

Impact of Japan's Earthquake on East Asia's Production Network

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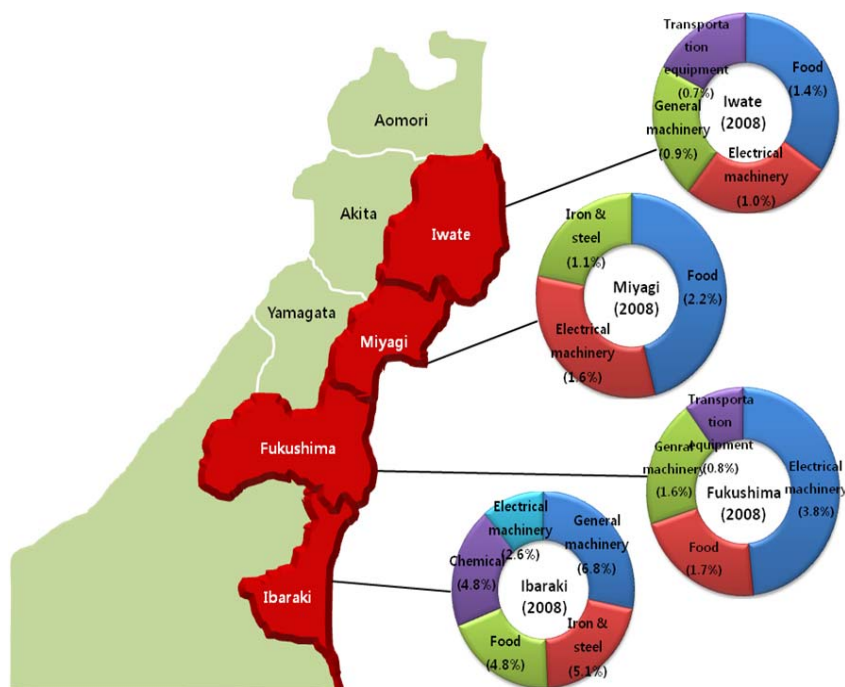
Summary ● ● ●

- ▶ The earthquake that struck Japan has seriously damaged that country's industrial output, mainly due to deficiencies in electricity supply and damage to distribution networks caused by the disaster.
 - The region directly affected by the earthquake accounts for 6.2 percent of Japan's GDP, while sectors such as general machinery and electrical machinery represent close to 10 percent.
- ▶ Disruptions in supply of Japanese parts and materials supply chain are hurting manufacturing companies in East Asia and in other areas around the world.
 - East Asian countries' dependence on Japan for parts and materials is high, with 29 percent for Taiwan and 25.2 percent for South Korea, while the ASEAN-4 (Thailand, Malaysia, Indonesia, and the Philippines) combined equal 21.6 percent. Thus, it is expected that East Asia's production network will be severely impacted.
 - A sudden and steep rise in the price of non-replaceable parts, and concomitant supply disruption is projected. This may result in a surge in demand for replaceable parts produced in South Korea and Taiwan.
- ▶ The ASEAN-4 account for 18 percent of exports to Japan combined, a relatively high figure. As a result, an economic recession in Japan raises the possibility of stagnation in the ASEAN-4 economies.
- ▶ Operations of Japanese companies in such Asian countries as China, Taiwan, Thailand, Malaysia, Indonesia, and the Philippines were given serious pause. Although the earthquake's impact on the companies in those countries is predicted to be limited, the close monitoring on the potential influence on each industrial sector is required.
 - Taiwan, a country with a large consumer electronics industry that is highly dependent on component parts from Japan, is considering diversification of its import channels, lowering import tariffs, and prioritizing supply within the domestic market.
- ▶ The damage to industries from the earthquake can occur at two ends – demand and supply.
 - On the demand side, the decline of ASEAN-4 exports to Japan can start a regional economic downturn.
 - On the supply side, there is a possibility of cost pressures and increase in prices of industrial product price all over East Asia.

1. Summary of Industrial Damages in Japan

- The earthquake and tsunami that hit Japan on March 11 halted operations for a large number of companies in the Tohoku and Kanto regions in such key industries as automobiles, electronics, and steel. This halt has spread to the operational suspension of major industries throughout Japan.
- Japan's most heavily damaged regions — Iwate, Miyagi and Fukushima prefectures (the Tohoku region) and Ibaraki Prefecture (the Kanto region) — account for 6.2 percent of the country's production capacity. As of 2008, the food industry comprised 10.1 percent, general machinery 9.9 percent, electrical machinery 9.1 percent, steel 7.5 percent, and chemicals 7.2 percent; representing a significant portion of Japan's production base (See Figure 1).

Figure 1. Current Key Industrial Trends of Major Affected Areas



Source: Ministry of Economy, Trade and Industry (METI), Japanese Industry- Lasting Change in Manufacturing Industry. March 2011.

- Such operational disruption in Japan has wreaked havoc on the supply of parts and materials to East Asian countries.
- As of 2010, the proportion of parts and materials exports from Japan to East Asian countries was 22.8 percent for China, 13.4 percent for the ASEAN-4, 8.9 percent for South Korea, and 7.6 percent for Taiwan. These countries are expected to feel significant impact from the production and export disruptions caused by the earthquake.

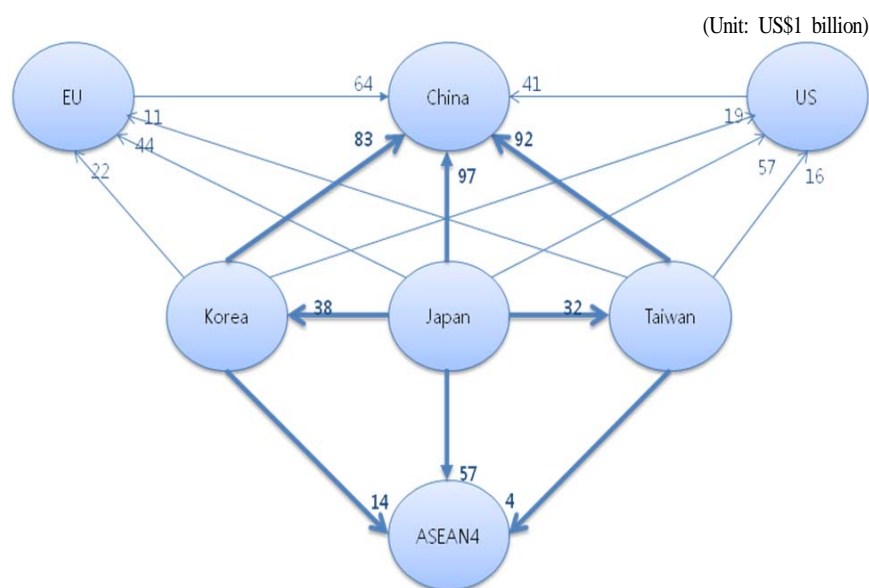
- The impact of the earthquake on each of the East Asian countries (South Korea, China, Taiwan) and the ASEAN-4 (Thailand, Malaysia, Indonesia, and the Philippines) will be examined below with reference to the current status of the production network for each area or country.

2. Current Status of East Asia's Production Network

- Japan plays a key role in East Asia's production network as a supplier of parts and materials (refer to Figure 2).

- The top importer of Japanese parts and materials in East Asia as of 2010 is Taiwan at 29 percent; followed by South Korea at 25.2 percent, the ASEAN-4 at 21.6 percent, and China at 15.3 percent. Japan stands as the largest supplier of parts and materials to East Asian countries (see Table 1).
- Exports of Japanese parts and materials totaled US\$42.7 billion, far ahead of South Korea at US\$22.9 billion, and Taiwan at US\$21.3 billion. It is impossible for South Korea and Taiwan to cover shortage of supply from Japan within such a short time period.
- Moreover, Japanese parts and materials are not low-priced goods that are easily replaceable—most are high value-added products.
- For instance, Asahi Glass's "touch-screen glass" is a key part in Apple iPad, an indispensable part currently without an alternative product. Likewise, Kureha's "polymer" is an irreplaceable component used in lithium batteries.

Figure 2. Parts and Materials Trade Trends of Major Countries (2010)



Source: Table 1.

Table 1. Parts and Materials Trade Trends of Major Countries (2010)

(Unit: US\$1 million)

		Export							Import		
		Japan	South Korea	China	Taiwan	ASEAN-4	U.S.	EU	Total	Proportion of Japan	Proportion of South Korea
I m p o r t	Japan	-	13,814	53,276	15,414	21,906	27,895	18,450	192,704	-	7.2%
	South Korea	38,094	-	37,303	10,049	8,227	16,418	17,917	151,180	25.2%	-
	China	97,256	83,184	-	92,218	71,909	40,605	63,958	635,991	15.3%	13.1%
	Taiwan	32,222	9,062	18,025	-	3,433	10,386	5,722	111,213	29.0%	8.1%
	ASEAN-4	57,280	14,293	33,819	3,976	-	19,822	19,245	265,064	21.6%	5.4%
	U.S.	57,181	19,496	73,666	15,537	29,383	-	122,053	502,338	11.4%	3.9%
	EU	44,268	22,289	106,193	11,237	29,235	101,339	-	529,087	8.4%	4.2%
E x p o r t	Total	426,609	229,038	547,431	218,925	282,432	494,328	645,055			
	Proportion of Japan	-	6.0%	9.7%	7.0%	7.8%	5.6%	2.9%			
	Proportion of South Korea	8.9%	-	6.8%	4.6%	2.9%	3.3%	2.8%			

Note: Figures between Taiwan and ASEAN-4 could be lower than the actual figures, as only top 10 sub-items were added from 2009.
Source: KITA, MCTNET, Taiwan CIECA (¥1=\$0.012, €1=\$1.369).

Table 2. Total Trade Trends of Major Countries (2010)

(Unit: US\$1 million)

		Export							Import		
		Japan	South Korea	China	Taiwan	ASEAN-4	U.S.	EU	Total	Proportion of Japan	Proportion of South Korea
I m p o r t	Japan	-	28,176	120,262	13,571	83,759	60,545	58,482	727,668	-	3.9%
	South Korea	64,296	-	71,574	13,647	31,174	40,403	37,732	425,212	15.1%	-
	China	176,304	116,838	-	115,645	120,535	91,878	153,706	1,375,451	12.8%	8.5%
	Taiwan	36,154	14,830	29,642	-	13,986	26,027	19,968	173,541	20.8%	8.5%
	ASEAN-4	82,819	27,310	77,110	15,150	-	37,274	42,210	401,540	20.6%	6.8%
	U.S.	120,348	49,816	364,944	35,907	73,054	-	322,990	1,912,092	6.3%	2.6%
	EU	88,277	52,757	385,009	32,856	77,481	227,580	-	5,400,797	1.6%	1.0%
E x p o r t	Total	808,864	466,384	1,576,817	193,801	465,439	1,277,504	5,313,200			
	Proportion of Japan	-	6.0%	7.6%	7.0%	18.0%	4.7%	1.1%			
	Proportion of South Korea	7.9%	-	4.5%	7.0%	6.7%	3.2%	0.7%			

Note: Trade figures of Taiwan and the ASEAN-4 are from 2009.
Source: KITA, IMF DOT (¥1=\$0.012, €1=\$1.369).

■ Under such conditions, a disruption in Japan's parts and materials supply capability would lead to shocks in the global production network.

- For instance, China imports US\$14.8 billion worth of general machinery from Japan, or 10 percent of the production volume in the earthquake-affected region. Should this sector suffer a suspension of exports, operations in China could be brought to a halt for the short term. In the long term, a reliance on third-party countries like Taiwan or South Korea to compensate for potential shortage of parts could develop, or there could be efforts toward self-sufficiency.

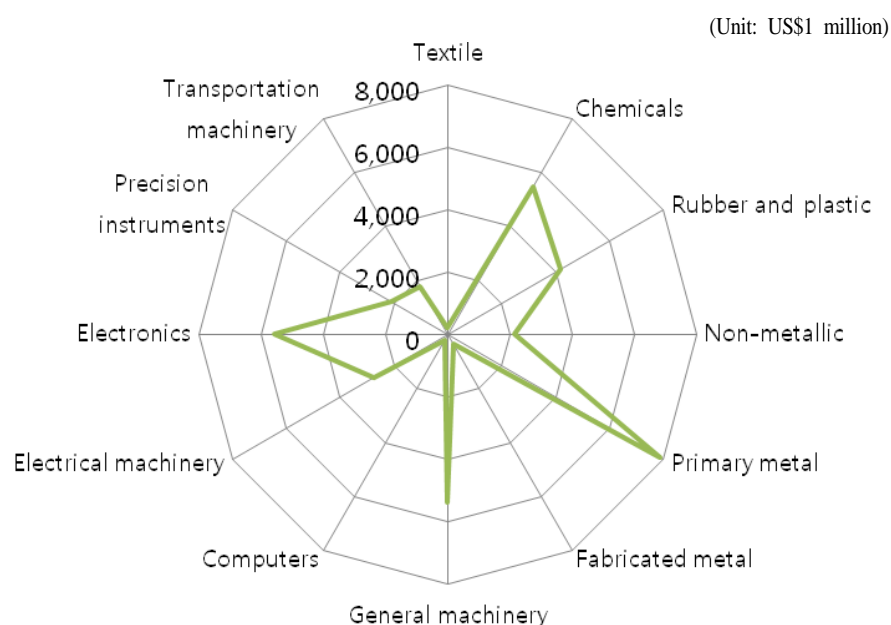
■ As Japan accounts for 18 percent of imports from the ASEAN-4, there is a high possibility that an economic downturn in Japan could result, in turn, in a downturn happening in the ASEAN countries (see Table 2).

- Japan (18 percent) and China (25.9 percent) are the ASEAN-4's most important export markets, bigger than the U.S. (15.7 percent) and the EU (16.6 percent).

- Other countries exporting to Japan including South Korea (6 percent) and China (7.5 percent) account for less than 8 percent of Japan's import market. They would not suffer much from Japan's economic downturn.

■ By category of parts and materials, the proportion of Japanese imports of electronics parts is high while that of transportation machineries and primary metals differ depending on each country's industrial structure (see Figures 3 -6).

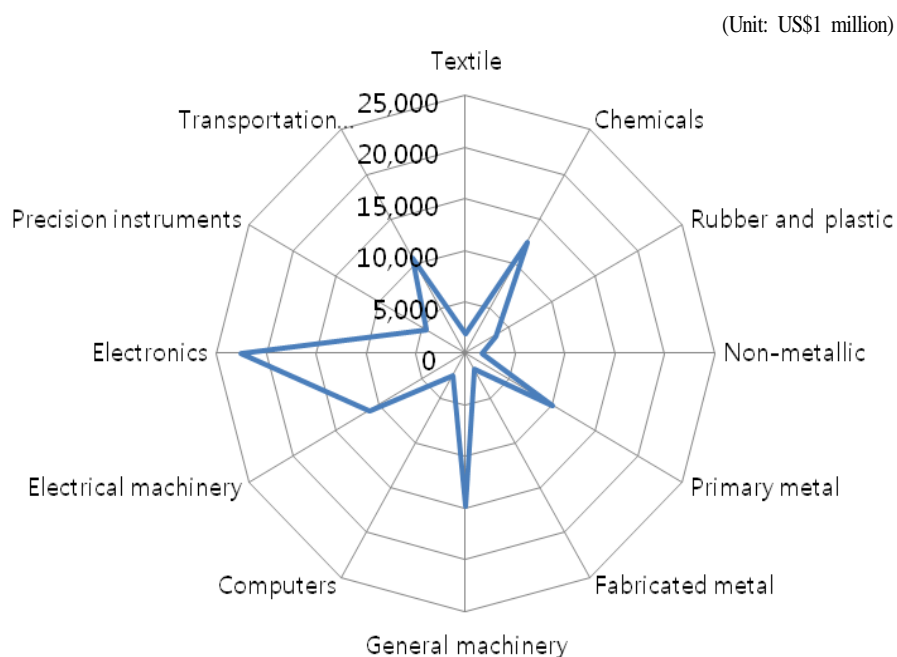
Figure 3. Distribution of Japanese Parts and Materials Imports for South Korea



Source: KITA (¥1=\$0.012).

- South Korea's imports from Japan are worth over US\$5 billion and are led by primary metals followed by electronics, chemicals, and general machinery. Compared to other countries, electronics account for a smaller proportion of South Korea's imports from Japan (see Figure 3).
- o The automobile industry comprise a significant portion of South Korea's production capacity, but imports of transportation machinery parts and materials is low, as South Korea has acquired self-sufficiency in production of those parts. For example, it is known that the percentage of Japanese parts out of total amount of parts used by Hyundai Motors and Kia Motors stands at only 1 percent.
- China's major imports from Japan include electronics, general machinery parts, chemicals, electrical machinery, transportation machinery, and primary metals. China is more reliant on Japan for electronics and transportation machinery than South Korea. Moreover, China's import trend shows a more even distribution than South Korea and Taiwan (see Figure 4).

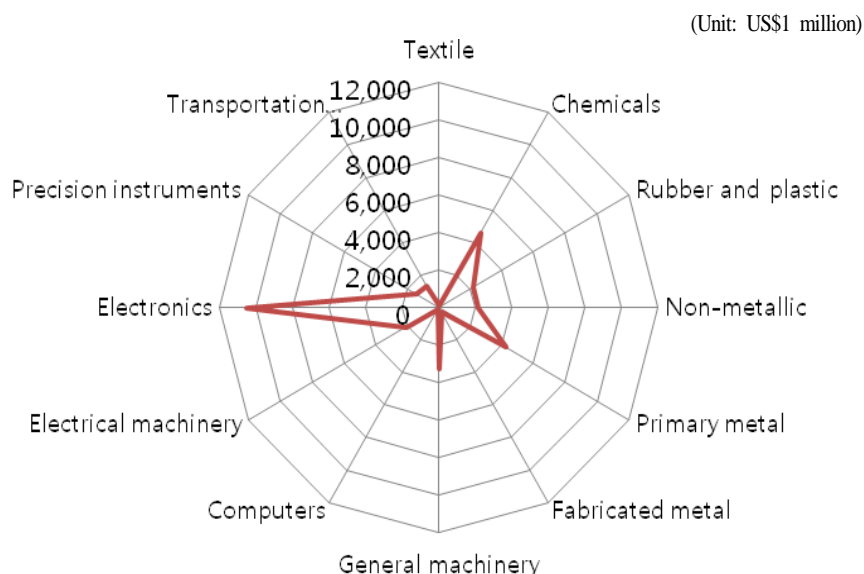
Figure 4. Distribution of Japanese Parts and Materials Imports for China (2010)



Source: KITA (¥1=\$0.012).

- Taiwan is most dependent on Japan for electronics, followed by chemicals, primary metals, and general machinery (see Figure 5).
- o Taiwan's semiconductor firms import silicon wafer parts from Japanese companies like Shin-Etsu and SUMCO, both of which were impacted by the earthquake.

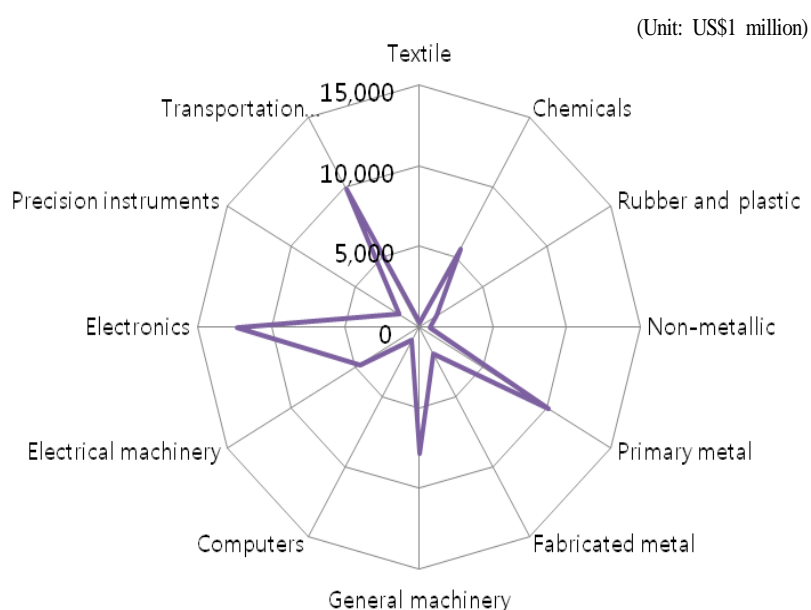
Figure 5. Distribution of Japanese Parts and Materials Imports for Taiwan (2010)



Source: KITA (¥1=\$0.012).

- The ASEAN-4's major imports from Japan are electronics, followed by transportation machinery parts and primary metals, with the import of automobile-related parts also comprising a high proportion.
- The high amount of automobile-related parts imports is due to Japanese carmakers like Toyota establishing production networks oriented around Southeast Asian countries, like Thailand and Indonesia.

Figure 6. Distribution of Japanese Parts and Materials Imports for the ASEAN-4 (2010)



Source: KITA (¥1=\$0.012).

3. Impact on Each East Asian Country and Countermeasures

A. China

- China's trade involves importing parts and materials from other countries and then manufacturing products at home at a low labor cost.
- China recorded a trade surplus of US\$183.1 billion in 2010 but posted a US\$88.6 billion deficit in parts and materials.
- Of China's top 10 imports from Japan, eight are parts and materials, and account for 20.6 percent of total imports from Japan (see Table 3).

Table 3. China's top 10 Japanese Imports (HS6)

(Unit: US\$100 million, %)

Rank	Code	Product Name	Amount	Growth rate	Proportion
1	854231	Monolithic integrated circuits	64.7	13.5	3.7
2	870323	Engines with displacement volume of 1.5~3.0	46.0	107.4	2.6
3	901380	Liquid crystal device	43.3	23.1	2.5
4	870840	Vehicle gear box and parts	42.2	34.2	2.4
5	854239	Other integrated circuit	37.4	27.4	2.1
6	854232	Electronic integrated circuit memory	30.9	7.7	1.8
7	844399	Printing machinery parts	26.5	38.8	1.5
8	842952	360-degree rotary machine	24.7	104.5	1.4
9	847989	Other machineries and tools	24.6	111.2	1.4
10	870324	Engines with displacement volume of 3.0	21.3	49.8	1.2
Total of 1~10			361.6	-	20.6

Note: The shaded areas represent parts and materials.

Source: KITA.

- China's auto industry imported over US\$10 billion worth of parts from Japan in 2010. A parts and materials supply system has been established between the two countries through partnerships forged by Japanese joint venture firms in China.
- The operations of joint Japanese-Chinese companies in China, such as Yiqi-Toyota, Guangzhou-Honda, and Dongfeng-Nissan, are now mired in crisis.

- The majority of joint Japanese-Chinese companies have only a two to three-week inventory surplus of electrical components, automatic transmissions, and CVT transmissions. China's car production is expected to suffer a huge blow if production problems are not addressed in the near term.
- In the case of Dongfeng-Nissan, major components like the VQ engine and transmission are imported from Japan. Yiqi-Toyota and Guangzhou-Honda import shock absorbers, engine covers, and the VTEC oil-pressure valves from Japan.
- On March 22, 11 days after the earthquake, Honda announced that it was suspending operations from March 23 to 27. On April 3, the company again announced that it would extend the stoppage and make future decisions based on the ability to secure parts.
- As of March 29, Dongfeng-Nissan's daily production capacity dropped to 82 units, a 25 percent decline from levels before the earthquake.

■ The damage from the earthquake vary across the electronics industry.

- The semiconductor industry is expected to be greatly affected, since key silicon wafer companies like Shin-Etsu are located in Japan's earthquake-stricken region. Japanese firms like Toshiba and Fujitsu that rely on such parts are expected to face severe challenges.

Table 4. Impact of Japan's Earthquake on China's Electronics Industry

Industry	Category	Degree of impact on Japan	Affected industries in China	China's dependence	Degree of impact on China
Semiconductor	Silicon materials	Serious	Semiconductor and manufacturing industries	★★★★	High
	Consumer goods IC circuits	Medium	Japanese companies in China like Toshiba, Sony	★	Medium
	Simulation IC	Medium	Electronic machines	★★	Medium
	Memory	-	Computer and consumer electronics machines	★	Very high
Electronics parts	Advanced condenser	-	Electronic machines	★★★★	Low
	Advanced resistor	Medium	Electronic machines	★★★	Low
	Advanced variable inductor	Medium	Electronic machines	★★	Low
LCD	Liquid crystal panels	-	TVs, notebooks, monitors	★	Very low
	Upstream materials	-	Liquid crystal panels	★★★	Low
Solar lighting	Solar cell	-	Chinese market	★	Very low
	Silicon implants	Not serious	Joint China-Japan solar energy cell companies	★	Very low

Table 4. Continued

Industry	Category	Degree of impact on Japan	Affected industries in China	China's dependence	Degree of impact on China
LED	Chip/Extension	-	LED final assembly	★★	Low
	Final assembly	Not serious	LED application	★★★★	Low
Automobile, electronics parts	Power control system and safety system electronics components, derivative redeployment electronics components	Medium	Joint China-Japan automobile companies	★★★★★	Comparatively high
Notebook	Finished product	-	Chinese consumers	★	Very low
	Relevant parts	Slight	Joint China-Japan notebook companies	★★	Medium
Digital camera	Finished product	Not serious	Chinese consumers	★	Very low
	Relevant parts/lens	Not serious	Joint China-Japan digital camera companies	★★★	Low

Source: HeXunKeJi.

- Disruption of China's production of Japanese cars is expected due to the concentrated location of various automobile electronics parts companies in earthquake-devastated areas.
- The impact on digital camera companies that manufacture in China, such as Sony, Matsushita, and Sharp is expected to be minimal, as many of the required parts have been localized.
- TV production is also considered safe as Japan's TV parts makers are either far away from the earthquake-hit area (Sharp), are sourcing parts locally (Matsushita), or are importing parts from other suppliers like Samsung (as in the case of Sony).
- In the case of LCDs, relevant LCD companies are projected to experience inventory shortfalls in the second quarter of 2011.
- Chinese notebook manufacturers will likely feel an impact, since Japan produces 50 percent of the world's lithium battery supply and China's production capacity in this area is still low.

■ It is necessary to be vigilant about the economic impact of difficulties in parts procurement could have on China.

- Deputy Director of the China's Ministry of Commerce Institute for Northeast Asia Economic Cooperation and Development Li Guanghui projected limited impact on China-Japan trade, but predicted that at least six months would be needed for recovery from the earthquake.
- NDRC's Zhang Yansheng expects China's GDP growth to slow by 0.5 percent due to the earthquake coupled with various other external shocks in the first quarter. He believes the impact on China will be greater after one month due to Japan's slow production recovery.
- On the other hand, a positive impact on exports to Japan is possible, as demand for such materials as steel and construction materials for rebuilding basic infrastructure will increase.

B. Taiwan

■ Taiwan's industrial structure is built almost entirely around the electronics sector. As the country depends on Japan for one-third of its parts and materials imports, the recent earthquake is expected to have a major impact on Taiwanese industry.

- Japan represents Taiwan's largest import source; in 2010, Taiwan's trade deficit reached US\$33.9 billion.

■ The earthquake is expected to hurt parts and materials procurement for Taiwan's key industry - the IT business.

- In 2009, the IT industry represented 12.6 percent of Taiwan's GDP. Fixed capital accounted for 22.4 percent.

○ Taiwan's GDP growth averaged 3.7 percent between 2005 and 2009, while growth in the IT industry averaged 13.9 percent, as the industry dominates Taiwan's GDP growth momentum and plays a key role in its economy.

■ Japanese parts and materials directly and indirectly affect the display, semiconductor, communications, and solar power industries while petrochemical, automobile, steel and machinery industries are less affected.

- The biggest impact on the display industry will most likely come from the disruption of the supply of anisotropic conductive film used for LCDs and PDPs.

○ Because Japan takes up 50 percent of the world's production volume of anisotropic conductive film, Taiwan's display companies immediately face the challenge of rising costs as they seek new suppliers.

- In the semiconductor industry, difficulties are projected for the 12-inch wafer and equipment sectors.

○ The 12-inch wafer factory operated by the world's largest producer of silicon wafers, Shin-Etsu Chemical Co., had accounted for 22 percent of global production. However, the earthquake has hurt the company's wafer supply to Taiwan's OEM companies.

○ Taiwan's largest semiconductor company, TSMC, is more worried about the uncertainty of securing semiconductor equipment for next year than the short-term supply woes stemming from power failures and facility destruction in Japan.

- For the communications industry, impacts will be felt on the supply of upstream raw materials and electronics parts.

○ Short-term supply disruption of power amplifiers, surface acoustic wave filters, temperature compensated crystal oscillators, and FCCL—all key components of mobile devices—is expected. However, these can be replaced with non-Japanese components.

○ Taiwanese companies could face a big blow should operation suspension at Mitsubishi Gas Chemical, the world's largest supplier of BT resin used in smart phones, PC tablets and other communications devices, become prolonged. Taiwanese companies are the largest importers from this Japanese company.

- Taiwan's leading smart phone company, HTC, announced that it has secured a surplus inventory up to May. Taiwanese companies are currently searching aggressively for alternative suppliers in case of a prolonged supply disruption.
- Although there will be limited impact on the solar power industry, the solar battery sector could potentially become a beneficiary in the long term.
- There is potential for the solar battery sector to benefit in the long term, thanks to a domestic increase of module companies.

■ **As long as the halt in Japanese companies' operations is not prolonged, the crisis is not expected to stifle Taiwan's economic growth.**

- Liu Yiru, the Chairman of Council for Economic Planning and Development predicts that the earthquake will slow Taiwan's economic growth by 0.5 percent to 1 percent in 2011.
- Goldman Sachs has also projected limited impact of the quake on Taiwan's economy in the long term, maintaining its 4.7 percent growth forecast for 2011 cited early in the year.

■ **The Taiwanese government is closely observing the trends developing in the wake of the catastrophe. It is preparing to diversify the country's suppliers in the short term, and for the long term, is devising plans to lower its dependency on parts and materials imports.**

- In the short term, Taiwan is preparing to (1) open up to Chinese imports and (2) lower tariffs on certain raw-material imports should a supply shortage raise prices. The government is also making moves to set up a system so that when necessary, (3) the domestic market is given priority to supply raw materials and key components in short supply. (Ministry of Economy Report, Mar. 23, 2011).
- In the long term, the Taiwanese government is planning to establish an industry-academic research organization to address issues of import dependency for key raw materials, parts and equipment. It is also looking into inducing relevant foreign companies to set up factories independently or through partnerships with local firms.

C. ASEAN-4

■ **Japan's labor-intensive industry has shifted production to the ASEAN-4 region after the mid-1980s. As the industry has returned to the region, the area has risen as the representative overseas production base for Japanese manufacturing companies. This process has enabled strong trade relations to develop between Japan and the ASEAN-4.**

■ **Trade between Japan and the ASEAN-4 in the machinery, electronics, and automobile industries has gained a significant share (see Table 5).**

Table 5. Trade Trend of ASEAN-4's Major Manufacturing Industries with Japan

Country	Industry	Export		Import	
		Rank	Proportion (%)	Rank	Proportion (%)
Indonesia	Machinery	2	12.1	2	18.6
	Electronics	3	11.2	3	11.4
	Automobile	3	14.6	1	40.1
Malaysia	Machinery	6	5.1	3	11.4
	Electronics	5	7.5	3	13.4
	Automobile	7	5.6	1	41.7
The Philippines	Machinery	2	18.1	1	30.0
	Electronics	3	12.3	2	11.7
	Automobile	3	14.5	2	26.1
Thailand	Machinery	3	8.8	1	25.9
	Electronics	1	14.5	1	23.3
	Automobile	6	3.8	1	60.5

Note: Created with the HS 2-unit standard, focusing on machineries (84), electrical and electronic materials (85), and automobiles (87). The proportion represents Japan's ranking with respect to the trade trends of each industry category.

Source: UN Comtrade.

■ Thailand is highly dependent on Japan for trade in the machinery, electronics and automobile sectors. Japan is also Thailand's largest foreign investor. Thus, Thailand is the most vulnerable to negative impacts from the earthquake among the ASEAN-4.

- Automobiles account for 60 percent of Thailand's total imports from Japan. This is because Thailand's automobile industry has been formed based on the production network of Japanese automotive manufacturers.
- Japan's accumulated investments in Thailand between 2005 and 2010 comprise of automobiles and metal processing at 52 percent, followed by electrical and electronics goods at 23 percent. Parts and materials account for about 73 percent of Thailand's imports from Japan.
- Production in Thailand will likely be hampered by a delay in the imports of Japanese parts. Some companies are reducing production to maintain inventory.

■ Among the ASEAN-4, the Philippines' manufacturing industry is the most stagnant. As Japanese electrical and electronics materials manufacturers and carmakers are establishing a core presence in the Philippines market, the earthquake is likely to pose major challenges.

- Japan is the Philippines' largest trade partner (second in exports and first in imports). Japan is also the Philippines' largest source of FDI as of 2010, accounting for 29 percent of the total.
- Repatriation to their home country of overseas Filipinos working in Japan is expected to increase. Income from overseas labor comprises 12 percent of the Philippines' GDP.

- Japan's Official Development Assistance (ODA) for the Philippines accounts for more than one-third of the total amount. A decline in aid is feared due to Japan's need for reconstruction funds.
- **Malaysia, of the ASEAN-4, is the least dependent on trade with Japan. However, a disruption in production of electrical and electronics goods is expected due to a delay in imports of relevant parts and materials.**
 - Japan is Malaysia's fourth largest export market and second largest import market.
 - Of the ASEAN-4, Malaysia has the most developed electrical and electronics materials industry. Forty-four percent of electrical and electronics materials are imported into the country from Japan.
 - Malaysia is the only ASEAN-member country to have successfully commercialized its own automobile brand. The industry uses Japanese parts acquired through strategic alliances with Japanese firms. Supply of automobile parts from Thailand is also expected to be hampered. Thailand is Malaysia's largest importer in the area of automobiles.
- **Indonesia's major manufacturing companies are highly dependent on trade with Japan. Japan is leading infrastructure development in the country through its Official Development Assistance (ODA) initiative, thus disruption to mid- to long-term development plans is possible.**
 - Japan is Indonesia's largest trading partner (No. 1 in exports and No. 3 in imports). Mineral fuels (HS-27) comprise the highest proportion of exports, accounting for more than 40 percent of total trade. Imports include machinery, automobiles, and electrical and electronics materials.
 - Imports of parts and materials from Japan take up a significantly high proportion, at 66 percent. These include machinery, metal, and automobile parts and materials. As Indonesia is highly dependent on Japanese imports, production in the country could be hampered by a delay in parts deliveries from Japan.
 - Japan is Indonesia's largest donor country, and as such has been leading bilateral and multilateral ventures and assistance programs in Indonesia, including the Indonesia Economic Development Corridors. These could be stifled due to Japan's need for reconstruction.
 - Energy demand is expected to rise due to Japan's need to replace its nuclear energy.
- **The impact of Japan's earthquake on the ASEAN-4 can be summed up as follows: disruption of production stemming from delays in supply availability; slowdown of exports; decline in investment capability and possible retraction of investments; and a possible decline in ODA.**
 - Parts and materials comprise most of the trade with Japan for most of ASEAN-4. Thailand tops the list at 73 percent, then Malaysia at 68 percent, Indonesia at 67 percent and the Philippines at 64 percent. The earthquake will likely affect the economic relationship between the ASEAN-4 and Japan in terms of import-assembly, production-consumption and export.

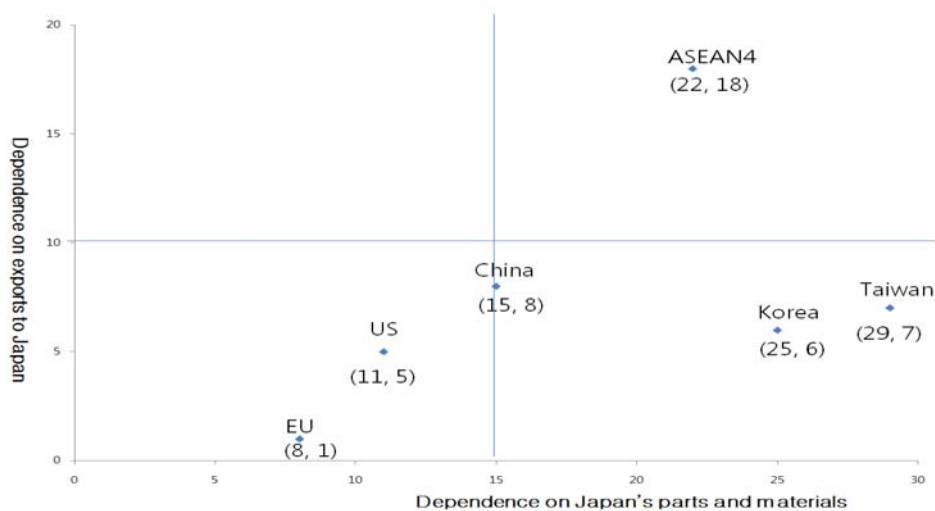
- Japan is this region's second-largest export market. This means an economic downturn in Japan would put a damper on exports from the ASEAN-4.
 - It is possible that the Japanese companies that have made inroads into the ASEAN-4 could retract their investments to help company headquarters in Japan.
 - However, there is also speculation that Japanese manufacturers may choose to diversify their regional risks by expanding overseas investments. Considering ASEAN countries' aggressive efforts to attract foreign direct investment (FDI) from Japan, there is potential for an expansion of Japanese investments in ASEAN countries.
 - Although no formal announcement has been made on the matter, there is the possibility that Japan, the main ODA nation for ASEAN countries, may delay or cut its assistance to concentrate on reconstruction of its disaster-stricken country.
- The impact of the earthquake on the ASEAN-4 will unfold gradually with respect to trade, production and investment, rather than being felt immediately.

4. Conclusion and Implications

A. Assessment of demand and supply risk

- By country, Japan's importance can be organized into four groups from the perspective of parts and materials supply and the export market (see Figure 7).

Figure 7. Dependence on Japan by Country



Source: Table 1 and Table 2.

- High dependence: The ASEAN-4 are highly dependent on Japan for parts and materials (22 percent) and exports (18 percent). Exports are likely to contract due to Japan's economic downturn, while production is expected to be hampered by a shortage of parts and materials.
- Medium to high dependence: South Korea (at 25 percent) and Taiwan (at 29 percent) show a high dependence on Japan for parts and materials, and low dependence on exports (at 6 percent and 7 percent, respectively). Production disruptions are expected due to parts and materials shortages. Should the countries' domestic markets have the capacity, they should make moves to either replace the Japanese parts with local ones or use the occasion as an opportunity to expand exports of local parts and materials.
- Medium dependence: China has medium dependence on Japan for parts and materials (at 15 percent), and low dependence on exports (8 percent). Production disruptions are expected due to parts and materials shortages. Should the problem in parts supply become protracted, a strategic shift that would entail replacing Japanese parts with Korean or Taiwanese alternatives is highly possible.
- Low dependence: The U.S. (at 11 percent) and the EU (at 8 percent) have low dependence on parts and materials from Japan, and low reliance on exports (at 5 percent and 1 percent, respectively). Thus, there will be limited impact on manufacturing companies and certain export categories.

Table 6. Degree of Impact of Japan's Earthquake by Country

Rate of dependence	Countries	Degree of impact	
		Parts and materials supply difficulties	Contraction of export market
High	ASEAN-4	★★★	★★★
Medium-high	South Korea & Taiwan	★★★	★
Medium	China	★★	★
Low	U.S. & EU	★	★

- The degree of impact of Japan's earthquake on the industrial sector of each country can be estimated with concepts outlined in Table 6.

■ To summarize, the impact of Japan's earthquake on East Asia's production network can be measured in terms of demand and supply.

- Impact on demand

- Economic downturn hurts Japan's import market(US\$727.6 billion) → Drop of ASEAN-4's exports to Japan(US\$83.8 billion) may trigger a recession → The transfer of the crisis to the finance sector from the real economy due to the devaluation of ASEAN countries' currencies.
- However, because of the relatively small scale of the ASEAN economy, the degree of the impacts will not be that intense.

- Impact on supply
 - Prolonged supply disruption of Japanese parts and materials (worth US\$426.6 billion) → An interruption to East Asian parts imports from Japan (worth US\$224.9 billion) → A real blow to East Asia's manufacturing → Supply shortages that lead to global industrial product price increases → Global stagflation.
 - Areas of particular concern are East Asia's entire electrical and electronics materials industry, and China and ASEAN countries' automobile industries.
 - China boasts the largest production volume in the world, thus a disruption in its production would send shockwaves beyond East Asia to other parts of the globe.

Figure 8. Impact of Japan's Earthquake on East Asia's Production Network

