

# Convergence on Silicon Island

Kyushu, the southernmost of Japan's four main islands, is home to a number of companies operating in the semiconductor sector; together they produce about six percent of the world's semiconductor devices. But for some time the area has been referred to as a "brainless silicon island," on account of the relative paucity of semiconductor design and development institutes in the region. To help dispel this criticism, the Ministry of Economy, Trade and Industry has provided financial backing for the Kyushu Silicon Cluster Project, in which private companies and university bodies have come together to generate new technologies and businesses. **Tamura Mariko** spoke with Professor Yamazaki Akira from the Graduate School of Economics at Kyushu University, who has been closely involved in the Kyushu Silicon Cluster Project from the outset.

## *Which is the leading organization in the Kyushu silicon cluster?*

The Kyushu Semiconductor Industries Technology Innovation Association [SEMIC-Q; established in 2002; chairman, Sasaki Hajime, who is also the chairman of NEC]. The organization now has more than 1,000 member enterprises and groups. The leading members are prominent scholars and business owners in Kyushu.

SEMIC-Q has primarily organized Sisui-Juku (semiconductor seminars) for business owners. It has also set up the System in Package (SiP) Research Committee and Manufacturing Facilities Research Committee, which attract people interested in similar topics. In addition, it holds other seminars and exhibitions. Even though participating enterprises have noted that SEMIC-Q is offering a broad array of industry information, there have been no specific achievements as yet.

## *What are some of the notable features of*



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## *the Kyushu region?*

The Kyushu region stretches over an area with a radius of about 200 kilometers, with Fukuoka-ken prefecture at the center. There is a great accumulation of automotive companies in the area, but auto plants are not equipped with decision-making functions such as R&D, design and purchasing. On the other hand, semiconductor plants are equipped with certain development and design functions, and many semiconductor firms are engaged in joint research with local universities. Even though the scope of related industries is smaller than that of the automobile industry, the ratio of locally based industries is higher in the semiconductor industry.

## *Can you describe the thirty-year history of the Kyushu silicon island?*

The establishment of semiconductor plants began in the late 1960s in Kyushu, initiated by Kumamoto Plant of Mitsubishi Electric Co. and followed by NEC, Toshiba, Fujitsu and Sony. Production was accounting for more than ten percent of the global semiconductor market in the late 1980s, and Kyushu came to be known as a "Silicon Island."

Even though the area grew into a production region with global scale, there was very little in the way of functions for R&D, planning, design and administration, giving rise to the epithet "brainless silicon island." Taiwan also came to be called a silicon island during the 1990s, as its semiconductor industry developed rapidly in these years.

About thirty-five years after the establishment of Kumamoto Plant by

Mitsubishi Electric, the semiconductor industry in Kyushu has started to gradually upgrade its functions. Today, many semiconductor plants are equipped with certain production management, planning and design functions.

## *Does this mean that a shift is underway from volume production of standard DRAM with intensified capital to system LSI (large-scale integration) with a concentration of brainpower?*

That's right. Today, there is an accumulation of companies that support semiconductor manufacturing in the area, including manufacturers of semiconductor-related components, semiconductor manufacturing equipment, silicon wafer, and facility maintenance and inspection services. Examples include Tokyo Electron Kyushu, Ishii Tool & Engineering Co., Daiichiseiko Co. and Kyushu Matsushita. With the manufacturing facilities of the leading firms at the core, the accumulation of semiconductor capacity has broadened to include metal forms for semiconductor manufacturing equipment and other related industries.

In other words, Kyushu Silicon Cluster Project lays out a strategy for building a wider range of related industries based on thirty years of semiconductor manufacturing in the area, in order to enhance international competence for the entire industrial area. Target outcomes include improvement in the functions for R&D, planning and design, and the ability to rapidly incorporate new semiconductor technologies.

## *We hear that some automotive manufacturers have attempted to participate in the semiconductor industry.*

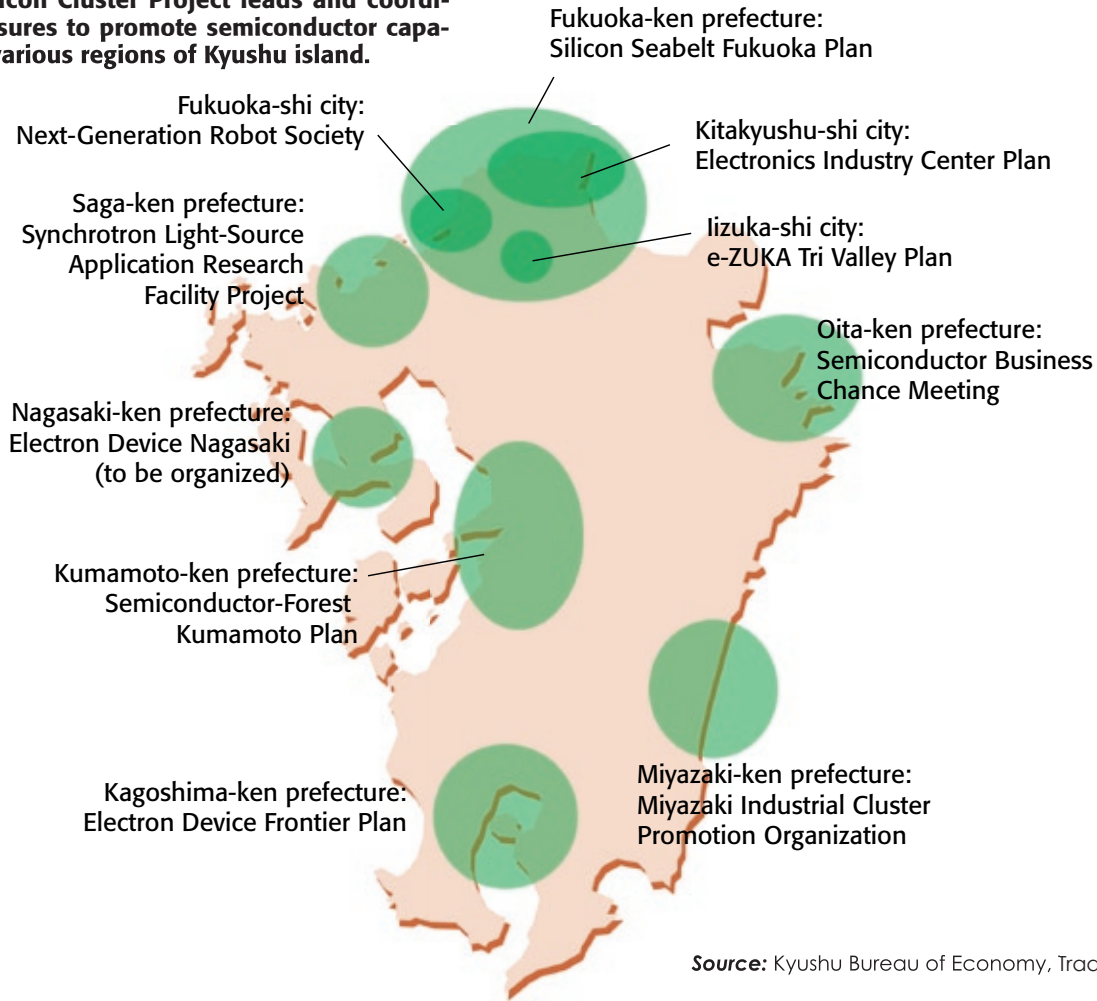
Indeed, the component manufacturer Aisinkyushu Japan Co., which is affiliated with Toyota, and firms affiliated with Honda have started making semiconductor manufacturing equipment and components.

Even though the accumulation of semiconductor-related capacity has progressed, however, the domestic share of related industries is only ten percent, compared with a thirty-percent share of domestic semiconductor production.

As Professor Michael Porter of Harvard University has pointed out, cluster integration is very important and further integration with related industries is needed to fill the gaps in domestic shares. The semiconductor industry should provide information not only to semiconductor-related industries but also to other sectors, to promote expansion of manufacturing networks in the cluster.

**Professor Yamazaki Akira is a member of the Cluster Meeting at the Ministry of Economy, Trade and Industry, where he is responsible for the analysis of semiconductor clusters.**

**Kyushu Silicon Cluster Project leads and coordinates measures to promote semiconductor capabilities in various regions of Kyushu island.**



Source: Kyushu Bureau of Economy, Trade and Industry

**How is the accumulation of semiconductor-related industries progressing, specifically?**

Sony Semiconductor Kyushu Co. has established its head office in the city of Fukuoka, and was followed by JM Net Inc., which develops semiconductor-manufacturing facilities and has moved its head office from Osaka. Sony Information System Solutions Inc. (today Sony Global Solutions Inc.) has established a system LSI development base there as well.

Moreover, the national government has invested 3.5 billion yen (31.5 million dollars) in establishing the Fukuoka System SLI Total Development Center. So, functional enhancement and the gathering of brainpower are moving ahead.

Other movements include the establishment of a plant by Inter Action Co., a light source equipment manufacturer, in Kumamoto Semicon Technopark, as well as the consolidation of analogue IC manufacturing capabilities at the Kitakyushu Plant of Toshiba. Thine Electronics Inc., a company engaged in LSI development, has also moved into Kitakyushu-shi city.

According to the Kyushu Bureau of

Economy, Trade and Industry, a structural change has resulted in semiconductor manufacturing at Kyushu, where the production share in yen terms now surpasses the share in unit terms. This has been since the implementation of the Cluster Project.

The cluster strategy to fully harness the potential of a regional accumulation of brainpower and industries from different aspects can be regarded as a survival strategy by regional industries.

**What are your views regarding measures to cope with globalization?**

The development and functional upgrading of international ports, harbors and airports are significant, because it is important for semiconductor cluster strategies to identify the position that Kyushu will assume in the global supply chain.

In this regard, Fukuoka Airport is one of the major hubs in the Asian network and can facilitate the building of an international logistics network over Asia. In fact, the value of trade through Fukuoka Airport now ranks third among international trading airports in Japan, a reflection of the rapid increase in semiconductor exports.

**What are the future issues and prospects for the Kyushu Silicon Cluster Project?**

One of the issues is the need for total coordination across a broader area of policy measures related to semiconductors. These are currently being implemented separately by each prefecture. Another point is that the keys to cluster formation, when viewed from a long-term perspective, are the accumulation and vitalization of brainpower in industries. In this respect, universities need to play a central role in unifying regional resources and brainpower.

This is especially true with system LSI, as the accumulation of knowledge is more important than facility investments in this area. Consequently, the reorganization of regional education and research schemes will be necessary. Moreover, experts capable of fully appreciating the current situation of the semiconductor cluster need to be found, to enable an accurate understanding of the policy needs of the industry. ■

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