

# **Strengthening the Competitiveness of Local Industries: The Case of an Industrial Cluster Formed by Three Tokai Prefectures**

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Efforts to form “industrial clusters” are now under way in various regions of Japan. While many of them involve affiliations between industries and academia, such linkages alone face limitations in creating an industry. This paper uses the case of an industrial cluster formed in three prefectures (Aichi, Mie and Gifu) in the Tokai region in an attempt to offer suggestions with respect to efforts aimed at creating industrial clusters in the future.

The three Tokai prefectures are home to industries that have high market shares worldwide, such as automobiles and machine tools, and which already constitute one of the most successful industrial clusters in Japan. Manufacturing activities are backbones of the local economy, and a number of industries and companies with high market shares have clustered in this region.

Within the industrial clusters in the three Tokai prefectures, there are many businesses that have long histories and which have survived to date by adjusting their format and contents to meet the requirements of each relevant era. Value chains are almost fully completed within the region, and technological innovations to improve competitiveness have moved forward. Furthermore, current successes have been achieved by envisioning new-generation industries and incorporating the technologies necessary for them.

As the product-manufacturing environment becomes increasingly severe in Japan, a new scenario of growth needs to be formulated by new businesses and new industries. While active approaches towards the development of new technologies have been taken in the three Tokai prefectures, focusing on the development of individual element technologies will limit the potential for growth as an industry. What is required is to create ideas for next-generation industries and to bring them to fruition.

In order to create future industries, this paper proposes the following: (1) approaches to the creation of new industries through a combination of technologies; (2) the development of applications through technological solutions; (3) rolling out businesses based on the results of verification tests in leading technologies; (4) fostering industries through the commercialization of leading technologies; (5) establishing local brand concepts; and (6) soliciting new company participation to enable value chains to be established. It is only when the government establishes mechanisms for these activities and the industrial world plays a leading role in rolling out such activities that the creation of new industries can be realized.

## I Three Tokai Prefectures as a Successful Industrial Cluster

Efforts are now under way in various regions of Japan to promote the formation of “industrial clusters” and “intellectual clusters.” Many of them are aimed at the creation of new industries through affiliations between industries and academia. However, it is difficult to look for successful results in a short period of time because many of the technological seeds owned by universities take considerable time to commercialize. Another factor that must be taken into account is what some would see as Japan’s national characteristic of adopting a cautious approach to business creation.

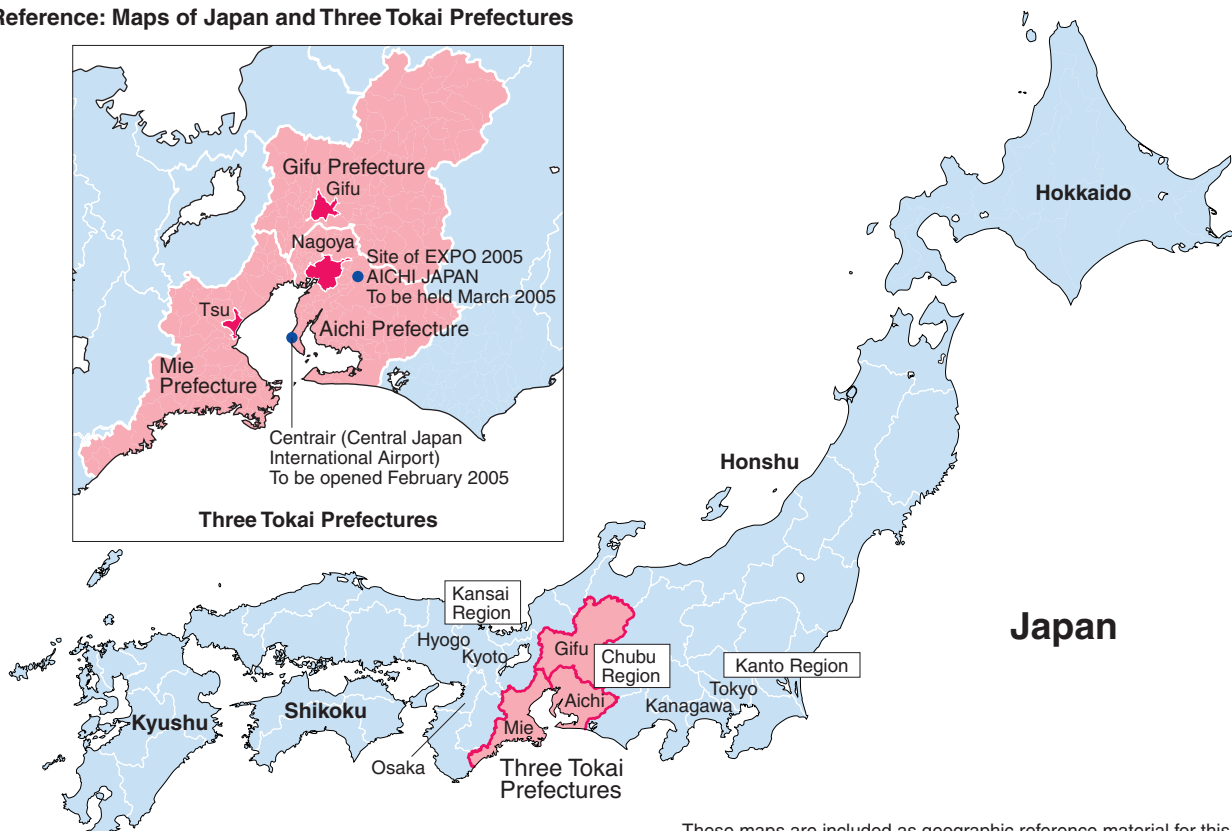
It is not generally the case that state-of-the-art technologies will spontaneously lead to the development of industries. Ideas about the products, services, businesses and the social mechanisms for the next era and generation must first be developed. Then, commercialization activities are carried out by combining both the technologies and the functions necessary to realize such concepts. It is only after the market has expanded with the participation of many companies and increased employment that such technologies become an industry.

To begin with, it is clear that an industrial cluster cannot be fully formed only by an affiliation between

industries and academia. The management economist Michael E. Porter has examined the sources of such competitiveness after analyzing cases of industrial integration that have resulted in high international competitiveness. He concluded that such sources can be found where companies in a specific industrial field, suppliers and service providers with high expertise, and related organizations (universities, industrial groups, etc.) are geographically concentrated, and where they are mutually competing and at the same time cooperating with each other, leading to a situation in which innovations are taking place on a continual basis (Figure 1). While individual companies and organizations remain independent, they nevertheless exert an influence on each other because they are located within a certain area. As they constitute what might be seen as a bunch of grapes when viewed from an overall perspective, such industrial integration is called an “industrial cluster.”

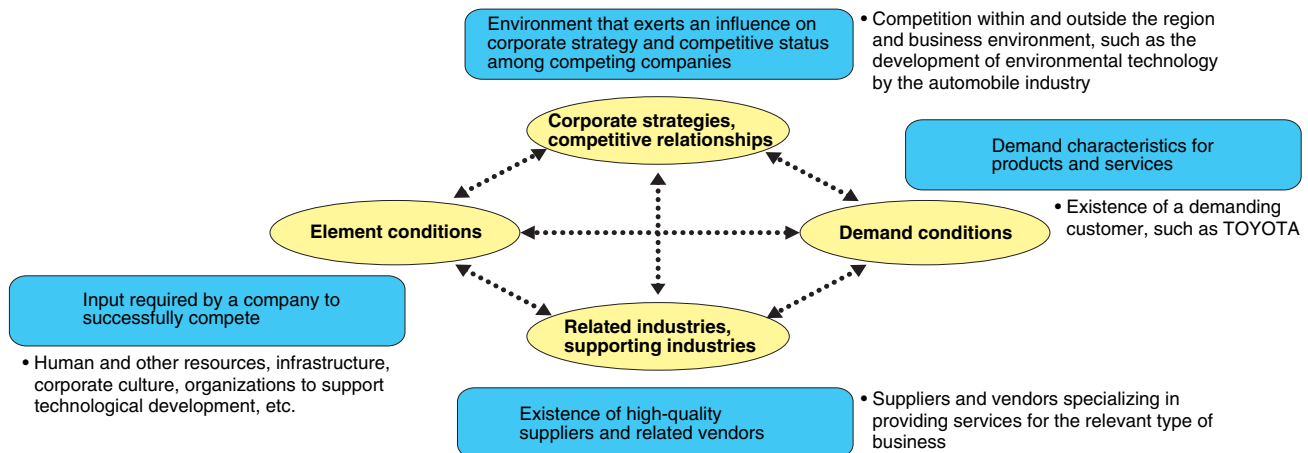
One of the clusters that meets the above conditions and which is now highly successful in Japan is the combined automobile and machine tool industries in the three prefectures (Aichi, Mie and Gifu) located in the Tokai region. While these machinery-related industries had their origins in textiles and foodstuff processing, they have now become industries with high market shares worldwide. However, as both automobiles and machine tools have already reached a considerable level

### Reference: Maps of Japan and Three Tokai Prefectures



These maps are included as geographic reference material for this paper.

This paper is based on the results of “Tokai Tri-prefectural project” (EXPO 2005 AICHI JAPAN partnership project) implemented by Nomura Securities Co., Ltd. and Nomura Research Institute, Ltd. The project was designed to analyze the industrial competitiveness of the three prefectures (Aichi, Mie and Gifu) in the Tokai region and to create an action plan for future industrial development. It was written by Yoshihiko Iwadare on behalf of the project team.

**Figure 1. Conditions to Fully Form an “Industrial Cluster” (Diamond Framework)**

Source: Compiled based on various materials such as Michael E. Porter, *Theory of Competitive Strategies II*, translated by Hirotaka Takeuchi, DIAMOND Inc., 1999.

of growth, efforts are being carried out towards the creation of industries geared for the coming era.

This paper examines the three prefectures in Tokai in an attempt to analyze the source of their competitiveness. At the same time, the problems that the region is currently facing are identified in order to provide suggestions concerning the direction of future activities aimed at creating industries. Although the past history of the development of an industry differs depending on the given region, there is something that can be considered common to all areas with respect to future approaches.

A variety of suggestions and initiatives concerning industrial policies have already been set forth in various parts of the country. Rather than considering what should be done, what is more important now is to start implementing them. It is hoped that this paper can provide an occasion for inaugurating specific activities towards the creation of new industries in various locales throughout the country.

## II Economy of Three Tokai Prefectures Continues to Support Stable Development

### 1 Three Tokai Prefectures Attracting Increased Attention

We are slightly more than one year away from the opening of EXPO 2005 AICHI JAPAN (March 2005), which will be the first world exposition in the 21st century. As the treaty governing such events requires an interval of five years or more between internationally recognized expositions that go beyond the level of regional or local fairs, EXPO AICHI JAPAN is assured of its position as the first world exposition in this century.

To meet the opening of this world's fair, the construction of Centrair (Central Japan International Air-

port) is moving forward at a fast pace in the Chubu region in central Japan. Centrair is slated to become the fifth 24-hour airport in Japan, following those of Naha, Shin-Chitose, Kansai and Haneda. The introduction of the so-called “TOYOTA method” in the construction process is also coming in for increased attention.

Despite the long-lasting sluggishness in Japan's domestic economy, the Tokai region has continued to enjoy generally favorable trends in terms of its industrial economy because the area is home to a number of automobile industry plants, including TOYOTA MOTOR CORPORATION (Aichi prefecture) and HONDA MOTOR CO., LTD (factories in Mie prefecture). As there are also many automobile-related parts and component makers and machine tool manufacturers in the Tokai region, the ripple effects from the positive environment in the automobile industry have been significant, leading to a general stability in the local economy.

Although the economic growth rate of these three prefectures in the Tokai region fell somewhat below that for all prefectures following the collapse of the bubble economy, this figure recovered soon thereafter and has exceeded the rate for all prefectures since roughly 1995. Indeed, the area's growth rate has generally hovered above that for the entire nation, except for 1997 when automobile demand dropped due to the increase in the consumption tax rate (Figure 2).

### 2 Local Economy Supported by Product Manufacturing

The three prefectures in the Tokai region are the center of product manufacturing in Japan. While there are other districts where small- and medium-sized companies with high technological strengths are gathered locally, such as Ota ward in Tokyo and Higashi-Osaka, the Tokai prefectures are unique in that the entire region is supported by the manufacturing industry.

In particular, Aichi has become one of the most industrialized prefectures in Japan as a result of the groundwork made in industrialization during and since World War I. After experiencing the high economic growth that came following World War II, the share of the manufacturing industry in the overall economy has recently been declining, as is the case with other prefectures throughout the country because the economy has started to mature. Nevertheless, the share of manufacturing in the three Tokai prefectures still remains at a high level of 29.2 percent in terms of total GNP, as compared to the national average of 20.8 percent, 14.3 percent for the Keihin region (Tokyo and Kanagawa)

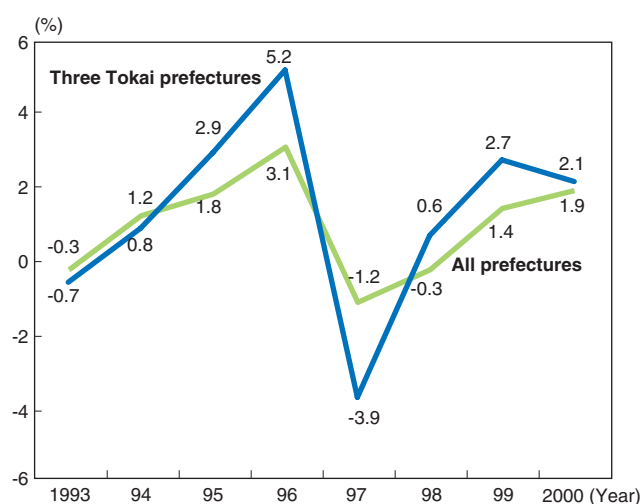
and 19.6 percent for the Hanshin region (Osaka and Hyogo).

If shipments of industrial products are viewed by prefecture, Aichi has continued to hold the first rank for over a quarter of a century, outpacing the second-place contender (Kanagawa prefecture) by a large margin. Indeed, the volume of manufacturing product shipments for Aichi prefecture alone is roughly equivalent to the combined totals of Kyoto, Osaka and Hyogo, ensuring Aichi's position as the No. 1 industrial prefecture in Japan (Figure 3). With two other Tokai prefectures both holding relatively high rankings (i.e., Mie at 11th and Gifu at 21st), the three prefectures together make up the center of product manufacturing in Japan.

The transportation equipment manufacturing industry, producing items such as automobiles and airplanes, and the machinery industry, producing machine tools, in the three Tokai prefectures hold top positions in worldwide terms as well. With respect to automobiles, for example, TOYOTA MOTOR alone accounts for more than 10 percent of global output, and the production volume of machine tools in Aichi prefecture reportedly accounts for about 10 percent of the world's total.

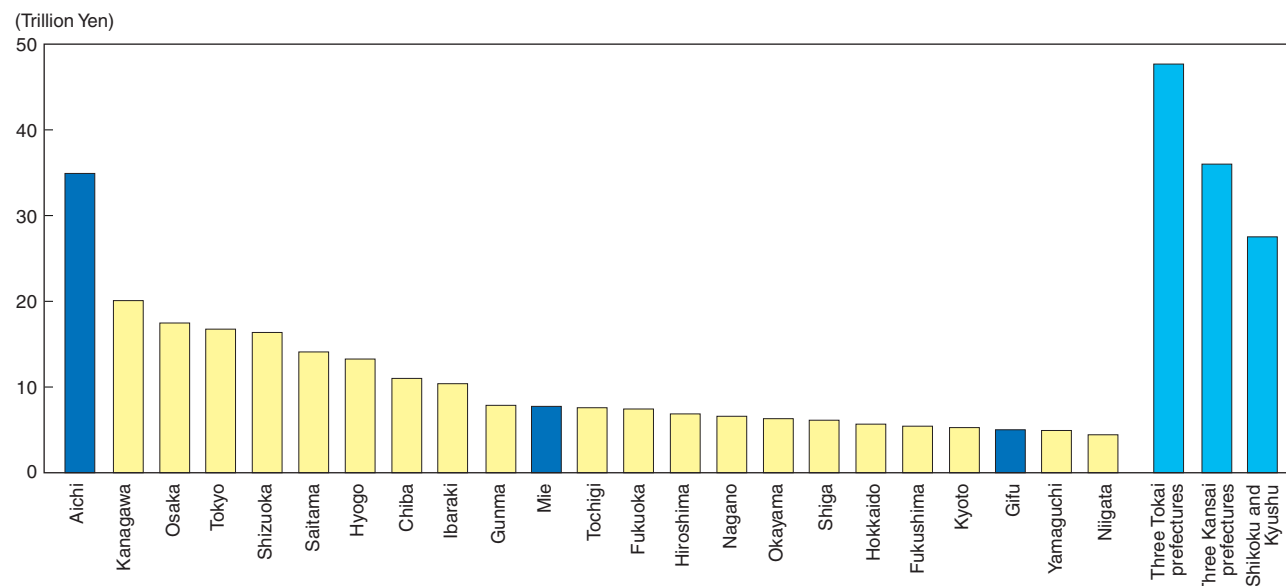
When these data are examined in detail in terms of products, there is also a very large number of manufactured items that make up the leading market shares nationwide. If limited to products that command shares of 30 percent or more, 115 product items fall into this category—clearly indicating a high level of competitiveness in wide-ranging business fields (Figure 4). This means that when new technology emerges, there are many planting beds where such technological seeds can be nurtured towards commercialization, a factor that ensures a high potential to create and start new businesses and industries.

**Figure 2. Change in the Real Economic Growth Rate in the Three Tokai Prefectures and All Prefectures**

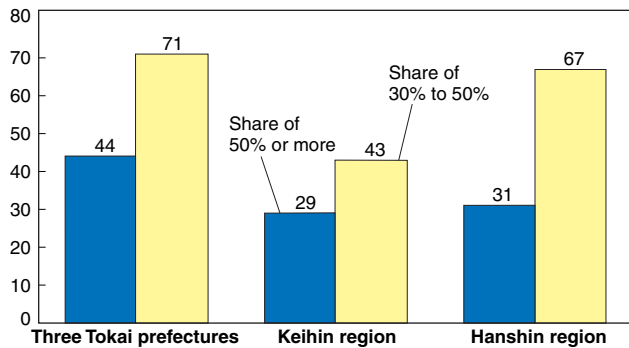


Notes: (1) Data on year-on-year changes for all prefectures have been available since 1993; (2) the three prefectures in the Tokai region are Aichi, Mie and Gifu.  
 Source: Compiled from the Economic and Social Research Institute, Cabinet Office, Government of Japan, Annual Report on Prefectural Accounts (Fiscal 2000).

**Figure 3. Product Shipments by Prefecture (2001)**



Note: The three Kansai prefectures are Osaka, Kyoto and Hyogo.  
 Source: Ministry of Economy, Trade and Industry, "Industrial Statistics Tables."

**Figure 4. Number of Product Items with Nationwide Shares of 30% or More (2000)**

Note: The Keihin region includes Tokyo and Kanagawa; the Hanshin region includes Osaka and Hyogo.

Source: Ministry of Economy, Trade and Industry, "Industrial Statistics Tables."

### 3 Concentration of Top-Share Companies

The three prefectures in the Tokai region also are home to many companies with high market shares from the individual company perspective. Among companies listed in the 1999 edition of *Chubu no No. 1 kigyō* (Top

*Companies in Central Japan*) published by Nihon Keizai Shimbun, Inc., those with especially high market shares are listed in Table 1. As this table clearly illustrates, there are many companies that maintain high shares in specific markets (niche markets) in this region. As the number of new participants in such niche markets tends to be limited, it can be said that many of these companies operate in a relatively stable management environment.

### 4 Economic Growth through Innovations

With respect to the increases in product shipments from manufacturing industries in the three Tokai prefectures over the past 20 years, analyses have been carried out to separately measure the extent to which capital investment and innovation (total factor productivity) have contributed to such growth. The results indicate that Aichi and Mie especially stand at high levels of innovation (0.81 and 0.78, respectively), as compared to the nationwide figure of 0.76, and those for Tokyo (0.37) and Osaka (0.68). The innovations discussed here include

**Table 1. Chubu Region Companies Occupying Leading Market Shares (1997)**

Field	Name of Company	Location of Head Office	Business Contents Holding First-Ranked Market Share	Share (%)	Sales (¥ Billion)	Number of Employees
Electronic equipment	AIPHONE Co., Ltd.	Nagoya	Intercoms for household use	52	25.9	733
	TOYO ELECTRIC CO., LTD.	Kasugai, Aichi	Elevator sensors	80	7.2	345
	HYOJITO CO., LTD.	Nagoya	Information maps	95	7.2	244
	HOSHIZAKI ELECTRIC CO., LTD.	Toyoake, Aichi	Automatic ice-making machines	67	48	1,260
	HONDA ELECTRONICS CO., LTD.	Toyohashi, Aichi	Compact fish finders	85	4.8	110
Machinery, metals	Asahi-Seiki Manufacturing Co., Ltd.	Owariasahi, Aichi	Quartz crystal parts	60	13.3	590
	KIKUKAWA IRON WORKS, INC.	Ise, Mie	Laminated lumber processing machines (total production amount)	64	6.3	322
	SHINPO CO., LTD.	Nagoya	Smokeless roasters	50	3.3	93
	Daido Steel Co., Ltd.	Nagoya	Crossing rails	70	269	5,964
	CHUBU CORPORATION	Kuwana, Mie	Ice shavers	80	8.8	330
	NIPPON SHARYO, LTD.	Nagoya	Pile-driving rigs (share of machines in operation)	83	90.7	2,461
	Beauty Co., Ltd.	Nagoya	Car-washing machines	65	22	360
	Fuji Machine Mfg. Co., Ltd.	Chiryu, Aichi	High-speed chip mounters	43	101.7	1,280
	AISIN AW CO., LTD.	Anjo, Aichi	Automobile AT systems (share among manufacturers specializing in this field)	63	363	6,250
Automobile components	Sumitomo Wiring Systems Co., Ltd.	Yokkaichi, Mie	Engine cabling	60	201	5,000
	Pacific Industrial Co., Ltd.	Ogaki, Gifu	Tire valves (second-ranking world share)	25	36.6	1,418
	AICELLO CHEMICAL CO., LTD.	Toyohashi, Aichi	Volatile corrosion-inhibiting films	83	13.3	549
Ceramics, materials	GIFU SHELLAC	Gifu	Natural resin shellacs	60	4.4	145
	NGK INSULATORS LTD.	Nagoya	Piezoelectric ceramics for printers	50	234.5	4,280
	FUJIMI INCORPORATED	Nishikasugai, Aichi	Lapping powder for silicon wafers	90	26.6	355
Housing, construction materials	NIHON DECOLUXE CO., LTD.	Tanba, Aichi	Anchor bolt binders	45	7.8	249
	MIRAI INDUSTRY CO., LTD.	Anpachi Gifu	Wiring junction boxes	80	23.5	748
Pharmaceuticals	Amano Enzyme Inc.	Nagoya	Digestive enzymes	90	11.0	400
	MEDICAL & BIOLOGICAL LABORATORIES CO., LTD.	Nagoya	Diagnostic reagents for autoimmune diseases	70	3.0	186
	YAGAMI INC.	Nagoya	Human body models for CPR education (1998)	40	6.5	143
Foodstuffs	SATO FOODS INDUSTRIES CO., LTD.	Komaki, Aichi	Powdered tea essence	90	5.2	349
Office supplies, etc.	Umajirushi Co., Ltd.	Nagoya	Whiteboards with laser-drawn matrix lines	85	0.9	73
	Shachihata Inc.	Nagoya	Self-inking rubber stamps	90	18	520
Hardware	YAHATA NEJI CORPORATION	Komaki, Aichi	Share among home center outlets handling screws	60	5.2	349

Notes: (1) Includes listed companies holding 40% or greater share of domestic market, and unlisted companies holding 60% or greater share (companies whose market share is unknown are not included). Data for Pacific Industrial Co., Ltd. reflect share of the world market; (2) AT = automatic transmissions; CPR = cardiopulmonary resuscitation.

Source: Nihon Keizai Shimbun, Inc. *Chubu no No. 1 kigyō* (Top Companies in Central Japan), 1999.

not only technical improvements, but also process innovations and the creation of new business models.

In the three Tokai prefectures, for example, TOYOTA MOTOR is said to have already introduced the just-in-time production system for automobiles even before the start of mass production, and a steady stream of innovations has characterized process technology in the ceramics-related industries as well. Moreover, as is true with vending machines for gameware-on-demand and online karaoke (both manufactured by Brother Industries, Ltd.) and a sales management information system for pachinko-style pinball parlors (developed by DAIKOKU DENKI), there are many cases in which success has been achieved by creating new business models in fields different from existing businesses and nurturing them into key business divisions.

### III History of Creating Industries to Meet the Times

The main source of the strength displayed by the industrial cluster in the three prefectures of the Tokai region is considered to lie in the following three factors.

- (1) Willingness of traditional industries to create new businesses as a means of surviving by keeping up with the times.
- (2) First establishing the concepts of next-generation businesses and industries, and then combining the technologies necessary to realize such ideas.
- (3) Building a complete value chain within the region, with an anchoring company taking the lead in technological innovations for the entire industry.

#### 1 Genealogy of Technologies and Industries: Creating New Businesses by Keeping Up with the Times

Many of the industries in the three Tokai prefectures have been developed on the basis of uninterrupted technological genealogies (Figure 5).

The Nobi plain, which stretches over Aichi and Gifu prefectures, is the second largest plain in Japan. It is fed

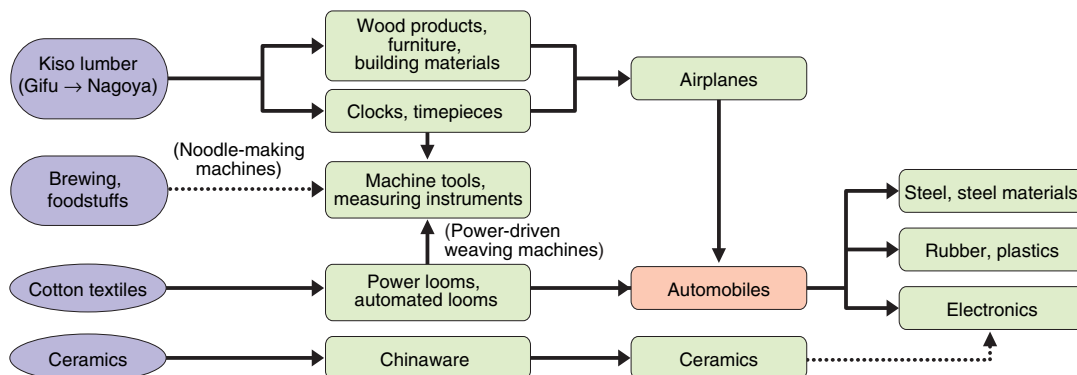
by the Nagara, Kiso and Ibi rivers and is located at almost the geographic center of Japan—long making it an important transportation and trade route between the Kanto and Kansai regions. Accordingly, it has been a center for agriculture and lumbering since antiquity. This has provided an environment for the early development of commercial as well as processing activities in foodstuffs, woodcraft, cotton textiles, ceramics, etc. Although raw silk, cotton textiles, ceramic ware, etc., have constituted key exports from Japan since the early days, these products often encountered problems from the very start of such trade due to trade friction. In order to adapt to the environment of the times, therefore, not a few Tokai industries started to roll out new businesses that were derivatives of their main activities.

While the three Tokai prefectures are the world’s largest production center for machine tools, the origin can be traced to noodle-making machines in the case of OKUMA, tatami-making machines developed by Yamazaki Mazak, and power-driven weaving machines pioneered by HOWA MACHINERY. Wooden propellers that were produced from local lumber eventually led to the development of the airplane industry, and other lumber-using industries such as the manufacture of wall clocks later evolved into makers of measuring instruments.

Because of this, industries with long histories have continued to survive and prosper to the present day—although with major changes in both business conditions and product contents to keep up with the times. In other words, it can be said that efforts were made to initiate new businesses as part of key corporate business strategies due to a sense of crisis about remaining a traditional industry. In this regard, the Tokai region appears to differ from other production centers where traditional industries seem to continue age-old operations on a static basis.

When we trace the roots of industrial development in this region, we find that many existing companies have achieved their success by creating industries compatible with the times, rather than resulting from a parade of entrepreneurs initiating new businesses one after another.

Figure 5. Preserved Industrial System (Brief Genealogies of Selected Industries)



## 2 Development through a Combination of Technologies

In the process of initiating a new business by means of new technology and trying to enable the new undertaking to develop as an industry, a number of limitations will quickly ensue if one relies only on an individual, special technology. An examination of actual cases in which companies in the three Tokai prefectures started new businesses and achieved success reveals many cases in which the comprehensive integrity of the operation was increased by incorporating outside technology in addition to in-company know-how (Figure 6).

In the early days of the TOYOTA Group, the manufacture of automobiles grew out of a business that had dealt with automatic weaving machines through the introduction of technology from the United States. Similarly, Rinnai developed infrared gas stoves that had not been available in Japan at that time by using catalytic technology from Germany. Brother Industries—once a maker of sewing machines—is now developing products and services related to information and communications. The starting point for this development can be traced back to the company’s early affiliation with a venture firm in the United States that developed the dot-matrix printing process, and which set the stage for Brother’s subsequent shift to the information and communications business.

New businesses were started and have been operated and developed as industries by envisioning products and services that would be needed by the upcoming era and by combining technologies for the realization of such concepts. Rather than relying on new technological seeds as a starting point, this approach of first assuming potential needs and working to realize them has clearly born fruit.

Accordingly, we can say that innovations have taken place only after totally new values have been introduced into society, have been accepted by the public and have taken firm root as part of a new mindset. The fact that such innovations have continued to emerge one after another in these three prefectures in Tokai is part of the region’s strength.

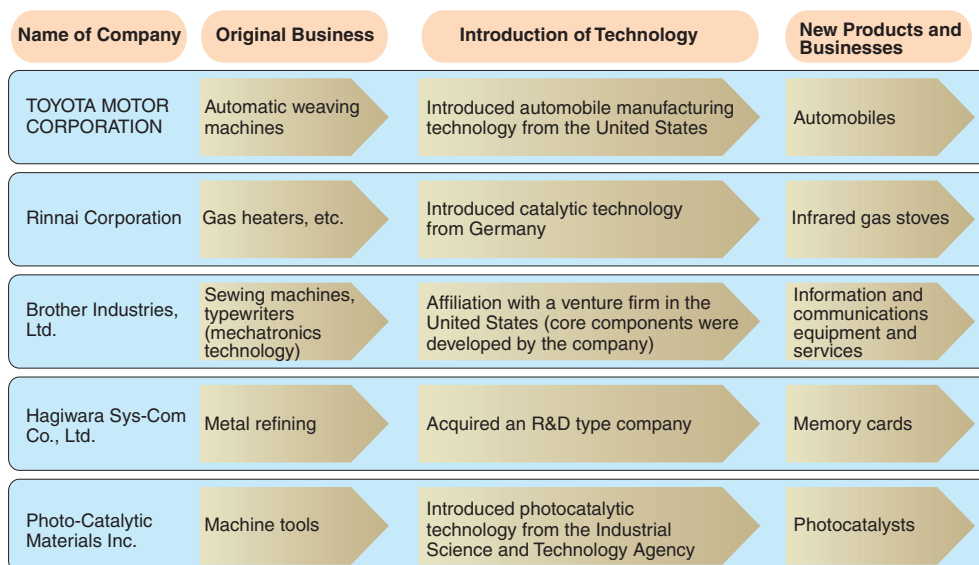
## 3 Completing Value Chains within a Region

On the basis of the inter-industry relations tables for the three Tokai prefectures, Tokyo, Kanagawa and Osaka areas, Figure 7 examines the ripple effect in terms of production that a specific industry or a type of business brings to a prefecture. This analysis shows, for example, that placing a hypothetical order for ¥100 million in transport machines in Aichi prefecture would generate as much as approximately ¥174 million in intra-prefectural production as a result of the ripple effect.

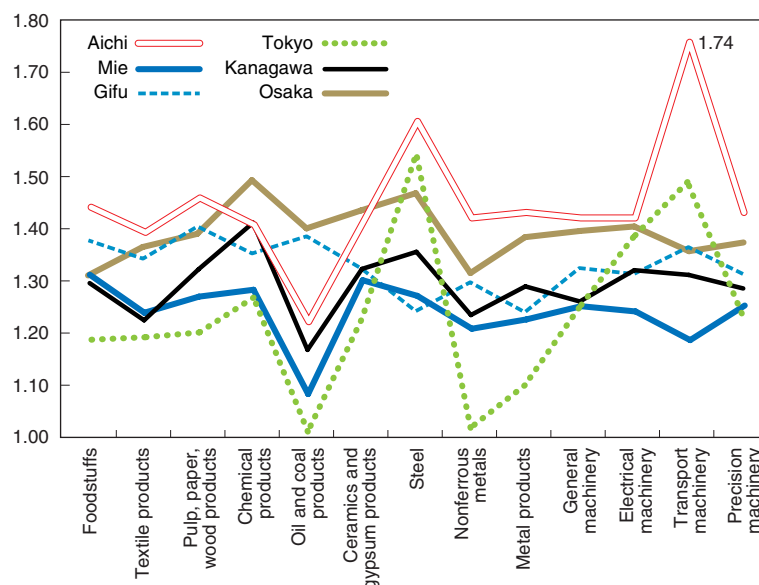
In the case of automobiles, the number of components that make up a single vehicle can reach well into many thousands when we take into consideration the various essential elements, such as steel, rubber, resins, textiles, and glass, as well as the components that combine such materials. As companies making such parts are clustered within Aichi prefecture and an intra-prefectural value chain has essentially taken form, the completion of the final product can have an impact on the entire region and contribute to its continuing development.

Historically, the demand for components and materials has grown out of the needs of an established auto manufacturer that takes on the role of an anchoring company, and such demand is then fulfilled within the region. Another advantage of having all the firms that are part of

**Figure 6. Examples of New Technology Developments in Three Tokai Prefectures**



Source: Compiled on the basis of interview surveys and *Chubu kigyoka retsuden (Biographies of Entrepreneurs in Central Japan)*, Nihon Keizai Shimbun, Inc., 2003.

**Figure 7. Multipliers by Industry (Order Reception within Prefecture → Multipliers of Intra-Prefecture Production)**

Source: Calculations were made on the basis of inter-industry relations tables for each prefecture.

a given value chain within the region is the ability to deal with efficiency improvements in the production process on an industry-wide basis. This is considered to have largely contributed to process innovations.

In comparison with Tokyo, Osaka and Kanagawa, the coefficient for induced intra-prefecture production is generally high in Aichi among the three Tokai prefectures, suggesting that an economic bloc has been fully completed within the prefecture. While Mie and Gifu prefectures have relatively lower coefficients, the southern part of Gifu has strong economic relationships with Aichi prefecture. Although an inter-industry relations table is not available for the three Tokai prefectures as a unit, the ripple effect within the area as seen from the overall regional data is assumed to be high.

## IV Problems and Responses for Further Development

### 1 Need for Creating New Industries and Tapping New Markets

The importance of the following three factors was noted in the previous chapter: (1) innovations by traditional industries to keep up with the times; (2) combinations of in-company technologies and technologies introduced from the outside; and (3) creating integrated value chains within the region, with an anchoring company taking the lead.

However, even the current achievements of the industrial cluster in the three prefectures in Tokai hold no promise of continued success in the future. Product manufacturing is clearly subject to intense competition in the global economy, and continual efforts are needed to hold on to success in the face of fast-breaking tech-

nological innovations. In order for innovations to continue to take place, it is important that there are tasks that have to be overcome. The three immediate issues in this regard are the following.

#### (1) The hollowing-out of product manufacturing

As product manufacturing has now become an increasingly heated race with developing countries and China looming ever larger in the field, there is no knowing whether the three Tokai prefectures can continue to maintain competitiveness in the future. Because of the strong push within the automobile industry to locate production bases close to the market, the possibility exists that future production bases may be shifted to Europe, where the market shares of Japanese cars have started to move upward from their previous lows, and to developing countries that are just entering the era of motorization.

Recent data from TOYOTA MOTOR on car production by area indicate that the slowdown in the growth rate for cars manufactured in Japan (the absolute numbers declined in 2002) is being offset by the rapid rise of auto production in Europe and developing country regions, including Asia and Oceania. Indeed, TOYOTA's annual report called for increasing production in Europe by 50 percent over the previous year's figures in 2003, with an 85-percent hike in Asia during the same period.

With this shifting of production overseas, there is serious concern over a decline in the region's ability to absorb workers even if the consolidated performance of various companies continues to show favorable results on a global basis. In order to respond to this very real possibility, new businesses and industries need to be created to secure employment opportunities. At the same time, steps must be taken to develop and foster the human resources required by such new industries.

**(2) Limitations of niche strategies**

It has been noted that the existence of many top companies in the niche markets may be exerting an impact on the level of stock prices among companies in the three Tokai prefectures. Figure 8 shows the dividend data and the price/earnings ratio (PER) for TOPIX-listed companies (i.e., TSE First Section price index) and firms whose head offices are located in the three prefectures in the Tokai region. A comparison between these groups indicates that the Tokai-based segment includes a large number of companies with PERs under 10 that pay relatively high dividends (e.g., 3% or more).

This means that the stock price is low in comparison to the company's earnings and dividend levels. Several interpretations are possible with respect to why the market price is low despite high profitability and stable business operations. One theory holds that many of these high-performance companies in the Tokai region produce materials and components and that their high competitiveness is not extensively known among general investors.

On the other hand, the top-ranked niche companies are essentially big frogs in a little pond. Although business operations are stable, expectations for growth in the future as seen from market perspectives are relatively low. This leads one to conclude that future growth will be limited since the pond is so small. Generally speaking, high current profit levels are not always reflected in stock prices unless there are expectations for future growth. In short, the capital market's enthusiasm for such companies is often muted until it detects signals such as moves to enlarge the pond by taking a risk or embarking on new activities in a new pond.

**(3) Realization of destructive innovations**

In his book entitled *The Innovator's Dilemma* (translated by Shunpeita Tamada and Yumi Izuhara, SHOEISHA, 2001), Clayton M. Christensen of Harvard

University pointed out that the greater the firm, the more difficult it is to adopt destructive innovations that start on a small scale. He also noted that while forecasting future markets is possible to some extent in the case of "continuing technologies" such as performance improvements involving existing products, it is not possible to forecast market size in the case of "destructive technologies" that create totally new markets together with customers, as they target markets that do not now exist.

The three Tokai prefectures where already established industries are now the engines of local economic growth could easily fall into such a trap. Actually, one major company points out that "a business scale of several hundred million yen is not large enough to become a new business activity within our company." For companies that have pursued stable business operations under a stable management foundation, a great deal of courage is required to even consider exploring unknown markets.

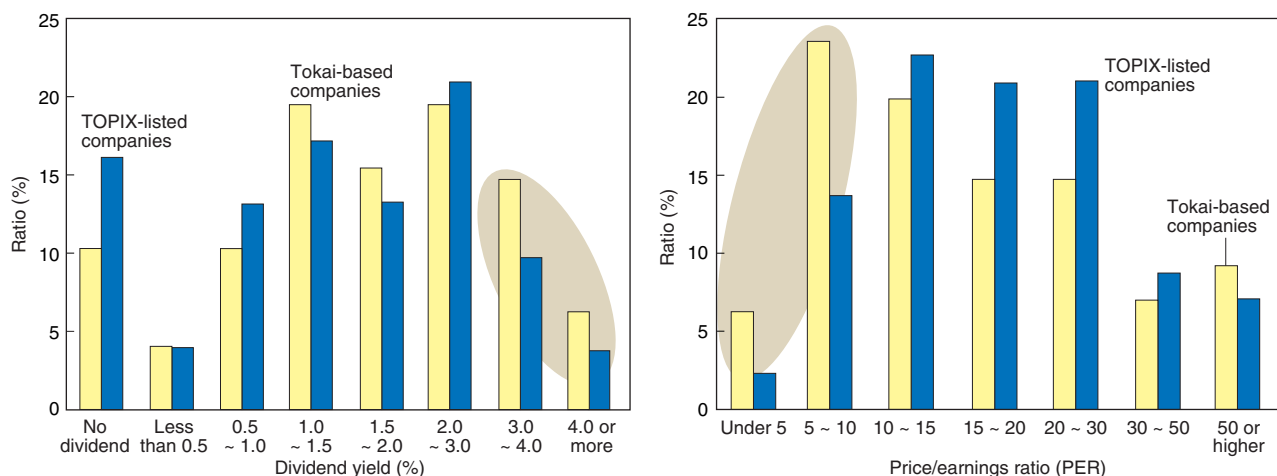
What is needed is a flexible approach that from the very beginning establishes a set of limited periods for a phase-by-phase review of marketability in order to determine if a business should be continued because it offers promise, or withdrawn if it appears difficult to pursue.

**2 Approaches Currently Taken for the Creation of New Industries**

**(1) Approaches by government and financial worlds**

In order to properly deal with these problems, various approaches aimed at the creation of new industries are being undertaken by local administrative offices and local financial entities. The main focus of administrative approaches has been to provide support for business creation and to solicit companies to participate (Table 2). While the direction of such policies is not

**Figure 8. Dividends and PER among Tokai-Based and TOPIX-Listed Companies (End of March 2003)**



Notes: (1) Comparisons were made between 272 publicly traded companies whose head offices are located in the three Tokai prefectures and 1,544 TOPIX-listed companies; (2) PER = price/earnings ratio; TOPIX = TSE First Section price index.  
Source: Financial Research Center, Nomura Securities Co., Ltd.

**Table 2. Activities by Administrative and Government Entities Aimed at the Creation of New Industries**

Organization	Major Industrial Policies	Major Activities
Chubu Bureau of Economy, Trade and Industry	Industrial cluster plans	<ul style="list-style-type: none"> <li>Establishing human networks among university researchers and companies</li> <li>Providing support on the basis of such networks for the development of new businesses, the creation of second businesses and venture start-ups</li> </ul>
Ministry of Education, Culture, Sports, Science and Technology	Intellectual clusters	<ul style="list-style-type: none"> <li>Providing support for the creation of businesses from university-originated technological seeds (supporting municipalities)</li> </ul>
Aichi prefecture	New industry creation plans	<ul style="list-style-type: none"> <li>Creating and fostering new industries (supporting ventures)</li> <li>Establishing appealing business environments (developing infrastructure, soliciting company participation, fostering human resources)</li> <li>Supporting the enhancement of and evolutionary developments by existing industries (global networks, small and mid-sized local companies)</li> <li>Setting up a systems and structures to promote industrial vitalization</li> </ul>
Nagoya	Nagoya Science Park	<ul style="list-style-type: none"> <li>Soliciting company participation</li> </ul>
Mie prefecture	Forming industrial clusters	<ul style="list-style-type: none"> <li>Crystal Valley (liquid crystals), Medical Valley (drugs and drug therapies), Silicon Valley (semiconductors)</li> <li>Pearl Valley (call centers, data centers)</li> </ul>
Gifu prefecture	Sweet Valley	<ul style="list-style-type: none"> <li>Forming a large cluster for IT-related companies, contents business and robotics industry</li> </ul>

Note: IT = Information Technology.

Source: Compiled on the basis of web page information and interview surveys.

**Table 3. Activities by the Financial Industry Aimed at the Creation of New Industries**

Organization	Major Current Activities	Other Proposals
Chubu Economic Federation	<ul style="list-style-type: none"> <li>Establishment of the Chubu Industrial Promotion Council.</li> <li>Activities to solicit company participation (forming a health and medical industry community)</li> <li>Venture Business Support Center</li> <li>Others</li> </ul>	<ul style="list-style-type: none"> <li>Forming a physical distribution network</li> <li>Forming resort parks</li> <li>Developing international schools</li> <li>Creating an "environmental symbiosis" city (social experiment)</li> <li>Developing a wide-area disaster prevention center (social experiment)</li> <li>Consolidation of selected prefectures into enlarged administrative units in pursuit of greater decentralization of authority</li> </ul>
Nagoya Chamber of Commerce & Industry	<ul style="list-style-type: none"> <li>Providing support for business creation and venture activities, and exchanges between academia and industry</li> <li>Fostering human resources</li> <li>Providing support for small and mid-sized company financing, business rehabilitation programs, company affiliations and M&amp;As</li> <li>Brand strategies</li> <li>Activities to solicit company participation</li> <li>Others</li> </ul>	
Chubu Association of Corporate Executives	<ul style="list-style-type: none"> <li>Committees were established to focus on issues relating to the environment, employment, finance, product manufacturing, international affairs, local development, consumption, education, and exchanges within the country, and the Committee to Consider Japan in the 21st Century was set up to provide a venue for discussions and the origination and dissemination of information</li> </ul>	

Note: M&A = mergers and acquisitions.

Source: Compiled on the basis of web page information and interview surveys.

wrong, some time may be required before meaningful results are generated.

Moreover, it often requires as long as ten to 15 years for the technological seeds produced through basic research at the university level to blossom into actual business undertakings. As for venture firms, it is rare for such companies to offer major employment opportunities from the initial stage immediately after establishment. Another factor is that this region presents a difficult environment for fostering ventures, as it is considered to be particularly sensitive to risk taking.

In order to initiate a business of a certain size in a relatively short period of time, it is also necessary to

identify the potential fields in which major markets can be expected. Products and services that can meet the needs of such markets can then be realized by combining technologies and introducing the needed technologies from the outside. In such cases, support should be provided not only to business creation by individuals and small and mid-sized companies, but also to efforts to advance into new fields by mid-range and major companies.

At the same time, the financial world has been focused on extending participation invitations to companies, providing support for business creation and venture activities, and promoting brand strategies (Table 3).

While various proposals have been presented, the core issue is how to effectively realize such ideas.

## (2) Approaches by companies

Companies in the three Tokai prefectures already recognize the need for the creation of new businesses. Such companies, including those in the automobile industry that are now achieving good performance results, are undertaking the development of new technologies in order to establish new business cores. Figure 9, which lists industries on the vertical axis and technologies on the horizontal axis, plots the major fields of technological development now being pursued.

In terms of overall trends, active efforts are being carried forward for the development of technologies related to automobiles (developments to reduce vehicle weight, new power sources, etc.) and eco-materials (environmentally friendly materials). Although the three Tokai prefectures are behind the Kanto and Kansai regions in quantitative integration, characteristic trends are seen with respect to biotechnology in such fields as regenerative medicine.

However, cases in which these moves have led to the creation of businesses or industries and in which promising leads are being pursued—including those in which it is too early to look for results—are still few and far between. In sum, there still remain some issues to be resolved to foster the creation of businesses and industries based on the development of element technologies.

## 3 Needed Mindset to Develop Concepts of Next-Generation Industries

In order to make the ongoing activities by administrative, financial and private-sector entities more fruitful, a mindset that is attuned to visualize and vitalize innovations is necessary. There are three main points to consider in this regard.

### (1) Combining technologies and escaping from the NIH syndrome

Any single new technology can generally be plotted at the point where the vertical and horizontal axes in Figure 9 intersect. If an overall perspective is applied to these elements from a business and industry viewpoint, however, the potential of any application can be considerably expanded through developing a system that combines multiple technologies.

Although industrial history is filled with examples in which the primary focus was placed on the performance of a specific product, the question for the future is how new functions can be realized. For example, ITS (intelligent transport systems) technologies as represented by ETC (electronic toll collection) have added new functions by incorporating vehicles into information and communications networks to combine finan-

cial and traffic services. Because there is a natural limitation within any single category with respect to how better performance and functions can be incorporated into an automobile, what is needed is the capacity to provide new value by combining multiple products and services.

In the case of motor vehicles, a single car represents a combination of many thousands of components. This has contributed to building strong value chains by incorporating most of the component companies under the umbrella of a single manufacturer. In the future, however, various industries such as electronics, communications, construction, financing, and traffic services need to bring technology and know-how relating to ITS together to develop new transport systems. As it is not realistic for a single company to provide all the know-how relating to various types of businesses, a new value chain must be built through overall integration.

It is said that there are many companies in the three Tokai prefectures that are weak at establishing alliances with other companies on an open-handed basis. But any company that adheres to the NIH (“not invented here”) syndrome and relies exclusively on its own technology will find it difficult to turn out products and services needed by the market. It is necessary to anticipate what products and services the market will need and want, and to integrate and combine technologies that focus on providing such products and services.

### (2) Being first to introduce leading-edge technologies and the origination and dissemination of information

It is not easy to form an integrated system that measures up to the standards of an industrial cluster in a totally new industrial and technological field where no existing accumulation of technologies is available. Without the development of world-class technologies and the appearance of players who create businesses out of such technologies one after another (i.e., without the existence of researchers, engineers and R&D companies), a competitive industrial cluster cannot emerge.

As suggested by the proposal of one academic to “invite the world’s foremost researchers” to the Tokai region to develop scientific and research capabilities within the three prefectures, the type of environment that would make the world’s top researchers “definitely want to come to Tokai” must be developed. The same can be said about extending invitations to companies. This is entirely possible, of course, in situations where there is already a heavy concentration of the leading technologies. In the case of creating and starting new technological and industrial fields, however, what comes first could end up as little more than the chicken vs. egg impasse, making it impossible to really move forward.

One of the methods to resolve this problem is to provide mechanisms and venues to introduce products and

Figure 9. Major Fields of New Technology Development and New Products and Business in Three Tokai Prefectures

	Reduced weight	New energy sources	Environmental materials	Measuring and sensor equipment	Bio-technology	Robotics	Information and communications	Display technology	Microsystems and nanotechnology	Others
<b>Ceramics</b>		Secondary batteries NAS batteries	Dirt-resistant materials Deodorizing materials Ceramic films Air-purifying materials	DNA chips	Artificial bone • Chubu University			Polarizing plates		Sanitary ware
<b>Machinery, metals</b>	Magnesium technology Hydroforming technology Nanocomposites	<b>Distributed energy systems</b>	Photocatalysts Anisotropic bonded magnets						Precision grinding machines	Woodworking machines
<b>Automobiles</b>	<b>LEVs (Low Emission Vehicles)</b>  <b>Community vehicles</b>	Fuel cells Wind power systems Electric vehicles	Kenaf boards Biodegradable plastics	Rotary sensors Magnetic sensors Temperature sensors	Biomass (cell sorter)		<b>ITS</b> Car navigation systems Pedestrian/ITS technology	Hologram display LEDs	Nanocomposites Hydrogen occlusion alloys	Hydroforming technology
<b>Electronics</b>		Solar cells	Recycled plastics	Ultrasonic wave systems		"ifbot" (Emotion expressing robots)	Office equipment (multi-function machines)	Liquid crystal panels FED panels	Semiconductor packages	
<b>Electric power, gas</b>		(Fully electric housing) Natural gas cogeneration	New refrigerants Using waste oils		<b>Clinical test networks</b>			<b>Display manufacturing</b>		
<b>Foodstuffs</b>			Plant cultivation accelerators		Food-related genetic engineering Brewing technology • Nagoya University	<b>Health foods Food-related genetic engineering</b>	(Product tracking systems)		Food additives	
<b>Medicine, pharmaceuticals and healthcare</b>			Bone-setting and repair devices	<b>Regenerative medicine hospitals</b>	Regenerative medicine Immune antibodies Pharmaceutical products • Nagoya University				Cosmetic powders	Catheters Gel beds
<b>Living, housing</b>			Eliminating VOC adhesives	<b>Safer housing, nurseries and retirement facilities</b>			Security systems			Aseismic housing Dwelling construction materials Office furniture
<b>Entertainment</b>		<b>Industrial technology sightseeing</b>						<b>Advanced entertainment systems</b>		Pachinko-style pinball machines

Notes: DNA = deoxyribonucleic acid; FED = field emission display; ITS = intelligent transport system; LED = light emitting diode; NAS = sodium sulfur; VOC = volatile organic compounds.

Source: Compiled on the basis of interview surveys, financial statements, etc.

services that pioneer the usage of leading-edge technologies. One possible way to attract companies and researchers from both Japan and overseas would be to create the perception of the advantages to be gained. This would mean developing a sense among those involved that “technological problems about eco-materials can be resolved by setting up operations in Tokai” or “new therapeutic technologies that are not yet used elsewhere in Japan are available in the three Tokai prefectures” or even “verification tests of new transport system technologies that employ real-life testing are possible in the Tokai region.”

There are many modest and reliable product manufacturing companies in these three Tokai prefectures, as well as a climate that takes to heart vestiges of tradition-

al culture that consider “being unobtrusive” a virtue. It is in these areas where locals and outsiders agree that the origination and dissemination of information is still weak. While it is difficult to totally change such character traits, approaches that herald the success of “the world’s first commercialization” and “Japan’s first productization” will no doubt lead to the spontaneous development of outreach activities.

**(3) Building the mechanisms of “industry producers”**

Even when superior technologies are involved, there are many cases in which efforts to create a business based on such technologies come to an impasse at the time of a shift to the next stage in the course of business creation. This phenomenon, which is called the “Valley of

Death,” exists not only within individual companies but also in efforts to create local industries. While superior technological seeds exist within research entities such as universities, corporate research centers, public research institutions, etc., the core factor comes down to the functions needed to combine such technologies, secure funding and explore the market.

If a new technology is destructive, marketability must be evaluated by establishing a limited period in which to determine whether to continue or withdraw from the course in question.

Activities to foster ventures and promote affiliations between industry and academia were started even before the outset of the cluster policy, and various support systems and programs are already in operation. There has been an increase in the number of engineers who are active in technology transfers and those with minds attuned to business needs. The individual who can coordinate technologies, explore the market, and put these efforts on the right track as a business is an indispensable player in terms of the future. While such people are often called coordinators, mere coordination alone is not sufficient. Rather, what is required is a producer.

A producer in this sense means a person who can assume responsibility for all elements throughout the process in terms of the market perspective, including technological development, integration of multiple technologies, productization and market exploitation. While leaders of economic associations or auxiliary entities within municipal administrations currently take on the roles of coordinators in many cases, new mechanisms to recruit human resources who can assume responsibility for establishing and promoting businesses are needed.

## V Building the Mechanisms for the Creation of New Industrial Clusters

As specific approaches to actually create next-generation industries, this paper presents the following six

proposals: (1) approaches to the creation of new industries through combinations of technologies; (2) development of applications through technological solutions; (3) rolling out businesses based on the results of verification tests of leading technologies; (4) fostering industry through the commercialization of leading technologies; (5) establishing local brand concepts; and (6) soliciting new company participation to enable value chains to be established (Figure 10).

At present, activities to promote innovations through linkages between industry and academia are ongoing at various sites throughout the world. As a result, there is a high possibility that new venture firms will start emerging one after another. In order for such undertakings to start integrating and form a single “industry,” they need the support of adequate demand and the enhancement of an industry-wide value chain.

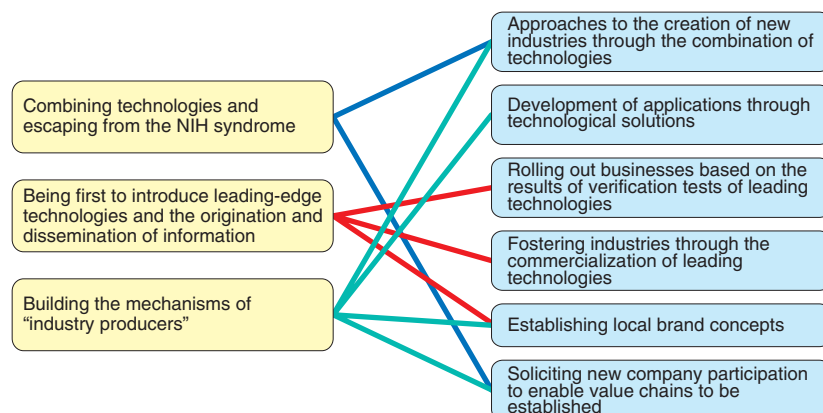
The following proposals are aimed at creating the mechanisms for the exploitation of this demand and the establishment of such a value chain.

### 1 Approaches to the Creation of New Industries through Combinations of Technologies

Through the convergence of information and communications and financial services by means of ITS, automobile manufacturing is creating a market that cannot be fully classified within the framework of the existing “transportation equipment manufacturing industry.” Similarly, existing industries also have the potential to create new markets by combining various technologies, products and services.

Within the three Tokai prefectures, there is also a concentration of housing-related industries such as construction materials, roofing tiles, pre-fabricated housing, etc. (Table 4). While a huge remodeling market including the demand for reconstruction is expected in the housing sector, one question worth asking is whether it would be possible to secure an even higher share by providing new functions and value in combination with various functions, such as information and

Figure 10. Ideas about Next-Generation Industries and Proposals for Specific Approaches



**Table 4. Examples of Companies Engaged in Secure Living Systems**

Products and Technologies	Examples of Companies and Organizations
Housing, construction materials, furniture	TOYOTA HOME CO., LTD. (homebuilding), NICHIIHA CORPORATION, AICA Kogyo Company, Limited (measures to prevent sick house syndrome), Tsuruya, TYK CORPORATION (fire-resistant tiles), SHINTO COMPANY LIMITED (solar power generation panels), OLIVER Co., Ltd. (specialized furniture) and others
Security and crime prevention	AIPHONE Co., Ltd. (security systems using intercoms) and others
Robotics	Business Design Laboratory Co., Ltd., Brother Industries, Ltd., Nagoya Institute of Technology (these three organizations are developing personal robots capable of expressing emotion), Human Robot Consortium (Nagoya) and others
Sensors	DENSO CORPORATION (millimeter wave sensors), AICHI STEEL CORPORATION (magnetic sensors) → development of sensors to prevent falls and systems to prevent accidents
Heating systems	Chubu Electric Power Co., Inc., TOHO GAS CO., LTD., and others
Information and communications	Nursery videophone relay project at Softpia Japan Foundation (Ogaki, Gifu) and others
Catalysts and others	INAX Corporation (dirt-resistant technology), Photo-Catalytic Materials Inc. (photocatalysts = deodorization, air purification) and others

Note: Companies selected for inclusion on the basis of interview surveys, financial statements, etc.

communications and crime prevention. For example, enhancing housing and public welfare facilities as “secure living systems” that provide safe dwellings—such as disaster prevention, crime prevention, the prevention of household accidents and health monitoring—can be considered as one new approach to enter the housing market.

## 2 Development of Applications through Technological Solutions

The establishment of a “technological solutions” service system through which product manufacturers can resolve questions and concerns about specific technologies could lead to a ready succession of new startups in various fields, as the latest information on needs at the application side would be constantly available through such consultation processes. Establishing such mechanisms could therefore be particularly effective, as the typical, passive cooperation between materials manufacturers and product makers can only offer limited possibilities for business creation. In short, breaking through the technical barriers will increase overall potential.

While an active approach is being adopted towards the development of eco-materials in the three Tokai prefectures, new processing technology may sometimes be required to enable the replacement of existing materials with new materials having superior environmental qualities. Support should be provided to product makers through developing and providing technological solutions to such problems by means of a system that promotes affiliations between industry and academia while identifying market needs. Applications for new materials should also be developed at the same time.

One approach would be to establish a technology development network that accepts any technological breakthroughs on eco-materials by setting up linkages between private-sector companies with particular strengths in materials processing technology (such as

ceramics), industrial technology research facilities and universities. Various material industries such as ceramics, steel, rubber and plastics are located in the Tokai region. Nagoya University and the National Institute of Advanced Industrial Science and Technology (AIST) are both advocating a program of providing support for technological breakthroughs by companies. If linkages are established with these activities, the perception can be created that “solutions to technological problems can be found in the three Tokai prefectures,” thereby helping to form mechanisms to match materials industries and product manufacturers.

## 3 Rolling Out Businesses Based on the Results of Verification Tests of Leading Technologies

Regardless of how much a technology may excel, it is often difficult to widely disseminate a new technology without ensuring that it can be commercialized without problems. Conversely, if it can be confirmed that a technology has clear commercial applications, its introduction will likely move forward at a single stroke.

For example, once the testing that was carried out in Singapore, etc., verified that the contact-less IC (integrated circuit) cards developed by SONY could be readily used, they were quickly adopted for commuting passes by Japan’s two major railway companies (JR East and JR West). Although another company developed a similar technology that offered higher information confidentiality, the SONY products were the first to be disseminated as the company quickly confirmed that their technology was fully usable.

These verification tests are especially effective in such fields as social systems and transport systems. While various social and verification tests have often been conducted in recent years, there are many cases in which these tests have been temporarily implemented as part of community planning and zoning activities

within a municipality, but then abruptly come to an end without ever being linked to business creation.

Various social tests are being implemented in the three Tokai prefectures including Toyota City concerning eco-cars (low emission vehicles), ITS, next-generation transport systems, etc. Accordingly, it has been suggested that the involvement of the industrial world in such activities should be strengthened, and that the next-generation transport systems should be rolled out as business operations in other areas by using the results of verification tests.

#### 4 Fostering Industries through the Commercialization of Leading Technologies

There are cases in which leading-edge technologies are not used in the industrial world due to regulatory limitations and consideration for existing industries. For example, medicine is a typical field where such cases are seen. As the effects of drug therapies can be life threatening, it is only realistic when promoting the commercialization of the newest technologies to tread cautiously by first applying such technologies in controlled situations under careful monitoring in locales that provide trial sites for structural reform under relaxed regulations.

Regenerative medicine, an area in which significant technological development has recently been seen, involves technology that can provide effective therapies for diseases and injuries that formerly were difficult to treat. Such treatments are still regulated in Japan, with only research and development being quietly carried out. While some companies related to regenerative medicine such as tissue cultures have been established, there are some fields whose potential for growth is not being fully pursued, as the prospects for commercial applications are still far from certain due to regulations.

The Tokai region is home to a university professor whose work in regenerative medicine is considered foremost in Japan and a company that is capable of producing cultured skin. While this region still falls somewhat behind Kanto and Kansai in terms of research and development for regenerative medicine, making it possible for a local hospital to actually carry out clinical applications of such therapies would go a long way towards triggering the creation of industries. In other words, the development of a biomedical industry can be expected to come about through the actual use of cultured skin and artificial bone, rather than just hospital applications.

#### 5 Establishing Local Brand Concepts

##### (1) Increasing brand recognition for local products

Efforts to increase local brand recognition are being made in various areas. As such activities are carried out

everywhere, however, the PR effects will not be particularly high unless the appeal adopts unified concepts to focus on the area's uniqueness.

There are many cases in which municipalities and commercial and industrial associations promote top-notch local companies and products by affixing the area's name as part of the brand name (e.g., "XXX brand"). Yet, brand recognition will likely not be significantly increased among consumers and customers if a uniform approach and standard concepts are not made part of such appeals.

As a number of companies making traditional food-stuffs are concentrated in the three Tokai prefectures, possible approaches might include, for example, establishing health-conscious concepts, and promoting and supporting the introduction of a tracking system in order to improve brand reliability as "safe and secure food products" that are backed by scientific data, rather than simply relying on tradition and confidence.

##### (2) Industrial sightseeing

In addition, the concept of industrial tourism is gradually taking root in the manufacturing world. Essentially, this means "industrial tourism provides insights into manufacturing and promotes human exchange through visits to industrial sites of historical and cultural importance" (Aichi prefecture, *Craftsmanship in Japan* CD-ROM, 2002).

A number of industrial sightseeing routes have already been set up in the three Tokai prefectures. Merely establishing such tours, however, is not enough to attract people. It is necessary to develop a strong awareness of such resources as well as a motivation to visit them among people in Japan and overseas, and to encourage a desire to travel to the area at least once. With respect to this point as well, formulating a focused local concept and conducting the related PR activities are necessary.

In view of the relationships within the automobile and airplane industries, it would also seem possible to use "vehicles" as a concept. For example, the Chubu Economic Federation plans to establish a theme park as part of its local vision. One idea includes the development of attractions that would enable visitors to actually experience an F1 race in full-scale simulations, and aircraft that are replicas of the real thing. What is important here is that such facilities be attractive enough to persuade people that a visit is well worth the effort by creating an experience that is available nowhere else in the world.

#### 6 Soliciting New Company Participation to Enable Value Chains to be Established

In order to create new industrial clusters, such concentrations should be promoted not only among existing companies, but also by soliciting new participation

from among outside companies, and a competitive environment should be developed to maintain and increase overall competitiveness.

For example, Berlin is starting activities to invite foreign companies to participate in a research and industrial concentration that targets the bioinformatics field within a biotech industry value chain. Berlin established an environment that facilitated the conduct of business transactions with other biotech-related companies that have already located within the area, and has been successful in shifting the European base of Hitachi Software Engineering operations, which were formerly in France, and in strengthening their overall functions. Preparing an environment that enables a new participant to easily enter the relevant industrial cluster and which facilitates its business operations are major factors in achieving success in inviting new company participation.

The secret of such solicitations is to formulate business operation plans from the standpoint of the companies being invited. At a time when vigorous investment activities are seen among companies, preferential measures such as tax incentives have become a major factor in determining the destination of investment projects. Now is the era in which not only Japanese companies but other companies as well make investments on a selective basis that promise clear prospects of leading to actual business advantages.

Missions from the government and the financial world have been dispatched overseas from the three Tokai prefectures. In narrowing down the list of companies subject to such solicitation efforts, it is effective to provide friendly support, such as assuming the likely

business roll-outs for that company, providing assistance concerning entry procedures in the language of the relevant country, and setting up business meetings with companies in the three Tokai prefectures.

As Michael E. Porter has stated, industrial cluster refers to venues that are geographically close and which can induce innovations on a long-term and continuous basis. Essentially, innovation is not limited to technological improvements only, but also refers to activities to create something new that was not available in the past in terms of products, production processes, markets, materials, components, organizations, etc., and which bring about a new economic paradigm after such new things are accepted by the public.

Through the development of affiliations between industry and academia and TLOs (technology licensing organizations), the mechanisms for technological innovations and technical transfers have already been enhanced to a considerable extent throughout the country.

From this point forward, activities that envision innovations from a more extensive perspective are necessary. I hope that major businesses and industries that fully utilize the features of the area will emerge one after another by skillfully combining existing industries and technologies and new technologies, and by strengthening the functions to explore potential markets in various places.

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