The Japanese Flat Panel Display Cluster

Microeconomics of Competitiveness 2011 Winter

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1. Country Analysis

1.1 National Economic Performance (macro)

Country Background

Japan is surrounded by the Sea of Japan to the west and the Pacific Ocean to the east as shown in Figure 1. In 2010, Japan’s population of 128 million people makes it the 10th most populated country in the world. The country’s area is 380,000 km$^2$, roughly the size of California. A highly mountainous terrain contributes to high population density on the Pacific coast side. In terms of OECD’s metropolitan area rankings of world populations in 2007, Japan’s capital of Tokyo is ranked 1$^{st}$ for its 35 million people, and Osaka in the Kinki region is ranked 5$^{th}$ for 17 million people. Although Japan does not have many natural endowments except ports and marine resources, the country has outstanding human capital with its long history of excellent primary education system.

Figure 1. Map of Japan
History of Japan

Japan’s geographical isolation fostered political independence and cultural uniqueness from overseas influence until the middle 19th century. Yamato Polity in the Kinki region emerged as the first central administration around AD 3rd century and expanded its control over most of Japan. Japan’s distinguishing cultures such as the Kana alphabet and kimono clothes were invented before AD 12th century when the federal period dominated by the Samurai families started. The Edo era of the last 265-year peaceful federal period was ended in 1867 by Kurofune of gunship diplomacy and western colonization of East Asia. The Meiji Restoration starting from 1868 rapidly modernized and industrialized Japan. Through the Russo-Japan War (1904) and World War I (1914-1918), Imperial Japan expanded its influence over northeast Asia and the West Pacific. After Japan lost World War II in 1945, Japan has focused on economic development and now is one of the most peaceful and richest countries over the world.

Economic Development

Japan’s economic development has had three stages after the World War II as described in Figure 2. During the first stage (1954-1973), Japan enjoyed high GDP growth averaging 8% per year over about two decades. Its main industry changed from agriculture and light manufacturing to heavy manufacturing. This high growth was supported by cheap labor and oil costs, a high saving rate, and a low exchange rate favorable to export-led growth. In 1968, Japan’s GDP became second in the
world only after the US. However, the world oil crisis in 1973 shocked Japan’s economy severely, as did rapid inflation and the Yen’s appreciation fostered by the monetary policy of “Nixon Shock.” Japan successfully overcame these economic setbacks by productivity improvement and technology innovation. The semiconductor and consumer electronics industries flourished. In terms of GDP per capita, Japan was ranked 1\textsuperscript{st} in 1990. Since the asset bubble burst in 1991, Japan’s economy has not grown for the two decades. During this period, fiscal and monetary policies have not been consistently strong enough to bring about the recovery of the economy.

Figure 2. Economic Development of Japan\textsuperscript{1}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{economic_development_japan.png}
\caption{GDP growth rate and Share of Japan in the world economy}
\end{figure}

\textsuperscript{1} Source: MOC Japan Team Paper 2009: World Development Indicators 
http://www.cao.go.jp/index-e.html
Productivity

GDP per capita of Japan is 20% less than that of the US. Compared to the US, the Japan’s labor utilization (hours worked per capita) is a little higher than in the US, while Japan’s GDP per hour worked is more than 20% lower. This means that Japanese work a little longer than Americans but much less effectively. This inefficiency can be attributed to Japan’s life-long employment since unnecessary employees are retained.

Figure 3. Japan’s productivity

Industry structure

The manufacturing industry is the most important industry in Japan’s economy, especially for

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2 Source: OECD Stats http://stats.oecd.org/
exporting. As of 2009, the largest industry in Japan is manufacturing, accounting for 21%, as shown in Figure 4, while the tertiary industry (business services) is twice as large as the secondary industry (manufacturing). Export has been rapidly growing since the 1970s, led by the transport (automobile) and electrical machine (consumer electronics) segments.

Figure 4. Japan’s industry structure

![GDP by industry in Japan (2009)](source: The Cabinet Office, System of National Analysis)

![The industrial structure change](source: The Cabinet Office, System of National Analysis)

![Export by product in 2009](source: Ministry of Finance)

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Macroeconomics Competitiveness

Japan’s macro economics competitiveness was ranked 33rd in the world in 2010. Although social infrastructure and political institutions (20th) are organized well and quite competitive on a nation level, decentralization of economic policy (106th) is far behind. This is because the central government dominates tax revenue and policy planning authorities. Regional governments including Osaka and Mie prefectures in Kinki have not been able to stimulate regional economic development. In addition, the government debt (135th) reached 200% of GDP in 2010. The more than 40 trillion Yen government deficit (104th) in the nation’s 2011 budget give Japan one of the worst rankings in the world in terms of budget deficits. MOC Team Japan 2009 argued that a major cause of this poor ranking is spending on a declining and aging population.
On March 11, 2011, Tohoku area was hit by M9.0 earthquake and tsunami. This catastrophic event took many lives of people and caused a severe production shortage. To finance recovery, the government plans to raise tax and issue bonds. This will hurt the nation’s financial sustainability and put a burden on future generations. However, as we discuss in the second section of this paper, the shock of this disaster could well provide the opportunity for long overdue changes in Japanese economic policy.

**Figure 5. Japan’s Macroeconomics Competitiveness**

<table>
<thead>
<tr>
<th>Macroeconomic Competitiveness (33rd)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Social Infrastructure and Political Institutions (20th)</strong></td>
</tr>
<tr>
<td>Human Development (17th)</td>
</tr>
<tr>
<td>• Life Expectancy (1)</td>
</tr>
<tr>
<td>• Primary Enrollment (1)</td>
</tr>
<tr>
<td>• Secondary Enrollment (1)</td>
</tr>
<tr>
<td>• (Low) Malaria Incidence (1)</td>
</tr>
</tbody>
</table>

**1.2 National Business Environment (micro)**

**Japan’s Business Environment**

Japan’s business environment was ranked 11th in 2010. As illustrated in **Figure 6**, while Related and Support Industries is ranked 1st and Demand Conditions is ranked 13th, Factor Conditions and Context for Firm Strategy and Rivalry (CSR) are ranked relatively lower, 21st and 25th respectively.
For Factor Conditions, the burden of government regulations (75th) and time required to start a business (77th) slows down businesses. For CSR, the lower ranking can be attributed to the limited prevalence of foreign ownership (95th) and investment as described in Figure 7. Japan needs deregulation to encourage foreign ownership and investment.

Figure 6. Japan’s Business Environment
The Second Lost Decade (2001-2010)

Macroeconomic and deregulation problems have remained although they have been discussed for years. Why has Japan not solved these problems? We attribute the reason to the fact that Japan did not work on the proposal made by Prof. Porter and Prof. Takeuchi in 2000 in the book called “Can Japan Compete?”. They identified several catalysts that would have brought about a reform (Porter, et al, 2000). However, as we see in Figure 8, hardly any of the catalysts have been put into effect.
Figure 8. Catalysts for Japan’s Reform

<table>
<thead>
<tr>
<th>Catalyst for Change</th>
<th>Progress to date</th>
<th>What happened in the last decade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing shares of foreign investors/ Growing # of foreign companies: <strong>Prevalence of foreign ownership (95th)</strong></td>
<td>Little</td>
<td>Reform of business rules on FDI and prevalence of foreign ownership are still weak. The government still protects Japanese companies from takeover. Activist funds decided to leave. Trade barriers are still prevalent.</td>
</tr>
<tr>
<td><strong>Keiretsu</strong> system in the process of change: <strong>Soundness of banks (75th)</strong></td>
<td>Little</td>
<td>The main bank system is still there, albeit many small-and-medium sized enterprises were forced into bankruptcy.</td>
</tr>
<tr>
<td>Government organizational reform: <strong>Burden of government regulation (75th)</strong>; Government procurement of advanced technology products (36th); Government success in ICT promotion (41st)</td>
<td>Little</td>
<td>Organizational structure has changed, but a reduction in personnel has not materialized.</td>
</tr>
<tr>
<td>New generation of CEOs assuming leadership</td>
<td>Little</td>
<td>Old established companies don’t seem to have changed a lot judging from their financial results.</td>
</tr>
<tr>
<td>Newer generation of entrepreneurial companies: <strong>Time required to start a business (77th)</strong></td>
<td>Little</td>
<td>Softbank and Rakuten are doing well, while Livedoor was forced out of the market.</td>
</tr>
<tr>
<td>Young workers more supportive of merit-based compensation: <strong>Extent of Incentive Compensation (32nd)</strong></td>
<td>Some progress</td>
<td>Trend reversed according to recent surveys, which showed young workers’ preference for stability instead of risk.</td>
</tr>
</tbody>
</table>

Source: “Can Japan Compete?” Michael E. Porter et al, and authors

The Japanese government promoted cluster development policies in the last decade. However, these programs were focused on networking or public R&D spending and not directed towards the enhancement of competitiveness through deregulation. Moreover, this was a top-down and two-pronged approach led by different ministries working independently within the central government. In our analysis, Japan should have pursued a bottom-up and decentralized approach.

Decentralization is still a key issue that Japan should address.
Company Strategy

Overall, Japan’s Company Organizations and Strategy was ranked 3rd in 2010. In Figure 10, Japanese firms are competitive, even though there are some issues with incentives. In the next section, we will describe the areas in which the government can take action to improve competitiveness.

Figure 10. Company Organizations and Strategy

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Although the Ministry of Agriculture, Forestry and Fisheries also has its own cluster development program, we selected the two ministries as case studies because these two are more relevant to the FPD cluster and it is enough to cover these two to draw implications as we did.
1.3 National Level Recommendation

Figure 11 briefly summarizes the Japanese government’s economic policy for the last few years. The Democratic Party of Japan established the New Growth Strategy as well as three steps towards the strategy in Figure 12 after they won the general election in 2009.

Figure 11. New Growth Strategy by 2020

<table>
<thead>
<tr>
<th>Theme</th>
<th>Project</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Build on Strengths</td>
<td>Green Innovation</td>
<td>• Fixed Price Purchase of Renewable Energy by Utility Companies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Eco-cities</td>
</tr>
<tr>
<td></td>
<td>Life Innovation</td>
<td>• Promotion of Advance Medical Care</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Acceptance of Patients from Foreign Countries</td>
</tr>
<tr>
<td>Open New Frontiers</td>
<td>Opening to Asia</td>
<td>• Export of Infrastructure Business</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Reduction in Corporate Tax</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Free Trade Agreement in the Asia-Pacific Region</td>
</tr>
<tr>
<td>Tourism and Community</td>
<td></td>
<td>• Special Zone (something like Special Economic Zone?)</td>
</tr>
<tr>
<td>Revitalization</td>
<td></td>
<td>• Inviting 30M Tourists from Abroad</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Promotion of Used Houses’ Market</td>
</tr>
<tr>
<td>Promote Platforms for</td>
<td>Science &amp; Technology, IT</td>
<td>• Internationally Competitive Graduate Schools</td>
</tr>
<tr>
<td>Growth</td>
<td></td>
<td>• R&amp;D</td>
</tr>
<tr>
<td>Employment &amp; Human Capital</td>
<td></td>
<td>• Unification of Nursery Schools and Kindergartens</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Promotion of the Social Sector</td>
</tr>
<tr>
<td>Financial Service</td>
<td></td>
<td>• Unified Market for Financial Products and Merchant Goods</td>
</tr>
</tbody>
</table>

Source: Ministry of Economy, Industry and Trade

Figure 12. Three Phases Toward New Growth Strategy

6 Prime Minister of Japan and His Cabinet http://www.kantei.go.jp/foreign/index-e.html
Japan was about to start the 3\textsuperscript{rd} phase of the three steps before the catastrophic earthquake on March 11, 2011. Three reforms on macroeconomic policy, the burden of government regulation, and centralized system were behind schedule in the New Growth Strategy. We recommend to the central government that the three reforms “3D Strategy” should be launched as described in Figure 13.

**Figure 13. Key Issues and Recommendation**

<table>
<thead>
<tr>
<th>Deconstruction</th>
<th>Deregulation</th>
<th>Decentralization</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macroeconomic Policy</strong></td>
<td><strong>Regulation</strong></td>
<td><strong>Centralized Government</strong></td>
</tr>
<tr>
<td>Wasteful government spending led to a huge budget deficit / debt</td>
<td>The burden of regulation resulted in low foreign ownership / FDI, counterproductive tax structures and market disruption, anti-immigration</td>
<td>The central government discourages municipal governments and companies from creating locally-oriented clusters</td>
</tr>
</tbody>
</table>

**Deconstruction:** Japan should deconstruct macroeconomic policy. The central government should delay the timing of retired people starting to receive pensions from the age of 65 to 70. It should also increase the co-payment of the public healthcare program from 10\%–30\% to 30\%–50\% for non-fatal illnesses. It should also raise the consumption tax from 5\% to 10\%.

**Deregulation:** Japan should deregulate FDI and immigration. The legal system as it relates to corporate law should be liberalized to be far more favorable to foreign investors. For example, the US-based activist fund of Steel Partners was defeated in court when attempting to acquire Bulldog Sauce in 2007. Their claims should have received a more favorable decision. Immigration should be
considered although most of the Japanese opposed to the idea.\textsuperscript{7}

**Decentralization:** Japan’s political system should be decentralized (Doshu-sei). Regional governments should be given full controls on taxes and laws except for national security and diplomacy, so that each region can develop and pursue its own economic development strategy.

**The 3.11 Earthquake & Tsunami and Its Aftermath**

Is the 3D strategy viable? Japan has not been able to implement significant reforms for the last two decades. The political will necessary for reform has been lacking, and government credibility has been ruined. So, how can Japan successfully change its policies? The crisis brought on by the March 11 earthquake might be a turning point. Japan has a history of performing miracles and remaking itself in the face of national crises, notably in response to the gunboat diplomacy by the Western great powers in the mid-19\textsuperscript{th} century and after defeat in World War II. This natural disaster may work as a catalyst for a long-awaited reform. The impact is discussed below in Figure 14 by 3D framework.

**Deconstruction:** The Japanese government is currently considering introducing a temporary reconstruction tax. A 5% increase of the consumption tax will raise tax revenue by 20% (i.e., $120B). During this crisis, people support the tax increase.

**Deregulation:** The Democratic Party of Japan and the Prime Minister Kan expressed their view that

\textsuperscript{7} Source
Japan would start negotiations on the Trans-Pacific Partnership of free trade zones with the United States and others before the earthquake. Although the trade zone initiative has been halted temporarily due to the earthquake, lack of funding for reconstruction and the urgent need for economic recovery will push the government to resume negotiations.

**Decentralization:** The central government has already started discussions on “Tohoku-Tokku,” a Special Economic Zone in the hardest-hit areas. This is highly likely to happen and will enhance decentralization.

**Figure 14. Impact of the 3.11 Earthquake and Tsunami**

<table>
<thead>
<tr>
<th>Deconstruction</th>
<th>Deregulation</th>
<th>Decentralization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Status</td>
<td>Nationwide opposition</td>
<td>Current ruling party supportive</td>
</tr>
<tr>
<td>Reason</td>
<td>Nationwide xenophobia</td>
<td>Strongly opposed by vested interests</td>
</tr>
<tr>
<td>Likely impact</td>
<td>TPP (Trans-Pacific Partnership) negotiation to be resumed in the medium term</td>
<td>Tohoku Tokku (Special Economic Zone) leading to innovative approach</td>
</tr>
</tbody>
</table>

- Problem recognized
- No consensus on how
- Culture of respecting the elderly is prevalent
- Constituencies don’t like tax increases
- At least a temporary tax increase expected
- Should keep it to decrease debts and deficits
2. Cluster Analysis

2.1 Introduction to FPD Industry

Scope of our analysis

In this chapter, we will analyze the competitiveness of the flat panel display (FPD) cluster in Japan.

In our analysis, we will consider FPD panel assemblers such as Sharp, Samsung, and component suppliers to the panel assemblers. Consumer electronics manufacturers such as Sony, Panasonic are not the main focus of our analysis (Figure 15).

Figure 15. Flat Panel Display Value Chain

Worldwide FPD Clusters

In terms of the panel assembling value chain, three regions are particularly competitive in the world:

Taiwan, Korea, and Japan. Korea produces 53% of worldwide Liquid Crystal Display (LCD, the largest and representative segment of flat panel display industry), Taiwan produces 37%, and Japan
produces 8%. In terms of the component suppliers industry, Japanese players dominate the world. For example, the largest and second largest producers of color filters are Toppan and Dainihon Print, both Japanese corporations. Their aggregated share is 65% of the worldwide color filter market. Other key component industries such as backlight, polarizer, and LCD manufacturing equipment, are in a similar situation (Figure 16). Considering the situation in the two industries, component suppliers and panel assemblers, it would be fair to say that Japan has a unique and sizable competitive advantage over other clusters in the world.

Figure 16. Worldwide FPD Clusters

<table>
<thead>
<tr>
<th>WW Share of Large LCD Panel</th>
<th>Top player name of key FPD components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component</td>
<td>Key Player</td>
</tr>
<tr>
<td>• Glass Plate</td>
<td>Corning (47%)</td>
</tr>
<tr>
<td></td>
<td>Asahi Glass (32%)</td>
</tr>
<tr>
<td>• Color Filter</td>
<td>Toppan (37%)</td>
</tr>
<tr>
<td></td>
<td>Dainihon Print (28%)</td>
</tr>
<tr>
<td>• Backlight</td>
<td>Toshiba (39%)</td>
</tr>
<tr>
<td></td>
<td>Sanken (29%)</td>
</tr>
<tr>
<td>• Polarizer</td>
<td>Nitto Denko (48%)</td>
</tr>
<tr>
<td></td>
<td>Sumitomo (26%)</td>
</tr>
<tr>
<td>• Mfg Equip.</td>
<td>Ulvac</td>
</tr>
</tbody>
</table>

2.2 Japan’s FPD Cluster

The Kinki region in western Japan is the place where the FPD cluster exists. Sharp, one of the worldwide players in the LCD industry, has several plants in the region and almost all types of FPD
component suppliers have sizable factories and research centers in the region as well (Figure 17). 

Figure 17. FPD related players in Mie Prefecture in Japan

A reason behind the development of this cluster is its location close to two key cities with large consumer populations. Another key reason is regional government’s relentless effort to develop the FPD cluster by providing significant amount of capital under the clear leadership of the governor of Mie Prefecture, one of the prefectures in the Kinki region. First of all, the region includes Osaka (a prefecture with population of 2.6M; third largest in Japan) and Aichi (a prefecture with population of 9

2.2M; fourth largest in Japan). Especially Mie Prefecture is in a good location in Kinki region as it only takes a few hours to transport goods to these cities thanks to its location (between Osaka and Aichi) and established highway infrastructures. Second, Masayasu Kitagawa, governor of Mie prefecture persuaded Sharp to establish its state-of-the-art factory in Mie prefecture in 2000, by providing a subsidy of $135M\textsuperscript{10}, far exceeding the historical record of regional government subsidies\textsuperscript{11}. The governor created an independent project team to persuade Sharp and helped to persuade key component suppliers such as Nitto Denko and Ulvac to come to the region as well. This resulted in Sharp’s decision to build a new factory in Mie prefecture instead of Korea, Singapore, and China, which also tried to persuade Sharp to build a new factory in their countries. Other FPD players such as Panasonic, one of the biggest manufacturers of Plasma displays, also built factories in the Kinki region during the 2000s, stimulating fierce competition in the region and further increasing the growth of the cluster (Figure 18).

This resulted in the significant increase in productivity of the region. After full-commerce operation of Sharp’s factory began, GDP growth of Mie Prefecture increased to 3.1% CAGR (04-07) from 0.0% CAGR (96-03). Also, Mie’s labor productivity ranking jumped from #14 in 2001 to #4 in 2005 (Figure 19)\textsuperscript{12}.

\textsuperscript{10} Katsuya Kodama, “NIRA Case Study Series No. 2007-06·AA·4”, National Institute for Research Advancement
\textsuperscript{11} ibid
\textsuperscript{12} Mie Prefecture Homepage, http://www.pref.mie.lg.jp/Databox/, accessed on April 10th
Figure 18. Historical Development of Kinki FPD cluster

Figure 19. Cluster Performance

Key Events in 2005

- Full-commerce operation of the Sharp’s factory started

Regional Economy in Mie 2005

- GDP Growth (Mie Prefecture)

- Productivity Growth
  Mie’s labor productivity ranking jumped from #14 in 2001 to #4 in 2005
2.3 Cluster Map

Figure 20 shows the cluster map of FPD in the Kinki area. The core of the cluster is FPD panel manufacturing. The customers include Sharp and Panasonic for TV sets, Sanyo for cell-phone manufacturing, and Toshiba and Sony for PC manufacturing. Some customers are vertically integrated with FPD panel manufactures. The suppliers in Japan dominate world demand as explained above. Overall, the FPD cluster in Kinki has potential competitive advantages. But its lack of practical IFCs impedes the development of the cluster, as discussed below.
Relationships of FPD panel manufacturers with both customers and suppliers are important, since FPD is not a module product but a “suriawase-gata” product. A “suriawase-gata” product has a fine-tuned architecture integrating individual parts in an optimal way as a total system. Suppliers cannot merely supply standardized parts. FPD panel manufacturers have to be involved in constant and deep discussions with both suppliers and customers to create optimal parts. This characteristic contributes to the necessity of locational proximity among them.

In addition to suppliers and customers, related cluster players contribute a lot to this industry. For example, the petrochemical cluster can supply important chemicals customized to the needs of manufacturers. The semiconductor, solar panel, solar battery, and lithium battery industries share similar production techniques.

However, the current relationship among FPD panel manufacturers is limited since practical and effective IFCs do not exist. Many IFCs are unable to be effective due to Japanese bureaucracy, in which high ranking officials are rehired by companies as board members, or so-called “Amakudari.” Many IFCs are created only for the purpose of increasing the income and prestige of these retired bureaucrats, rather than for effectively stimulating industry coordination and growth. Due to a lack of coordination by IFCs, each company has in-house research institutions and participates neither in open innovation nor in common research. Lack of coordination also affects educational institutions.

In Kinki area, 16 universities including Kyoto University and Osaka University have already conducted FPD related research. However, the achievements of these researches rarely contribute to
the actual FPD business.

Local governments also played an important role. They compete fiercely with each other to attract FPD manufacturing companies. They offer not only subsidies to these companies but also provide one-stop service for administrations by building new plants, developing infrastructures for their needs, offering tax incentives and deregulating land usage. In this sense, local governments are good “Manekineko”. However, local governments have often failed to continue their efforts consistently after the companies were located. Furthermore, the FPD manufacturing business is highly automated and requires high technology expertise, and therefore does not require many unskilled workers. FPD manufacturing companies do need not so many local SMEs and local workers, and so the external positive spillover is very limited.

Another problem for the local governments is their administrative boundary. Under Japan’s bureaucratic system, they cannot work beyond their boundary. Four prefectural governments (Osaka, Hyogo, Nara and Mie) and two bureaus of METI (Chubu and Kansai) are related to this cluster but none of them coordinates together. Few people recognize the importance of coordination.

### 2.4 Cluster Diamond

Strong **demand condition** from consumers in the region, **context for firm strategy and rivalry**, and **factor condition** such as infrastructure, government support, and access to capital support cluster development, as illustrated in the following Cluster Diamond graphic (Figure 21). However, **related and supporting industries** contain problems.
Demand condition: Consumers in the Kinki area of Japan are the most cost and quality sensitive consumers in Japan. Osaka, the center of Kinki, is historically the city of merchants compared with Tokyo, the city of politics.

Context for firm strategy and rivalry: Three FPD manufacturing companies, Sharp, Panasonic and IPSα fiercely compete with each other.

Factor condition: The logistics of manufacturers is perfect, since four airports and two good ports are located in this small area. Also, the electricity black-out rate is the lowest among developed
countries.\textsuperscript{13} Water supply is also stable as Japan’s amount of renewable freshwater withdraw ranks 20\textsuperscript{th} among 177 countries.\textsuperscript{14}

**Related and supporting industries:** The related industries are strong but collaboration among players is weak. The weak relationship between universities and companies, among companies, between different administrative boundaries, between local SMEs and newly located companies, all of these problems contribute to the lack of effective and practical IFCs.

### 2.5 Competitors

**South Korea:** Samsung and LG started joint ventures with other global LCD manufactures and became the world leaders by 2010. Samsung has maintained the No.1 position in the LCD market since 2002\textsuperscript{15}, initially launching a joint venture with Sony. Samsung produces most of the world’s LCD panels in domestic plants at TangJeong and two other cities in South Korea, but also got approval to construct a new factory at Suzhou in China\textsuperscript{16}. LG, the world second largest producer, used to have a joint venture with Philips and now does most of the production itself. The South Korea government has supported LCD cluster development in Peju\textsuperscript{17}. The population of Peju increased by 80\% for the last decade. The city plans to develop 200,000 apartments for the

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\textsuperscript{13} METI http://www.enecho.meti.go.jp/topics/hakusho/2010energyhtml/1-1-4.html accessed on April 30th

\textsuperscript{14} World Bank: World Development Indicators http://data.worldbank.org/data-catalog/world-development-indicators accessed on April 30th


\textsuperscript{16} Wall Street Journal (WSJ), http://online.wsj.com/article/SB10001424052748703554304575595414197771030.html

\textsuperscript{17} WSJ, http://online.wsj.com/article/SB10001424052748703350104575652151842812356.html
employees of new LCD factories.

**Taiwan:** AUO is the nation’s largest LCD producer. AUO operates advanced factories in Taichung, central Taiwan. To catch up to Samsung and LG, AUO plans to build a factory in China\(^{18}\). However, the Taiwan government has delayed the approval due to political concerns. Industrial Technology Research Institute (ITRI) plays a key role in promoting collaborative R&D among university institutes and private companies.

**China:** All advanced generation factories are owned and managed by global players while old generation factories are owned and operated by domestic producers which bought them out from the global players. China’s advantage is that it enjoys the world’s largest domestic demand, and that demand is still growing. Since many LCD panel customers are located in China, the factories in China can save transportation costs and reach customers efficiently.

### 2.6 Policy Recommendation

**Creating practical IFC**

To create practical IFCs that all major related parties, from FPD manufacturing companies, suppliers, universities, local governments, local SMEs, financing sectors and METI, participate in is the most important task in order to develop the FPD cluster. To be practical, IFCs should be well funded and strong leadership is needed. The concept is close to the SEMATECH project in the US.\(^{19}\) The

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\(^{19}\) SEMATECH HP http://www.sematech.org/corporate/ accessed on April 30th
SEMA TECH project focuses on joint research and development. However, this IFC in the US is a wider concept that includes university and local SMEs and social development. The reason for the success of the SEMATECH project is that the government provided sufficient start-up funding and encouraged the participation of all major members. Therefore, for an IFC to be effective, government financial support and practical-minded leadership is needed. In the past, METI was responsible for creating IFCs, but these IFCs were not practical at all but only for the purpose of rewarding “Amakudari.” Thus, the governors of the four prefectures should work together to jointly create this new, more effective IFC that promotes strong regional cooperation among all the players in industry and government. The aftermath of the earthquake and tsunami is an opportunity to gather support for this decentralization policy. Now is the time to move forward. In 2002, METI tried to develop the Advanced SoC Platform Corporation (ASPLA) project that aimed to develop a joint platform for semiconductor fabrication. The project seemed headed for success because most of the major players participated. However, this project failed soon after its start mainly because of temporary LSI (Large Scale Integration) market recovery in 2003.20 This also clearly demonstrates the importance of the timing. The key to success is whether all four governors can understand the value and the importance of IFCs and the cooperation of all players.

Developing local SMEs

FPD panel manufacturing is highly automated and supplied parts are relatively small but require specialized high technology expertise. Without proper training, it is difficult for local SMEs and workers to contribute to this cluster. However, without local companies and workers participation, the cluster will fail to live up to its potential. For this reason, local government should train and educate these SMEs and workers. There are many universities that are currently conducting FPD related research and these universities would be a good resource, but only if the research is linked in a practical way to the FPD industry. An effective and practical IFC is necessary to support the effort. However the most important point is whether governors acknowledge their role correctly. Often governors work hard to attract FPD companies to locate in their prefecture, but this is just a begging. To develop local SMEs and workers to be integral components of the cluster is the most important role of the governors and to realize this, governors have to upgrade the education and training of local SMEs and workers by using university resources.

**References**


MOC Team Japan 2009, *The Video Game Cluster in Japan*. 