	5	10	6	1	8	1	1
	100%	20	60	50	100	60	10	80	10	10
IT/Communications	5	2	3	1	5	3	2	4	0	0
	100%	40	60	20	100	60	40	80	0	0
Car assembly/Machinery	6	2	3	1	6	3	1	5	0	0
	100%	33.3	50	16.7	100	50	16.7	83.3	0	0
Electronics Devices/Software	9	3	5	1	8	5	2	8	0	0
	100%	33.3	55.6	11.1	88.9	55.6	22.2	88.9	0	0
Liquid Crystal Display	4	2	3	0	3	2	1	4	0	0
	100%	50	75	0	75	50	25	100	0	0
Energy	2	0	1	1	2	1	1	2	0	0
	100%	0	50	50	100	50	50	100	0	0
Environmental Recycling	6	1	2	4	6	3	1	5	0	1
	100%	16.7	33.3	66.7	100	50	16.7	83.3	0	16.7
Other	7	1	5	5	7	3	1	6	1	0
	100%	14.3	71.4	71.4	100	42.9	14.3	85.7	14.3	0

Local Government Answer	TOTAL	Industrial zone	Nucleus firm*	Support of Gov. Policy	University/Institutes	Human Resource Pool	Environment	Related Firm	Key person in the industry	Other
TOTAL	21	7	10	6	15	8	4	17	4	3
	100%	33.3	47.6	28.6	71.4	38.1	19	81	19	14.3
Biotechnology/Medical	9	3	3	3	9	5	2	7	3	1
	100%	33.3	33.3	33.3	100	55.6	22.2	77.8	33.3	11.1
IT/Communications	4	3	3	3	3	3	2	3	2	0
	100%	75	75	75	75	75	50	75	50	0
Car assembly/Machinery	10	3	6	1	5	4	2	9	1	2
	100%	30	60	10	50	40	20	90	10	20
Electronic devices	5	4	4	2	5	3	2	5	2	1

	100%	80	80	40	100	60	40	100	40	20
Liquid Crystal Displays	2	0	1	0	1	0	0	2	0	0
	100%	0	50	0	50	0	0	100	0	0
Other	6	1	3	2	6	2	1	6	1	0
	100%	16.7	50	33.3	100	33.3	16.7	100	16.7	0

JETRO Answer	TOTAL	Industrial zone	Anchor Firm	Support of Gov. Policy	University/Institutes	Human Resource Pool	Environment	Related Firm	Key person in the industry	Other
TOTAL	23	3	10	6	6	7	6	8	1	4
	100	13	43.5	26.1	26.1	30.4	26.1	34.8	4.3	17.4
Biology/Medical	8	0	2	2	3	3	2	5	1	0
	100	0	25	25	37.5	37.5	25	62.5	12.5	0
IT/Communication	8	2	3	4	4	4	2	3	0	1
	100	25	37.5	50	50	50	25	37.5	0	12.5
Car/Machinery	6	1	3	1	0	2	3	3	1	1
	100	16.7	50	16.7	0	33.3	50	50	16.7	16.7
Electronic device	8	2	5	1	1	3	1	3	0	2
	100	25	62.5	12.5	12.5	37.5	12.5	37.5	0	25
Other	9	1	4	1	2	2	3	2	1	3
	100	11.1	44.4	11.1	22.2	22.2	33.3	22.2	11.1	33.3

Summary of above 3 tables (Precondition)

METI, Local Government, JETRO	TOTAL	Industrial Zone	Nucleus Firm*	Support of Gov. Policy	University/Institutes	Human Resource Pool	Environment	Related Firm	Key person in the industry	Other
TOTAL	67	16	36	21	43	30	14	46	7	9
	100%	23.9	53.7	31.3	64.7	44.8	20.9	68.7	10.4	13.4

* Firm likely to form a nucleus for growth

(4) Institutional Support for the Formation of Industrial Clusters

The availability of supportive subsidies and loans was identified as the most effective government policy by all three units, namely METI (all respondents), local government offices (90.5%), and JETRO centers (60.6 %.). METI identified as the most important single policy the New Business Promotion Act for Small Firms (47.8% of respondents), while local government and JETRO offices singled out as the next most important policies the Act for the Promoting the Relocation of University Technology and the legislation for

Designated Structural Reform Districts (Table5). Some replies mentioned, as particularly important policies, the subsidy for helping the growth of firms through supporting technology and the fund for promoting consortiums.

In 87.0% of METI, 52.4% of local government, and 30.4% of JETRO responses, mention was made of the importance of supportive policies for the formation of industry clusters. In one reply, it was said that “a comprehensive mechanism that takes into account marketing strategy has to be created.” Other similar opinions referred to the need for “supporting policies for marketing research and distribution”. Additionally, responses mentioned that “human resource management is needed to organize an industry cluster project”, “human resource development is needed for the future (as regards both company management and intellectual property strategy)", and "there is a need for the development of coordinators. Many areas, where industry cluster projects are already under way, urgently need policies for supporting marketing, strategic planning, and human resource management.

Moreover, “companies have sought for supportive policies for new industries, such as ‘extension of the Green Procurement Project (generating a demand for recycled products)’”, “support for the commercialization of the bio-venture business”, or “policies assisting venture companies (loan priority and coordination).” Furthermore, one respondent felt that there was a need for a bold policy “to ease regulations in special financial business zones”. Some 28.6% of METI local offices consider there is a demand for the adjustment of policies towards the evolution of industry clusters, and 14.3% of local government offices

and 13.0% of JETRO trade information centers shared the same view. “Establishment of a scenario” and “research and development by public agencies” have been seen as necessary starting points for the implementation of government long-term planning. Also, it was felt that there is a need for “skill angels” in the form of business-supportive staff from local government as well as an “improvement of the government’s coordinating function.”

Table 5. Effective Government Policy

The government policy that is effective to form an industrial cluster is

METI Answer	TOTAL	Law for Promoting University-Industry Technology	Promotion of Special Zones for Structural Reform	Financial Aid	Revised Industrial Revitalization Law	Promotion of Small Business Establishments	Other
TOTAL	23	7	0	23	0	11	3
	100%	30.4	0	100	0	47.8	13
Biotechnology/Medical/Social Welfare	10	4	0	10	0	3	1
	100%	40	0	100	0	30	10
IT/Communications	5	2	0	5	0	2	1
	100%	40	0	100	0	40	20
Car assembly/Machinery	6	2	0	6	0	3	0
	100%	33.3	0	100	0	50	0
Electronics Devices/Software	9	3	0	9	0	5	1
	100%	33.3	0	100	0	55.6	11.1
Liquid Crystal Displays	4	1	0	4	0	1	0
	100%	25	0	100	0	25	0
Energy	2	0	0	2	0	2	0
	100%	0	0	100	0	100	0
Environmental Recycling	6	0	0	6	0	2	1
	100%	0	0	100	0	33.3	16.7
Other	7	3	0	7	0	3	1
	100%	42.9	0	100	0	42.9	14.3

Local Government	TOTAL	Law for Promoting University-Industry Technology	Promotion of Special Zones for Structural Reform	Financial Aid	Revised Industrial Revitalization Law	Other	N.A.
TOTAL	21	4	3	19	1	0	2
	100%	19	14.3	90.5	4.8	0	9.5
Biotechnology/Medical	9	1	2	9	0	0	0
	100%	11.1	22.2	100	0	0	0
IT/Communications	4	0	1	4	0	0	0
	100%	0	25	100	0	0	0
Car assembly/Machinery	10	2	1	8	0	0	2

	100%	20	10	80	0	0	20
Electronic devices	5	0	1	5	0	0	0
	100%	0	20	100	0	0	0
Liquid Crystal Displays	2	1	0	2	0	0	0
	100%	50	0	100	0	0	0
Other	6	3	1	6	1	0	0
	100%	50	16.7	100	16.7	0	0

JETRO	TOTAL	Law for Promoting University-Industry Technology	Promotion of Special Zones for Structural Reform	Financial Aid	Revised Industrial Revitalization Law	Other	N.A.
TOTAL	23	4	4	16	0	2	4
	100%	17.4	17.4	69.6	0	8.7	17.4
Industrial zone	3	0	0	2	0	0	1
	100%	0	0	66.7	0	0	33.3
Nucleus Firm	10	1	1	6	0	1	2
	100%	10	10	60	0	10	20
Support of Gov. Policy	6	2	2	6	0	1	0
	100%	33.3	33.3	100	0	16.7	0
University/Institutes	6	2	2	5	0	1	0
	100%	33.3	33.3	83.3	0	16.7	0
Human Resource Pool	7	0	1	6	0	1	1
	100%	0	14.3	85.7	0	14.3	14.3
Environment	6	2	2	5	0	2	1
	100%	33.3	33.3	83.3	0	33.3	16.7
Related Firm	8	1	2	5	0	1	1
	100%	12.5	25	62.5	0	12.5	12.5
Key person in the industry	1	0	0	0	0	0	1
	100%	0	0	0	0	0	100
Other	4	0	0	2	0	0	2
	100%	0	0	50	0	0	50

(5) The role of agencies promoting cooperation in industrial cluster formation

The three types of agency may have different purposes, but they nevertheless find themselves in the same situation when it comes to encouraging the formation of industry clusters. For example, all of them wish to see the setting up of networks involving collaboration among industry, government, and academia, initiatives designed specifically for small companies, and the promotion of exports. When asked what would be the best way to create new technology, new business enterprises and new industry, METI agencies

chose the promotion of collaboration between business and academia, and networking and matching assistance (91.3% each), while local government offices selected the promotion of collaboration between business and academia (95.2%) and specific support for small firms (39.1%). JETRO picked export promotion (56.5%), the attraction of enterprises (43.5%), and industry-government collaboration (39.1 %) (Table6).

Table 6. Role of the Cooperative Promotion Agency

To develop industrial clusters, the government should engage in

METI Answer	TOTAL	Attraction of Enterprises	Improvement of Infrastructure	Policies for small businesses	Policy Support	Export Promotion	Industry-Gov.-Academia Corporation	Network-Building	Provision of Information	Matching Assistance	Overseas Operation Backup	Other
TOTAL	23	2	0	5	4	0	21	21	19	21	10	3
	100%	8.7	0	21.7	17.4	0	91.3	91.3	82.6	91.3	43.5	13
Biotechnology/Medical/Social Welfare	10	1	0	0	2	0	10	9	8	9	5	1
	100%	10	0	0	20	0	100	90	80	90	50	10
IT/Communications	5	1	0	2	2	0	4	4	4	4	3	1
	100%	20	0	40	40	0	80	80	80	80	60	20
Car assembly/Machinery	6	0	0	1	0	0	6	4	3	5	2	2
	100%	0	0	16.7	0	0	100	66.7	50	83.3	33.3	33.3
Electronics Devices/Software	9	1	0	3	2	0	8	7	8	8	4	2
	100%	11.1	0	33.3	22.2	0	88.9	77.8	88.9	88.9	44.4	22.2
Liquid Crystal Displays	4	0	0	1	1	0	3	3	3	3	1	0
	100%	0	0	25	25	0	75	75	75	75	25	0
Energy	2	0	0	1	0	0	2	2	2	2	0	0
	100%	0	0	50	0	0	100	100	100	100	0	0
Environmental Recycling	6	1	0	1	0	0	5	6	5	5	1	0
	100%	16.7	0	16.7	0	0	83.3	100	83.3	83.3	16.7	0
Other	7	2	0	2	1	0	7	7	6	7	2	2
	100%	28.6	0	28.6	14.3	0	100	100	85.7	100	28.6	28.6

Local Government Answer	TOTAL	Attraction of Enterprises	Improvement of Infrastructure	Policies for small businesses	Policy Support	Export Promotion	Industry-Gov.-Academia Corporation	Other	N.A.
TOTAL	21	3	3	6	5	1	20	3	0
	100	14.3	14.3	28.6	23.8	4.8	95.2	14.3	0
Biology/Medical	9	1	2	1	2	1	9	0	0
	100	11.1	22.2	11.1	22.2	11.1	100	0	0

IT/Communication	4	2	2	1	0	0	4	1	0
	100	50	50	25	0	0	100	25	0
Car/Machinery	10	1	3	3	2	0	9	1	0
	100	10	30	30	20	0	90	10	0
Electronic device	5	1	2	1	1	0	5	1	0
	100	20	40	20	20	0	100	20	0
Liquid Crystal Display	2	0	1	0	1	0	2	0	0
	100	0	50	0	50	0	100	0	0
Other	6	1	0	2	3	1	6	1	0
	100	16.7	0	33.3	50	16.7	100	16.7	0

JETRO Answer	TOTAL	Attraction of Enterprises	Improvement of Infrastructure	Policies for small businesses	Policy Support	Export Promotion	Industry-Gov.-Academia Collaboration	Other
TOTAL	23	10	6	6	6	13	9	4
	100%	43.5	26.1	26.1	26.1	56.5	39.1	17.4
Biotechnology/Medical	8	4	3	2	2	5	3	1
	100%	50	37.5	25	25	62.5	37.5	12.5
IT/Communications	8	3	3	1	1	5	4	0
	100%	37.5	37.5	12.5	12.5	62.5	50	0
Car assembly/Machinery	6	1	3	2	1	2	3	1
	100%	16.7	50	33.3	16.7	33.3	50	16.7
Electronic devices	8	2	2	2	2	5	2	1
	100%	25	25	25	25	62.5	25	12.5
Other	9	4	1	2	1	6	2	1
	100%	44.4	11.1	22.2	11.1	66.7	22.2	11.1

1.3 Collaboration within industrial clusters, and the predominance of the region

(1) Collaboration and the exchange of information within the industrial cluster

Collaboration and the exchange of information between promotion agencies and companies and industry clusters were being done by 90.5% of the local government offices, and by 69.6% of the JETRO agencies. As regards methods for achieving collaboration between companies and the industrial cluster, specific mention was made of information exchange via e-mail, events for companies to exchange information (87.0% each), and mandatory meetings at the time of company inaugurations, and conferences and for

business matching (82.6% each). The two major ways to achieve collaboration advocated by local government offices were mandatory meetings (78.9%) and information exchange via e-mail and telephone (63.2%). JETRO offices identified mandatory meetings (68.8%) and communication by e-mail and telephone (62.5%) (Table7). All of the organizations mentioned communication through IT and face-to-face communication.

With reference to collaboration in industrial clusters, the survey gathered information on which organization supports which type of industry, and what combination of features was thought to be the most attractive. METI supports first of all the promotion of technology research and development, R&D, and networking (100.0% each), as well as information distribution and dispatching (95.7% each). The next most cited approaches among the METI offices were, collaboration among companies, local government, universities and institutes (100.0% each). The forms of collaboration favored by METI were “technology, R&D and networking with private firms”, “technology and R&D collaboration with universities and research institutes”, “network agencies linking firms” and “networking agencies providing links with universities and research institutes” (100.0% each). The initiatives preferred by local government offices were in technology and R&D, collaboration with promotion agencies, small companies (84.2% each), and the forms of matching popular among local government offices were in “technology and R&D and small private firms” (84.2%) and “technology, R&D and participating firms” (73.7%). For their part, the JETRO agencies said that they put most of their efforts into the promotion of technology and R&D (43.8%), and “technology, R&D and Nucleus Firm”

(37.5%) (Table8). These results indicate the fact that in Japan, there has been widespread collaboration mainly in technology and R&D among firms, universities and research institutes, and small companies. Collaboration of this kind, involving a number of units, is thought to have contributed considerably to the development of industry clusters. All or most of the METI offices identified “local technology development” (100.0%) and “development of new products” (95.72%), as playing an important role, an opinion that was shared by local government offices (68.4% for “local technology development” and 47.4% for “development of new products”). The responses from the JETRO centers mentioned “new product development” (31.3%) and “local technology development” (25.0%) (Table9). The biggest contribution was technology and new products generations.

Table 7. Communication

Describe your preferred method of communication (you may choose more than one)

METI Answer	TOTAL	E-mail or Phone call	Mandatory Meeting	Informal Meeting	Visit them freely	Business Matching	Academia-Industry Community Conference	Other
TOTAL	23	20	19	6	7	19	20	9
	100%	87	82.6	26.1	30.4	82.6	87	39.1
Biotechnology /Medical/ Social Welfare	10	9	8	4	2	8	8	5
	100%	90	80	40	20	80	80	50
IT/Communications	5	5	4	1	0	4	3	3
	100%	100	80	20	0	80	60	60
Car assembly/Machinery	6	4	4	2	1	4	4	4
	100%	66.7	66.7	33.3	16.7	66.7	66.7	66.7
Electronics Devices/ Software	9	8	6	3	2	7	7	4
	100%	88.9	66.7	33.3	22.2	77.8	77.8	44.4
Liquid Crystal Displays	4	4	4	2	2	2	2	0
	100%	100	100	50	50	50	50	0
Energy	2	2	2	0	0	2	2	0
	100%	100	100	0	0	100	100	0
Environmental Recycling	6	5	6	0	1	5	6	1
	100%	83.3	100	0	16.7	83.3	100	16.7
Other	7	7	6	0	2	7	7	5

	100%	100	85.7	0	28.6	100	100	71.4
--	------	-----	------	---	------	-----	-----	------

Local Government	TOTAL	E-mail or Phone call	Mandatory Meeting	Informal Meeting	Visit them freely	Other
TOTAL	19	12	15	6	5	1
	100%	63.2	78.9	31.6	26.3	5.3
Biology/Medical	9	7	8	3	2	0
	100%	77.8	88.9	33.3	22.2	0
IT/Communication	4	4	3	2	1	0
	100%	100	75	50	25	0
Car/Machinery	8	5	6	1	0	1
	100%	62.5	75	12.5	0	12.5
Electronic device	5	4	3	1	2	0
	100%	80	60	20	40	0
Liquid Crystal Display	2	2	1	0	0	1
	100%	100	50	0	0	50
Other	6	3	5	2	3	0
	100%	50	83.3	33.3	50	0

JETRO Answer	TOTAL	E-mail or Phone call	Mandatory Meeting	Informal Meeting	Visit them freely	Other
TOTAL	16	10	11	7	2	3
	100%	62.5	68.8	43.8	12.5	18.8
Biology/Medical	6	5	6	3	1	1
	100%	83.3	100	50	16.7	16.7
IT/Communication	6	5	3	2	0	2
	100%	83.3	50	33.3	0	33.3
Car/Machinery	5	4	5	4	0	0
	100%	80	100	80	0	0
Electronic device	5	3	4	1	0	1
	100%	60	80	20	0	20
Other	5	2	2	2	1	1
	100%	40	40	40	20	20

Table 8. Corporative Partner

Make a mark in the box identifying your organization's corporative partner and the category that they are active in

METI Answer		Participating Firms	Nucleus Firms	Local Governments	Universities/Institutes	Other	N.A.
TOTAL		96	90	46	69	31	56
		59.6	55.9	28.6	42.9	19.3	34.8
1.Technologies/Innovations		23	21	1	23	2	0
		100%	91.3	4.3	100	8.7	0
2.Supplying New Jobs		3	3	0	0	0	20
		13	13	0	0	0	87

3.Process of Decision Making		2	5	7	1	4	13
		8.7	21.7	30.4	4.3	17.4	56.5
4.Networking		23	21	21	23	10	0
		100%	91.3	91.3	100	43.5	0
5.Exploitation of Sales Channels		22	18	1	2	5	1
	100%	95.7	78.3	4.3	8.7	21.7	4.3
6.Providing Information	23	21	20	16	19	10	1
	100%	91.3	87	69.6	82.6	43.5	4.3
7.Other	23	2	2	0	1	0	21
	100%	8.7	8.7	0	4.3	0	91.3

Local Government	Promotion Org.	Nucleus Firm	Small Business	Other	N.A.
TOTAL	24	16	23	7	46
	31.6	21.1	30.3	9.2	60.5
1.Technology/Innovation	14	10	16	5	3
	73.7	52.6	84.2	26.3	15.8
2.Increasing the Demand for Labor	2	4	5	0	13
	10.5	21.1	26.3	0	68.4
3.Decision Making Process	7	2	2	2	12
	36.8	10.5	10.5	10.5	63.2
4.Other	1	0	0	0	18
	5.3	0	0	0	94.7

JETRO Answer	Promotion Org.	Nucleus Firm	Small Business	Other	N.A.
TOTAL	19	15	12	8	37
	29.7	23.4	18.8	12.5	57.8
1.Technology/Innovation	7	6	4	3	5
	43.8	37.5	25	18.8	31.3
2.Increasing Demand for Labor	4	3	3	0	11
	25	18.8	18.8	0	68.8
3.Decision Making Process	4	3	1	1	11
	25	18.8	6.3	6.3	68.8
4.Other	4	3	4	4	10
	25	18.8	25	25	62.5

Table 9. Contribution

The major benefit that you can get from the corporation you checked in the chart above is

METI Answer	TOTAL	Shipment Value Increased	Employment Increased	New Product Innovation	Technology Innovation in the Area	Encouragement of Agglomeration	Other
TOTAL	23	5	2	22	23	4	3
	100%	21.7	8.7	95.7	100	17.4	13
Biotechnology/Medical/Social Welfare	10	2	1	10	10	2	1
	100%	20	10	100	100	20	10
IT/Communications	5	1	1	5	5	1	1
	100%	20	20	100	100	20	20

Car assembly/Machinery	6	2	0	6	6	0	1
	100%	33.3	0	100	100	0	16.7
Electronics Devices/Software	9	3	1	9	9	2	1
	100%	33.3	11.1	100	100	22.2	11.1
Liquid Crystal Displays	4	1	0	4	4	1	0
	100%	25	0	100	100	25	0
Energy	2	0	0	2	2	0	0
	100%	0	0	100	100	0	0
Environmental Recycling	6	0	0	5	6	0	0
	100%	0	0	83.3	100	0	0
Other	7	1	0	7	7	0	2
	100%	14.3	0	100	100	0	28.6

Local Government	TOTAL	Shipment Value Increased	Employment Increased	New Product Innovation	Technology Innovation in the Area	Other	
TOTAL	19	3	3	9	13	2	
	100%	15.8	15.8	47.4	68.4	10.5	
Biotechnology/Medical	9	0	2	5	8	1	
	100%	0	22.2	55.6	88.9	11.1	
IT/Communications	4	0	1	2	4	1	
	100%	0	25	50	100	25	
Car assembly/Machinery	8	3	2	4	3	2	
	100%	37.5	25	50	37.5	25	
Electronic devices	5	0	1	3	4	2	
	100%	0	20	60	80	40	
Liquid Crystal Displays	2	1	1	1	1	0	
	100%	50	50	50	50	0	
Other	6	0	0	3	6	0	
	100%	0	0	50	100	0	

JETRO Answer	TOTAL	Shipment Value Increased	Employment Increased	New Product Innovation	Technology Innovation in the Area	Other	N.A.
TOTAL	16	2	2	5	4	4	4
	100%	12.5	12.5	31.3	25	25	25
Biotechnology/Medical	6	1	0	2	3	1	1
	100%	16.7	0	33.3	50	16.7	16.7
IT/Communications	6	1	1	2	1	1	2
	100%	16.7	16.7	33.3	16.7	16.7	33.3
Car assembly/Machinery	5	2	2	1	1	0	2
	100%	40	40	20	20	0	40
Electronic devices	5	1	1	1	0	1	2
	100%	20	20	20	0	20	40
Other	5	1	0	1	0	3	0
	100%	20	0	20	0	60	0

(2) Regional supremacy in areas where industrial clusters are being formed

As regards how to achieve regional supremacy in areas where industrial clusters are being formed, METI stressed the development of new technology and the creation of a human resource pool (52.2%). Local government offices identified new technology (85.7%) and the creation of a human resource pool (23.8%), and the JETRO centers opted for the development of new technology (30.4%) and the creation of a human resource pool (26.1%) (Table10).

Table 10. Advantage of Industrial Cluster

What is the major advantage of your industry cluster being in the region concerned?

METI Answer	TOTAL	Technology Innovation	Human Resource Pool	Information Network	Increasing Productivity	Beneficial institutions	N.A.
TOTAL	23	12	12	8	3	2	5
	100%	52.2	52.2	34.8	13	8.7	21.7
Biotechnology/Medical/Social Welfare	10	7	4	3	2	2	2
	100%	70	40	30	20	20	20
IT/Communications	5	2	3	2	0	1	1
	100%	40	60	40	0	20	20
Car assembly/Machinery	6	4	2	1	0	0	2
	100%	66.7	33.3	16.7	0	0	33.3
Electronics Devices/Software	9	5	4	5	0	1	1
	100%	55.6	44.4	55.6	0	11.1	11.1
Liquid Crystal Displays	4	2	2	2	0	0	1
	100%	50	50	50	0	0	25
Energy	2	1	1	1	0	0	1
	100%	50	50	50	0	0	50
Environmental Recycling	6	3	3	1	0	1	1
	100%	50	50	16.7	0	16.7	16.7
Other	7	2	3	1	1	1	2
	100%	28.6	42.9	14.3	14.3	14.3	28.6

Local Government Answer	TOTAL	Technology Innovation	Human Resource Pool	Shared Information	Increasing Productivity	Beneficial institutions	N.A.
TOTAL	21	18	5	4	3	3	1
	100%	85.7	23.8	19	14.3	14.3	4.8
Biotechnology/Medical	9	9	4	1	1	2	0
	100%	100	44.4	11.1	11.1	22.2	0
IT/Communications	4	4	3	1	0	0	0
	100%	100	75	25	0	0	0

Car assembly/Machinery	10	9	3	3	3	2	0
	100%	90	30	30	30	20	0
Electronic devices	5	4	4	1	0	0	1
	100%	80	80	20	0	0	20
Liquid Crystal Displays	2	2	0	1	2	2	0
	100%	100	0	50	100	100	0
Other	6	4	0	1	1	1	1
	100%	66.7	0	16.7	16.7	16.7	16.7

JETRO Answer	TOTAL	Technology Innovation	Human Resource Pool	Shared Information	Increasing Productivity	Beneficial institutions	N.A.
TOTAL	23	7	6	1	1	5	6
	100%	30.4	26.1	4.3	4.3	21.7	26.1
Law for Promoting University-Industry Technology	4	2	0	0	0	1	1
	100%	50	0	0	0	25	25
Promotion of Special Zones for Structural Reform	4	1	0	0	0	2	1
	100%	25	0	0	0	50	25
Financial Aid	16	4	5	1	1	5	3
	100%	25	31.3	6.3	6.3	31.3	18.8
Other	2	1	1	0	0	1	0
	100%	50	50	0	0	50	0
N.A.	4	1	1	0	0	0	2
	100%	25	25	0	0	0	50

1.4 The Future Formation of Industrial Clusters

(1) Areas that are already developing industrial clusters

As for future approaches to industrial cluster formation in the regions of Japan, one respondent wrote that “hitherto, we have focused on services for networking and technology development only for member companies, and for this reason, in the manufacturing sector a distinctive industry cluster has not yet emerged. Our next goal will be to provide services for forming a distinctive industrial cluster.” “To promote innovation as the main objective of industry cluster projects, I would like to emphasize the creation of networks among various industries. It will also be essential to find and where necessary

educate coordinators and advisers for developing such networks” These opinions indicate that the nature of the requirements changes beyond the first stage of industrial cluster formation. Whereas in the initial phase a formal step-by-step approach is necessary, in the subsequent stage, development should be much more locally specified, with member companies sharing a clearly defined mission statement and engaging in substantial collaboration to create identical results. In this context, the demand for coordinators will grow as a result of advances towards high-level collaboration.

“In the semiconductor field within the Kyushu region, we have held many different kinds of seminar and have undertaken various initiatives for promoting technological development and sales development. Since starting the cluster plan four years ago, we have achieved substantial results. The number of members belonging to the companies involved with the promotion agencies has increased to 1,119 as of August 2005. We have also established a network linking industry, academia, and government. Since the promotion act for Kyushu's semiconductor industry was introduced, the industry has been efficiently activated. We would like to reinforce our local networks with the newly established “Wide Area New Business Network Reinforcement Project.” It is apparent that there are some geographic areas, where cluster projects have been developed, that are trying to expand the fields in which they collaborate. Many of these inter-category collaborations have occurred in areas which have been trying to engage in industry cluster projects for a relatively long period.

Many respondents mentioned goals for the next stage of cluster formation. “We are currently working on joint research and information exchange to develop healthy long life industry, and new energy source industries. So far, we have concentrated on traditional industries and on modern measurement analysis and electronic devices. Now, we plan to promote new wellness-related enterprises or a trial manufacturing industry cluster incorporating horizontal technology development linked with local technology.” These are roles that respondents expect the government to fulfill in the formation of industry clusters. However, it is also hoped that private firms will be capable of forming a cluster by themselves. “A president of a medical device company in Lombardia, Italy, opened a new company in a small village. The firm was growing rapidly, and he sold the company and set up a related company near by the original one. Finally, there were more than eighty medical-related firms concentrated in and around the tiny village. However, the village attracted little attention from the cities because the government could not catch up with the speed of its growth. Therefore, what the government should do is to restrict itself to supporting private companies trying to create a cluster.”

(2) Areas with no Current Industry Cluster

As regards future cluster development, local government offices which do not at present have an industry cluster present in their territories, want to have firms capable of forming growth nuclei as leading companies (40.0%). They also want involvement by universities and research institutes (33.3%), and would like to see the presence of charismatic leadership (26.7%). JETRO also expects to have universities and research

institutes, firms that are related to each other, and human resources (42.9% each)(Table 11). We can see from these responses that the leading desiderata for cluster formation are thought to be firms capable of forming growth nuclei, related firms, universities and research institutes, and successful human resources. Here are some specific opinions. "From 2002 to 2004, we repeatedly discussed a plan for creating an industry cluster in our area, and I felt there must be a clear leader to act as a coordinator." The demand for a leader to organize a concentration of related firms is here clearly apparent, as is the need for consortiums. "Two regions have been selected as 'Ministry of Education and Science City Area Business Projects' thanks to the seeds generated by new technology. Although these regions are currently approaching the stage where they will develop into "Intellectual Clusters", they will need an "area consortium research and development project" to link the intellectual clusters with an industry cluster, an industry cluster being defined as the creation of new businesses out of a network involving industry, academia and government." "Several kinds of seed can generate an industry cluster; however, a real industry cluster, which does not have functional characteristics that the clusters are supposed to have, has yet not appeared. The reason might have something to do with the existence of a business concentration in Tokyo, which means that there is an outflow from local sources to the Tokyo area." "Competition among cities beyond national frontiers has begun, and if this trend continues, international economic barriers may eventually be eliminated. Until Japan finds a clear solution of that problem, it will be difficult to create industrial clusters in the Japanese provinces."

Table 11. Future Plan for forming Industrial Cluster

The most important factor likely to encourage the future growth of an industrial cluster in your area is											
Local Government Answer	TOTAL	Industrial zone	University/Institutes	Related Firm	Nucleus Firm	Human Resource Pool	Key person in the industry	Support of Gov. Policy	Environment	Other	N.A
TOTAL	16	0	6	3	6	1	4	0	1	3	1
	100%	0	37.5	18.8	37.5	6.3	25	0	6.3	18.8	6.3

Local Government Answer	TOTAL	Industrial zone	University/Institutes	Related Firm	Nucleus Firm	Human Resource Pool	Key person in the industry	Support of Gov. Policy	Environment	Other
TOTAL	7	0	3	3	1	3	0	0	0	1
	100%	0	42.9	42.9	14.3	42.9	0	0	0	14.3

2. Knowledge gathered from Research on the Factors underlying Cluster Formation and Industrial Cluster Policy

Currently, the most common kinds of industrial cluster in Japan are those with industries based on biotechnology and medicine, social welfare, electronic devices, and the software industry. These clusters often incorporate existing big companies or an agglomeration of small firms and depend on these enterprises for cluster development. It is clear that there are several cases where it is possible to achieve matching between locally-specific technology potential and popular present-day demand. Consider for example “an Eco-town project with environment-related and recycling industry as its core element” and “high technology potential in the field of the life-science industry.” In the next paragraph, the process and fundamental stages of industrial cluster formation will be examined.

In areas where each of the actors has already worked on a project for creating an industrial cluster, the exploitation of local resources has played an important role. Here, local resources are defined broadly as natural resources ranging from plant and water resources (whose endowment reflects specific temperature and other geographic conditions) to energy resources, such as solar power or fuel batteries. Broadly defined, “local resources” can also include existing industrial agglomerations, small manufacturing companies, and skilled technicians.

The Japanese industrial clusters created in recent years have made good use of existing local resources such as these. Moreover, the infrastructures created by former industrial development policies, such as the Technopolis and Knowledge-location policies, were also used. It is clear that the exploitation of local resources and infrastructures created by former industrial development policies are essential in the formation of industrial clusters. The conclusion is that in the early stages of its development, an industrial cluster is likely to benefit unique local resources and the infrastructure provided by government.

As has already been made clear, the major preconditions needed for the formation of an industrial cluster were thought to be the presence of related firms, firms likely to function as nuclei for growth, and universities and research institutes. The existence of firms likely to function as nuclei for growth is the most important basic requirement for cluster formation. In vehicle assembly and machinery production, in the assembly of electronic devices, and in the software industry, firms likely to function as nuclei for

growth and related firms are the most important requirements. On the other hand, the growth of biotechnology, medical service industries, and social welfare industries, has tended to be associated with the presence of universities and institutes. The growth factors differ from category to category because “in an industry agglomeration area, the existence of a big company, which can be a firm likely to function as a nucleus for growth, and one with high development capacity, makes it far easier for other firms to form an agglomeration in the early stages of cluster formation,” while “the strength of big companies in terms of capital, and the high technology of smaller firms can make possible the joint development of industry by combining core technology with peripheral technology.” Moreover, by making use of seeds provided by universities and research institutes, industries can generate new technology as well as businesses with high-value added production. The collaboration of firms and universities and research institutes can contribute substantially to the creation of new technology and new types of business. One can conclude that “agglomeration” will be created by mutually supporting industries centering on firms functioning as nuclei for growth, with related firms and new incoming firms following the lead taken by the big company.

In the process of generating an industry cluster, cash subsidies and policies for financial support were the approaches most highly thought of among the respondents to our survey. Another popular approach was the “New Business Supporting Act” for smaller firms, a means of providing direct support for smaller companies. Some respondents approved of the “Act for Supporting the Relocation of University Technology” which

provides patent protection and which recognizes the importance of technology relocation to private companies. It follows that in the early stages of industrial cluster development, the most desirable supporting policies are those that directly assist small companies and that reinforce extensive cooperation between related firms and universities and research institutes. Patent protection and technology relocation, both of which can be promoted by collaboration between universities and private companies, are also much esteemed as an approach to industrial cluster development.

Four years have passed since the government introduced its industrial cluster policy, and by now each region in Japan has at least one new industrial cluster challenge to tackle. In our survey, more than 90% of METI branches thought that current supporting policies ought to be adapted to suit local circumstances, and more than half of local government offices also agreed there should be some sort of policy adaptation. More than 30% of JETRO trade information centers responded likewise. The current supporting policies are not perfect, because some private firms have made particular requests to government. The results of our survey suggest that a desirable new supporting policy would be one that gives attention to aspects of marketing strategy for the commercialization of production as well as to marketing research. Another type of useful policy would be one that recognizes the importance of human capital development for the management of industrial cluster projects, for creating new businesses, and for coordinating the activities of the main actors in a cluster. Some of our respondents also felt that there was a need for policy to support the development of venture capital businesses. Each of the three agencies whose views we

investigated agreed that there appeared to be a need for the provision of people able to advise on marketing, especially with respect to the growth of new industries, as well as specialists able to coordinate the main trends within a cluster and organize them with a clear scenario in mind. Thus far, and in the absence of individuals with charismatic leadership qualities, these roles have been taken by industrial promotion agencies and through collaboration among industry, government, and academia. This means that there is a demand for agencies and people with leadership qualities to encourage and organize collaboration and regional cooperation among industry, government and academia.

What have been the benefits of industrial clusters, and what are the future tasks so far as industrial cluster formation is concerned? Judging by the replies of our respondents, many regions have benefited from a growth of an industrial cluster, especially in cases where engineering has been developed, and where industries have brought forth new products. The biggest single benefit provided by industrial clusters has been product innovation, as distinct from the process innovation that has been predominant hitherto. New kinds of technology and valuable human resources have become properties of regional clusters that can be inherited by the next generation.

In areas that have no industry cluster at present, the local offices of METI, local government and JETRO believe that the driving force for future industrial cluster formation will come from firms likely to provide nuclei for future growth, universities, research institutes, and resources of human capital. Areas without a cluster but wishing to create one should try to identify “regional resources” that can generate “added-value” by using

“technology development and relocated technology created by collaboration among universities, research institutes, and other actors in a cluster.” The major player within an industry cluster is “the private firm.” Government needs to encourage the formation of “region-oriented” industrial clusters, and should support the creation of an environment in which “companies” can gain competitive strength. Firms, for their part, should maximize usage of their local advantage to “compete” and “cooperate” constructively.

3. Observations on the Results of a Survey on the Information Technology of Owners of Small and Medium Size Enterprises (hereafter SMEs)

In 2004, a survey was carried out under the auspices of the United Nations Development Programme (UNDP) of two geographical concentrations of SMEs of the kind that have long been characteristic of Japan’s manufacturing base. The concentrations were respectively in Ota ward, Tokyo and Higashi Osaka city, Osaka prefecture. The purpose of the survey was to assess the use of information technology by SMEs in the manufacturing sector. This section of our paper will examine the current situation regarding the application of IT by SMEs and related issues, using our study¹ of the two aforementioned geographical concentrations of Japanese SMEs, one located in the Osaka conurbation and the other in metropolitan Tokyo.

¹ We here refer to M Tsuji, H Miyoshi, T Bunno , H Idota, M Ogawa, E Tsutsumi ,M Nakanishi and N Smith (2005) and Report for UNDP (2004).

3.1 Characteristics of two selected clusters

As has already been pointed out (Tsuji et.al., 2005; UNDP, 2004), Japan's industrial SMEs have supported the entire 'monostukuri (manufacturing)' sector by supplying high quality parts and components. It is common knowledge that the superior quality of many Japanese products is largely based on SMEs' technological know-how and accumulated skills. For this study, we selected the two largest SMEs clusters that possess highly specialized technologies and regional collaboration networks: Higashi Osaka City and Tokyo's Ota Ward. These two regions, however, display distinctly different characteristics.

SMEs in Higashi Osaka have superiority in the manufacturing of finished products in the machinery and metalwork industries. More than 100 SMEs in Higashi Osaka produce their own unique items, maintaining the largest market shares for these products throughout the world. The main sectors in which Higashi Osaka's SMEs are active include metalware, plastics, electronics, general machinery, and printing and publishing. Although they accept contracts from some large "demand transporter" companies such as Panasonic, Sanyo and Sharp, these SMEs tend to be more independent-minded and less focused on acting as subcontractors than their counterparts in Ota Ward. In Higashi Osaka, manufacturing SMEs have constructed local networks through horizontal cooperation among nearby small and medium sized producers of unique niche products and associated peripheral products. In the Higashi Osaka cluster, SMEs are practicing various cross-industrial exchanges in order to absorb ideas for new technologies, product marketability, and so on. These exchanges are strongly oriented towards creating new markets.

Most SMEs in Ota Ward specialize in metalworking and processing, and are known for their high-level technical capabilities. Large as well as leading medium-sized companies in the electronic and automobile industries, such as Toshiba, Sony, NEC and Nissan, have benefited by purchasing high-quality parts from Ota's SMEs. Historically, large companies have agglomerated in Tokyo's metropolitan areas, and the SMEs in Ota Ward are thus able to maintain strong ties and various kinds of collaboration with these large firms by way of proximity. This collaboration increases the SMEs' effectiveness, but in turn, restricts their behavior: in other words, SMEs in Ota Ward tend to be passive and accept their role as subcontractors.

3.1.1. Higashi Osaka cluster

Higashi Osaka, a well-known industrial city, ranks fifth among Japanese cities in number of manufacturing facilities, with over 8,000 factories, and ranks first in factory density (the number of factories per square km of habitable land). In June 2004, we sent questionnaires by mail to 3,500 SMEs in this region. Some large firms that do not fit into the category of SMEs are also located in Higashi Osaka, but we omitted these from our sample. We received 691 responses, a response ratio of 17.4%. The results of the survey allow us to describe Higashi Osaka SMEs in terms of a) size of firms in terms of capital and employees, and b) industrial category.

a) Capital and employees

More than half of our Higashi Osaka respondents have capital of less than 10 million yen, and the average is nearly 21.8 million yen. Table 3-8 shows that 80% have less than 50 employees. Small businesses with less than 20 employees comprise 60% of the

total. The number of IT-related employees is set out in Table 3-9. This table shows that nearly 30% of SMEs do not have any IT-related employees, and the average number of such employees per enterprise is only 1.5.

b) Industry

More than half of our respondents were from the manufacturing sector, and 17.7% were wholesalers. This implies that Higashi Osaka is primarily a manufacturing cluster. The breakdown by category is: metalware, 32% plastics and rubber products, 14.6%; electrical machinery and equipment, 13.9%; and general machinery, 12.8%. Most companies are currently working on expanding their traditional business, very few having changed their basic business models since their inception. Examining the relationship between the number of employees and the type of business, we find that companies with less than 20 employees are mostly in manufacturing, retail, money lending, real estate, information services, and other assorted service businesses. A large number of the companies with between 21 and 300 employees are in the transportation, telecommunications services and construction industries. The average net profit margin of all our respondents ranged from 11 to 20% in FY 2003.

3.1.2. Ota cluster

Ota Ward, another well-known industrial city, ranks third in Japan in factory density, possessing over 6,000 factories. We sent questionnaires to 3,396 SMEs in June 2004 and received 507 responses, a response ratio of 14.9%. We can describe Ota Ward SMEs in the

same terms as their Higashi Osaka counterparts, namely a) size of firms in terms of capital and employees and b) industrial category.

a) Capital and employees

Two thirds of Ota SMEs have less than 10 million yen of capital, and the average is nearly 15.3 million yen, which indicates that these SMEs are, on the whole, much smaller than those of Higashi Osaka. More than half of Ota SMEs employ less than 10 employees; the average is 17.5 . There are more small companies in Ota Ward than in Higashi Osaka. Nearly 30% of SMEs do not have any IT-related employees, and the average is only 0.9.

b) Industry

About 91.9% of our total valid replies are manufacturing SMEs, an extremely high ratio. The remaining percentage is divided up among other industries in roughly the same proportion as in Higashi Osaka. Table 3-11 shows the relative shares of manufacturing product categories, with a predominance of metalware (31.8%), machinery and tools (23.6%), electric machinery (22.5%), and other manufactured products. Again, many companies have been expanding their existing business models, and very few have made fundamental changes. If we examine the relationship between the number of employees and the type of business, we find that there are many companies with fewer than 20 employees in manufacturing, wholesale, retail, house building, and other service businesses. A large number of companies with 21 to 300 employees are in the businesses of real estate and information services. The average net profit margin ranged from 6 to 10% in fiscal year 2003. SMEs in Ota Ward show much lower net profit margins than those in Higashi Osaka.

3.2. Future IT and Policy

3.2.1. Policy measures desired

Our survey also asked SMEs about the government policies they would like to see implemented in order to improve their IT usage. The results of the survey are shown in Table 12.

According to the responses to our questionnaire, SMEs would like governments to implement policies to promote IT investment, including subsidies for IT investment and low-interest loans, followed in importance by support of education such as the provision of IT seminars and training. SMEs with a higher desire to use IT in the future would like to see more financial assistance for IT investment. SMEs are often afraid that IT enlarges the “digital divide,” since these small firms tend to be handicapped when it comes to IT usage.

Different appraisals of the situation are given, and different policy measures desired, by SMEs with different current levels of IT usage, although most want assistance in funding and education. Governments are requested to lessen companies’ above-mentioned IT-related fears by providing information about IT, and to nurture regional environments that promote IT.

SMEs request that governments support IT usage in manufacturing, in particular by providing information to assist companies’ IT usage. SMEs often possess specific technologies for order- and custom-made products, but follow traditional trade practices, both of which are difficult to integrate or systematize with IT. Governments are requested to assist in solving these problems. In addition, the workforce is rapidly aging in these

companies, and measures targeted toward assisting senior employees are also requested.

As has already been pointed out (Tsuji et.al., 2005; UNDP, 2004), SMEs in Ota request that the government implement policies to promote IT investment. Such policies would include the provision of subsidies for IT investment (36.1%), low-fee leasing of IT (35.1%), IT seminars (32.6%), low-interest loans for IT-related equipment (31.5%), and training for PC operation (28.7%). This implies that these firms basically want government support related to funding and human resource development. SMEs with a greater intention to use IT request more financial assistance in IT investment. From this case study, we learn that, since many SMEs cannot afford to hire younger workers, it is difficult to find IT leaders within the firm (e.g. Company G, described later); thus, small firms seek to hire knowledgeable IT specialists through headhunting (e.g. Company I, described later). They also request training and seminars to increase the IT abilities of their existing workers. Another request is for governments to provide concrete examples of success and failure of IT usage in other firms. As an extreme case, one firm stated that it did not expect any government support, and expects all IT-related issues to be addressed through the private sector.

Table 12. IT Polices Requested by SMEs

	Total		Higashi Osaka		Ota Ward	
	number	ratio	number	ratio	number	ratio
1. IT seminars	391	32.6%	253	36.6%	138	27.2%
2. Training for PC use	344	28.7%	197	28.5%	147	29.0%
3. Training for website development	212	17.7%	120	17.4%	92	18.1%
4. Advice for IT promotion	267	22.3%	176	25.5%	91	17.9%
5. Low-interest loans for IT	377	31.5%	233	33.7%	144	28.4%
6. Lease of IT with low fees	421	35.1%	272	39.4%	149	29.4%
7. Tax exemption incentives for IT	384	32.1%	238	34.4%	146	28.8%

investment						
8. Grants and financial supports for IT investment related projects	432	36.1%	275	39.8%	157	31.0%
9. Support for opening new portal sites	37	3.1%	18	2.6%	19	3.7%
10. Deregulation	202	16.9%	125	18.1%	77	15.2%
11. Commendation of small company business models that make use of IT	47	3.9%	32	4.6%	15	3.0%
12. e-procurement, e-purchase	86	7.2%	50	7.2%	36	7.1%
13. Others	61	5.1%	29	4.2%	32	6.3%
Unknown	224	18.7%	102	14.8%	122	24.1%
Total	1198		691		507	

3.2.2. Special Zones for IT and new business promotion

Next, we asked for opinions concerning the tentative concept of a “Special District for IT and New Business Promotion.” The details of the concept are as follows.

“The Special District for IT and New Business Promotion” is designed to facilitate the creation of new industries, the invitation and incubation of new businesses, and better services for the public through the development of IT and telecommunications infrastructure based on fiber optical networks and deployed by local governments. The deregulation provided in this District will make it much easier to conduct businesses that use IT in various fields.

“The Special Districts for IT and New Business Promotion” are expected to confer a large advantage on Japanese manufacturers seeking to achieve stronger international competitiveness (58.1%). SMEs expect that the districts will provide them with financial support (55.7%) and support for human resources development (56.1). On the other hand, many believe that only large or IT-related companies will be able to take advantage of the districts, and some SMEs believe that they will gain nothing from them (49.8%). However, responses regarding practical use of such districts, were they to exist in Higashi Osaka City or Ota Ward are “quite agreeable (21.2%)” and “to some extent agreeable

(26.5%).” Approximately half of the SMEs in both areas responded positively regarding the practical application of the concept.

The detailed responses to our open-ended question regarding what SMEs in both areas want from the “Special Districts for IT and New Business Promotion” included the following: a desire for financial support, such as “tax reduction for investment,” “mitigation of levies and taxes”, “creation of low-priced IT environments,” “creation of low-priced or free infrastructure”, “cheap introduction of IT technology” and “low-cost cooperative development between industry and government”. Desired HR support included “HR development of IT experts”, “development of the younger generation, including IT education at school”, “free help from instructors”, and “supply of educational opportunities to understand new technology”. Additionally, there are demands for consulting functions and joint development functions, such as “detailed advice and presentations for each business field”, “consultants for preparing for IT environments”, “taking a role in development”, and “joint ownership of information”. Other requests included “study sessions for venture business development”, “joint ownership of information between venture businesses”, “information spillover”, and “development and support of creative ideas”, which are related to the development of new industries and business culture. There are also demands for information infrastructure support, such as “low-priced fiber connections”, and “free connections.” IT content and venture business-related demands included “information exchange between different business fields”, “creation of a suppliers’ database”, and “development of profitable applications”. Moreover, some

proactive companies want to create new markets. Their wish list includes “cooperation between companies ” and “creating markets for each business field.”

Table 13. The Special Zone for IT and new business promotion

	Agree	Agree to some extent	Uncertain	Don't agree much	Disagree
1. The Special Zone will be provide large advantages for Japanese manufacturers seeking to achieve stronger international competitiveness.	26.5	31.6	18.3	6.2	4.0
2. We expect the Special Zone to provide us with financial support.	25.6	30.1	19.7	6.3	4.3
3. We expect the Special Zone to support our human resources development.	24.5	31.6	20.1	5.6	3.7
4. Only large or IT-related companies will be able to take advantage of the Special Zone, and other SMEs may get nothing from it.	25.3	24.0	26.8	6.3	5.1
5. If the Special Zone is established in Higashi Osaka City or Ota ward (Tokyo), we'd like to make practical use of it.	21.2	26.5	27.8	6.9	4.5

Analysis of the likely practical use of “The Special Districts for IT and New Business Promotion”

In order to extract the factors that affect firms’ willingness to put the “The Special Districts for IT and New Business Promotion” to practical use, we apply multiple regression analysis with the Special District “practical use” question (Question 5 in Table 14) as the dependent variable, and importance of IT, IT use intention, intention of additional investment, and expectations of benefits from IT as the independent variables (potential factors). Higher correlation coefficients are present for IT use intention (0.171), expectation of management decision and faster enterprise development(0.162), expectation of communication and sharing of information and knowledge(0.075), belief in the

importance of IT (0.074), expectation of closer cooperation with customers (0.074) and so on. Belief in IT's importance leads to a higher intention to use information technology, and companies that expect speed, jointly-owned information and knowledge, and cooperation to be the effects of IT intend to make more practical use of the Special Districts.

Table 14. Multiple regression analysis for intent of practical use of The Special District

		Coefficient		Standard Coefficient	t value	Significance Level
		B	Standard Error			
1	Constant	1.359	.203		6.713	.000
	Importance	.074	.052	.070	1.419	.156
	IT use intention	.171	.059	.141	2.897	.004
	IT invest increase	.038	.036	.041	1.054	.292
	Expectation 1	.022	.047	.019	.473	.637
	Expectation 2	-.048	.051	-.037	-.940	.348
	Expectation 3	.030	.046	.026	.639	.523
	Expectation 4	.162	.051	.133	3.187	.001
	Expectation 5	.075	.049	.062	1.544	.123
	Expectation 6	.074	.054	.058	1.356	.175
	Expectation 7	.064	.057	.052	1.111	.267
	Expectation 8	.022	.057	.018	.378	.706

Independent Variable: Intent of Practical Use of The Special District

	R	R square	Adjusted Square	Standard Error
1	.411(a)	.169	.158	1.00049

3.2.3 Collaborative projects with universities and other research institutions

Next, we asked if SMEs would like to collaborate with research institutions such as universities, a question to which 12.3% answered yes, and 10.2% “yes, to some extent.” The total number of positive responses reached only 22.5%.

As an open-ended question, we also asked in what fields SME’s would like to collaborate.. In Higashi Osaka, they answered that they would like to develop new fields and new technologies, for example, “new product development”, “new technology development”, “new material development”, “making seeds practical,” “constructing new business models,” and so on. The specific fields that they mentioned were biotechnology, environmental technology, energy conservation, sensors, precision processing, and health and food-related products. In Ota Ward, SMEs answered that not only would they like to develop new fields and new technology, but they would like to develop new fundamental knowledge, for example, “new product development,” “new technology development,” “new material processing technology,” “fundamental research,” “high technology development,” “applications of fundamental knowledge,” and so on. The specific fields that they mentioned were “glass processing,” “fine ceramics,” “press processing,” “new welding technology,” “nano-technology and natural energy,” “robotics products” and “seismography software”. SMEs in Ota Ward work in different fields and have different aspirations from those in Higashi Osaka, and they indicated that they would like to engage in more fundamental and collaborative research.

Table 15. Intent to pursue collaborative projects

	Total		Higashi Osaka		Ota Ward	
	number	ratio	number	ratio	Number	ratio
1. Very much	147	12.3%	79	11.4%	68	13.4%
2. To some extent	122	10.2%	76	11.0%	46	9.1%
3. Uncertain	557	46.5%	338	48.9%	219	43.2%
4. Not so much	97	8.1%	53	7.7%	44	8.7%
5. Not at all	132	11.0%	65	9.4%	67	13.2%
Unknown	143	11.9%	80	11.6%	63	12.4%
Total	1198	100.0%	691	100.0%	507	100.0%
Average	0.1		0.1		0.0	

3.2.4. IT communication spaces

In conclusion, we asked managers of SMEs if they consider IT communication spaces to be public or private. 17.2% answered that the spaces are absolutely public, and 16.9% answered that the spaces are primarily public. On the other hand, 8.1% said the spaces are absolutely private, and 13.7% said the spaces are primarily private. It is encouraging to note that more SME's consider these spaces public than consider them private. Moreover, the companies that tend most strongly to consider the spaces public are typically those that consider IT as being important for overall management, who have the most intent to utilize IT, who invested a lot in IT last year, and who intend to invest more in IT on future occasions – in other words, the most forward-looking, IT-receptive companies.

Additionally, many SMEs agree with statements about IT's positive role in transforming the world economy, examples being "IT promotes the globalization of the world." and "IT creates new markets and replaces old ones." However, there was less agreement with statements concerning IT's effects on personal independence, as can be concluded from "Data obtained through IT is fully open to the public and to businesses."

and “IT creates greater autonomy for people and business.” Also, 12.9% of managers think “IT will widen the gap between large companies and SMEs.” Some 14.0% of them think “IT will widen the economic gap between the developed and developing countries.” One third of managers anticipate that IT will widen the gaps between large and small corporations and between developed and developing countries.

Table 16. IT Communication space How much do you agree on the following views?

	Agree	Agree to some extent	Uncertain	Don't agree much	Disagree
1. IT provides all people with equal opportunity for information exchange	15.4	27.7	19.7	16.4	19.3
2. Data obtained by IT is fully open to the public and to businesses.	4.4	12.8	32.7	25.6	12.7
3. IT creates greater autonomy for people and businesses.	5.2	23.9	32.5	16.6	9.3
4. IT will widen the gap between large companies and SMEs.	12.9	19.1	33.4	15.6	7.0
5. IT will widen the economic gap between developed and developing countries.	14.0	24.2	29.7	13.6	6.3
6. IT promotes the globalization of the world.	26.2	40.3	16.3	3.0	1.7
7. IT creates new markets and replaces old ones.	17.9	38.8	23.3	5.5	2.8
8. IT makes it possible to have instant responses to our actions from all over the world, so that we can adjust direction any time.	5.7	19.9	40.8	14.5	6.7

Public space/private space discriminant analysis

In order to figure out how the difference between considering IT a public space and considering it a private space contributes to intentions regarding IT, we have applied discriminant analysis with the “private/public space” response as the criterion (y) and the responses regarding IT communication spaces’ equality (x_1), public nature (x_2), autonomy (x_3), expansion of large-small company gap (x_4), expansion of developed-developing country gap (x_5), promotion of globalization (x_6), , creation of new markets (x_7) and rapid-response enabling properties (x_8) as the discriminant variables. As a result, the following equation was calculated.

$$y = 0.487x_7 + 0.378x_2 + 0.328x_1 + 0.194x_8 + 0.120x_3 - 0.087x_5 - 0.170x_6 - 0.193x_4$$

Thus, variables that are associated with companies that view IT communication spaces as public are responses indicating that IT creates new markets, that IT makes data public, that IT will create greater equality, and that IT will increase companies’ ability to respond rapidly to feedback. Those companies that consider IT communication spaces to be private spaces tend to foresee IT widening the gap between SMEs and large companies, increasing globalization, and expanding the gap between developed and developing countries. “IT creates new markets and replaces old ones” carried the biggest positive coefficient.

Creating new markets and making information available to the public are not competitive concepts; as a result, these ideas contribute to a view of IT communication spaces as public spaces.

Table 17. Public space/private space discriminant analysis

	Wilks	Square	Frequency	Significance Level
1	.950	30.576	8	.000

Standard Discriminant Coefficient

	1
Equality	.328
Openness	.378
Autonomy	.120
Scale gap	-.193
Development gap	-.087
Globalization	-.170
New markets	.487
Rapid response	.194

Structure Matrix

	Function 1
Openness	.686
Equality	.684
New markets	.628
Rapid response	.603
Autonomy	.553
Scale gap	-.247
Globalization	.217
Development gap	-.185

One of our questions related to IT's importance for rapid response, which means reflexivity² - this is the statement that "IT makes it possible to have instant responses to our actions from all over the world, so that we can adjust direction any time." Of the respondents, 23.6% of respondents answered that they agreed with the statement, and 40% of them gave neutral answers. Respondents who said that IT communication spaces are public ones, tend to emphasize this reflexively rapid-response-enabling feature of IT communication spaces. Managers who said that IT communication spaces create new

² Reflexivity means the concept which reflects oneself to others and determines oneself by the reflection of others. The sociologist Giddens uses reflexivity to explain the behavior of modern society and to suggest new rules of sociological method (A. Giddens, 1991, *Modernity and Self-identity: Self and Society in the Late Modern Age*, London: Polity Press, A. Giddens, 1976, *New Rules of Sociological Method*, London: Polity Press).

markets and promote globalization tend to emphasize this feature as well, as do ordinary people who believe that IT communication spaces are public spaces and create new markets.

IT reflexivity multiple regression analysis

In order to ascertain what factors contribute to agreement with the “rapid-response” statement, we applied multiple regression analysis. We put agreement with the “rapid-response” statement as the dependent variable and choosing to view IT communication spaces as public spaces (x_0), and IT communication spaces’ equality (x_1), public nature (x_2), autonomy (x_3), expansion of large-small company gap (x_4), expansion of developed-developing country gap (x_5), promotion of globalization (x_6), and creation of new markets (x_7) as the discriminant variables. As a result, following equation was calculated.

$$y=0.332x_7+0.162x_3+0.133x_2+0.091x_6+0.059x_1+0.024x_0+0.056x_4-0.009x_5 +0.183$$

($R=0.571$, $R^2=0.320$)

All factors were found to be positively correlated with the tendency to believe that IT increases rapid-response capabilities, with the idea that IT will create new markets being the strongest predictor. The strength of this factor tends to reflect the opinions of managers, who tend to believe in IT’s potential for expansion of business activities.

Table 18. IT “reflexivity” multiple regression analysis

		Coefficient		Standard Coefficient	t value	Significance Level
		B	Standard error			
1	Constant	.183	.167		1.096	.273
	Equality	.059	.025	.075	2.333	.020
	Openness	.133	.030	.143	4.433	.000
	Autonomy	.162	.028	.177	5.693	.000
	Scale gap	.056	.027	.065	2.024	.043
	Development gap	-.009	.027	-.010	-.322	.747
	Globalization	.091	.033	.084	2.783	.005
	New markets	.332	.031	.328	10.613	.000
	Public nature	.024	.022	.029	1.059	.290

Independent Variable Reflexivity

	R	R square	Adjusted R square	Standard Error
1	.571(a)	.326	.320	.79259

Moreover, managers who actively introduce IT into their businesses together with those who tend to believe that IT creates new markets, tend to anticipate that these IT investments will create additional value, and tend to believe in the importance of IT. The same individuals will also tend to emphasize IT’s “rapid-response” feature to a greater extent. Managers who actively try to participate in IT-related activities realize this rapid-response feature, and reflexively their awareness should allow them to make a rapid response.

3.3. Findings from the Result of IT Usage in the Two Clusters

1. According to the responses to our questionnaires, SMEs would like governments to implement policies to promote IT investment. Such wished-for policies include subsidies for IT investment and low-interest loans, followed by education-related assistance such as IT seminars and training. SMEs with a greater desire to use IT in the future would like

more financial assistance for IT investment. In addition, SMEs are afraid that IT enlarges the “digital divide,” since SMEs who lack capital and appropriate expertise are handicapped when it comes to IT usage. Different appraisals and desired policy measures are reported by SMEs with different levels of current IT usage, and all of them want assistance in funds and education. Governments are requested to assuage companies’ IT-related fears by providing important information, and to nurture regional environments and atmospheres that promote IT.

2. The Special Districts for IT and New Business Promotion are expected to create large advantages for Japanese manufacturers seeking to achieve stronger international competitiveness. On the other hand, the districts are believed by many to be something that only large or IT-related companies will be able to take advantage of. SMEs believe that they may reap relatively few of the benefits associated with these Districts.

Approximately half of respondents in both areas respond that they intend to make practical use of the Districts. Those companies that consider IT to be important tend to intend to use the Districts more, as do companies that expect the Districts to provide greater speed, joint-owned information and knowledge, and cooperation. Some proactive companies want to create new markets. They mention “cooperation between companies ” and “creation of markets in all business fields” when asked about the effects of IT. However, only 22.5% want to collaborate with research institutions such as universities, showing that reliance on these institutions is still small.

3. We asked if managers of SMEs consider IT communication spaces to be public or private. More managers replied “public” than replied “private.” Moreover, companies that consider IT important for overall management, who have great intent to utilize IT, who invested a lot in IT last year, and who want to invest in IT on future occasions, tend to consider IT communication spaces as public. Additionally, managers typically agree with statements like “IT promotes the globalization of the world,” and “IT creates new markets and replaces old ones.” By contrast, we found less agreement with statements such as “data obtained by IT are fully open to the public and to businesses,” and “IT creates greater autonomy for people and business.” One third of managers predict that IT will widen the gaps between large and small corporations and between developed and developing countries. The targets of SME managers who believe that IT communication spaces are public ones, show perception of the “rapid-response” feature of IT communication spaces. Managers who agree that IT creates new markets and promotes globalization tend to perceive this feature as well.

In summary, managers of SMEs in such well-established industrial clusters as Higashi Osaka and Ota Ward, Tokyo, expect IT to have significant effects on their business environments. However, they have particular problems that IT alone cannot solve. They are afraid that IT will widen the gap between corporations of different size. They also do not rely on collaboration with research institutions, such as universities. Government policy should make much of their own traditional business mode. In addition, by combining reflexively new business models with traditional business cultures in innovative ways, government should create opportunities for SMEs to create new markets by way of IT.

4. Conclusion

It is probably too soon to come to firm conclusions concerning the positive effects of Japanese industry cluster policy. But even though the policy might have its weaknesses, some useful lessons can be identified, and these will now be discussed.

1. In the first stage of the creation of an industrial cluster, existing agglomerations of big companies and smaller firms can be used as a local resource forming the basis of the cluster. Many industrial clusters have been formed by matching the specific industrial potential possessed by each region with the desires of contemporary Japanese society. Using concentrations of industry created by previous industrial policies and by economic activity in general, the government has established its industrial cluster policy as an instrument for innovation.

2. As the next step following the formation of an industrial cluster, several conditions for growth are essential. These comprise the existence of firms likely to function as nuclei for industrial activity, related companies, and universities and research institutes. The most effective of these factors is the presence of a firm likely to function as nucleus for industrial activity. This is because as an actor in the formation of a geographical concentration of industry, a pre-existing top manufacturing firm that is likely to function as a nucleus for industrial activity will have already assumed a leadership role, and will have displayed development potential in respect of the generation of both core and peripheral technologies. This makes the early clustering of related companies a possibility. Moreover a leading

“nucleus” company, through technological collaboration with other enterprises, can play an important role in encouraging firms to take advantage of the research seeds sown by universities and research institutions, and can contribute to the development of high-level value-added technology as well as new kinds of business activity.

3. At present in Japan, and in the context of a knowledge-based economy, there is a conspicuous tendency for there to be a switch from an innovation strategy to a cluster-based strategy. Many of the regions of Japan are in the process of realizing a locally-based industry strategy which makes use of the unique characteristics of each region.

4. For there to be further progress following the initial stage in the development of an industrial cluster, the presence of a “key person” (a charismatic leader) is an important requirement. In this context, emphasis can be given to the demonstration of the benefits of partnerships and other forms of regional collaboration.

5. In the fixing of strategies and in project implementation, industrial policies based on “science leadership” and on limitless and wide-ranging high technology are being pursued. Moreover in many cases, proper attention is being given to pre-existing industries and industrial concentrations. As a “stepping up” policy, introducing new kinds of knowledge and technology into such industries and concentrations is an effective way ahead.

6. Vigorous use is often being made of university and research institute facilities. At present, attempts are being made to establish collaboration between industry and universities and research institutes, to develop education (with an emphasis on human resources) and to overhaul the existing entrepreneurial infrastructure.

On the other hand, the survey also revealed limitations and difficulties. These are as follows.

1. The fruits of industrial cluster policy, namely the new industrial products that are being produced, need to be marketed, and there is a strong need for specialist expertise in the marketing field. Moreover there is a need to establish markets in which new types of consumer can buy new types of product. This is something different from conventional networking.

2. It cannot be said that there has been a conspicuous amount of collaboration or enthusiastic participation by SMEs in industrial cluster projects and related developments. IT policy – for example the provision of facilities in the Special Districts – can often be seen as something that results in profits only for large companies and the IT industry and not for run-of-the-mill small and medium size enterprises. SMEs of the traditional type have not shown much of a tendency to collaborate with universities and research institutions. Moreover there is a danger that so far as traditional SMEs are concerned, new policy will merely serve to widen the gap between the old-established small companies and

the modern large ones. In management style, Japan has so far had far less experience in horizontal forms of collaboration than America and Europe, and is more used to vertical collaboration. From now on, Japan will have to give much greater thought to horizontal collaboration.

On the basis of these points, we should like to offer the following two policy recommendations.

1. So far as agencies for promoting cooperation are concerned, there is a need for the formation of networks centering on collaboration between industry and universities and research institutions. It is hoped that centering on technological and research development, vertical and horizontal collaboration will proceed among participating companies, universities, research institutes, and SMEs, so as to ensure the generation of new forms of technology and the development of new types of products. Furthermore, new kinds of technology and new human resources can be seen as major assets arising from the development of clusters in the regions of Japan - assets which can be passed on to the next generation. It is hoped that even in regions which do not at present possess a cluster, firms likely to provide nuclei for growth, universities, research institutes and outstanding human resources will all exert powers of attraction.

2. On the policy side and seen from the viewpoint of marketing, with the promotion of industrial growth and given the participation of people able to coordinate that growth with a comprehensive scenario, the growth of new markets becomes a possibility as the next stage

of development. For example IT spaces provide both a new marketplace and a public space – the two functions are complementary and not mutually contradictory. It is hoped that the development of new markets and further collaboration between industries and research institutions will be able to narrow the gap between policy implementation and the traditional SMEs that belong to existing industrial concentrations, and will dispel the strong suspicions of the older SMEs that policy is designed only for the benefit of big companies. So far as supportive public policy is concerned, government must support the development of an environment in which companies can maintain market competitiveness, and must help to create the conditions in which new markets can be created. Such policies, moreover, must be extended to the SMEs which occupy the entire extent of industrial concentrations. With the application of approaches of this kind, a highly effective industrial cluster policy becomes a strong possibility.

References

A.Giddens, 1991, *Modernity and Self-identity: Self and Society in the Late Modern Age*, London: Policy Press.

A. Giddens, 1976, *New Rules of Sociological Method*, London: Policy Press.

M Tsuji, H Miyoshi, T Bunno , H Idota, M Ogawa, E Tsutsumi ,M Nakanishi and N Smith 2005
IT Usage by SMEs in Japan:A comparative Study of Higashi Osaka City and Ota Ward ,Tokyo
CRES OSIPP.