



D. 3.2 – Preparatory Briefing on Japan

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Abstract: The preparatory briefing on Japan is the result of the collection of relevant cluster information in the country, including business and sector trends, cluster policies and programmes, as well as a cluster mapping. This document is intended to provide a good overview of the country's opportunities for European cluster organisations and SMEs.

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1. Objective of the report

The aim of this “*preparatory briefing*” report is to provide up to date information on the cluster landscape in Japan in order to support European cluster organisations and their (SME) members to familiarise themselves with the country and explore its potential for collaboration and market opportunities. More specifically, this briefing paper provides an overview of the country’s economy and main sectoral trends and opportunities which may be of interest to the cluster community. In addition, it aims at giving an overview of the existing Japanese cluster community, the cluster policies /local support to clusters and the cluster programmes - including their historical development and internationalisation activity where this applies.

A complementary report, “*discussion paper*”, will be available within a short time that will provide an overview on the existing EU-Japan cluster cooperation, present related good practices/success stories and opportunities for future exchange, including recommendations for an EU-Japan cluster policy dialogue (non-public information).

The information of this report is based upon desk research and confirmed by relevant local contact points, notably the EU-Japan Centre for Industrial Cooperation and the Japan External Trade Organisation (JETRO) who also contributed to this report.

2. The Japanese Economy: focus on sectoral trends

2.1. Overview

As a highly developed economy and a major global trading country and overseas investor, Japan is an important partner for the EU. Japan has one of the largest and prosperous economies in the world. It is the third largest economy in the world in 2016, after the United States of America and China (in terms of nominal GDP having ceded the second spot to China in 2010) and fourth in terms of GDP by purchasing power parity (PPP).¹ Japan has an important domestic market of 126 million people, the 10th most populous country in the world².

The country economy has however been facing difficulties over the last decade. The country has fallen into recession four times since 2008. Japan has a low growth rate, in general, compared to other industrial countries: GDP Growth Rate in Japan averaged 0.51 percent from 1980 to 2016, -0.1 % in 2014, and 0.59 % in 2015 and is projected to reach 1.0% in 2017 before slowing to 0.83 % in 2018³. Among other issues, Japan's economic performance has been constrained by weak domestic demand and a rigid labour market that has limited risk taking and entrepreneurial activity. Since 2013, the Government has engaged in a series of reforms (the "Three Arrows"⁴) intended to "revitalise" the economy, based on a flexible fiscal policy (notably the Stimulus package⁵), monetary easing, and structural reforms.

The Japanese economy remains the **6th most competitive economy in the World**, according to the Global Competitiveness Index in 2016.⁶ Amongst its main strengths are its excellent infrastructure and one of the world's healthiest workforces, with a life expectancy of over 80 years. The country also performs well in the more complex areas of competitiveness: **businesses are highly sophisticated** (2nd), employing unique products and production processes (1st) with large control over international distribution (2nd) and benefitting from the world's best local suppliers (1st). The main weakness of the

¹ IMF's World Economic Outlook Database, October 2016.

<https://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx>

² World population review, Japan Population 2016, <http://worldpopulationreview.com/countries/japan-population/>

³ OECD, <https://data.oecd.org/gdp/real-gdp-forecast.htm> and OECD, Japan Economic Forecast Summary, November 2016: <http://www.oecd.org/japan/japan-economic-forecast-summary.htm>

⁴ The Economist, Abe's Master Plan, 2013. <http://www.economist.com/news/leaders/21578044-shinzo-abe-has-vision-prosperous-and-patriotic-japan-economics-looks-better>

⁵ Trading Economics, Japan Approves \$130 billion Stimulus Package. <http://www.tradingeconomics.com/articles/08022016123651.htm>

⁶ Global Competitiveness Report, Japan, 2016. <http://reports.weforum.org/global-competitiveness-report-2015-2016/economies/#economy=JPN>

Japanese economy appears to be its macroeconomic environment, especially its national budget balance and the national debt (the largest debt in the world in terms of ratio to GDP⁷).

Japan is considered one of the most innovative economies in the world, it is ranked the 5th economy in terms of innovation in the Global Competitiveness Report (based on country perception), and its Gross domestic expenditure on research and development (GERD) was the third highest in the world in 2014 (3,59 % of GDP)⁸. It is the first country in the world in terms of patent applications (PCT) in the OECD⁹. According to the Global Competitiveness Index, high-quality research institutions (7th) and company spending on R&D (2nd), coupled with an excellent availability of scientists and engineers (3rd), contribute to the country's overall highly innovative environment. The country also remains an early and eager adopter of new technologies (13th).

As of 2016, Japan included 52 companies in the Fortune/CNN Money Global 500 ranking of the world's largest corporations. Japanese companies in the top 100 of the Fortune ranking included in 2016 Toyota Motor, Honda Motor, Nissan Motor, and Hitachi (Panasonic, Sony and Toshiba are in the top 200). Japan's corporate sector has continued to push the technology boundaries in fields such as robotics, medical devices, clean energy, satellite communications and spacecraft, water processing and other high-technology industries.

In terms of political stability, Japan generally benefits from a good image as a stable and predictable environment abroad. The World Bank rates Japan's political stability, from 1996 to 2014 with an average value of 1.01 points, and 1.00 in 2014¹⁰ (on a notation where the minimum of -2.5 means weak; maximum 2.5 as rather strong) and classifies it the 27th most stable country in 2014, placing it above the United States of America. The Global Competitiveness Report 2015 also classified Japan as the 13th country in the world in terms of Institutions based on a wide range of criteria such as performance, independence or stability of the country's institutions and regulations. However, Japan is also seen as a country where, due to the specific characteristics of the Japanese society and economy, doing business or investing is often considered complex.

Japan is a member of the World Trade Organization (WTO), the Organization for Economic Cooperation and Development (OECD), G-20, G8, the Asia-Pacific Economic Cooperation (APEC) and several other international organisations.

⁷ Statista, Japan: National debt from 2010 to 2020 (in billion U.S. dollar), 2016.
<https://www.statista.com/statistics/270121/national-debt-of-japan/>

⁸ OECD Data, Gross Domestic spending on R&D, 2016. <https://data.oecd.org/rd/gross-domestic-spending-on-r-d.htm>

⁹ OECD, Patent Database, July 2015

¹⁰ The Global Economy, Political stability of Japan, based on World bank data:
http://www.theglobaleconomy.com/Japan/wb_political_stability/

2.2. Opportunities for Europe – investment, trade and Science, Technology & Innovation cooperation

Japan's economy is strongly export driven, with a ratio of exports to GDP standing at 15%, compared to 10% in the EU. However, the domestic market in Japan is less open to imports than the EU market. Imports as a share of domestic demand reach 17 percent in the EU and only 6 percent in Japan. This low import penetration is spread out fairly evenly across most sectors.¹¹

Japan is a significant trade partner for the EU, the EU's second biggest trading partner in Asia after China. Europe is also a very important market for Japan. Regarding **trade in goods**, Japan is the 6th EU partner in terms of exports and 7th in terms of imports and accounted for 3.2 % of EU exports, 3.5 % of EU imports in 2015, with a total trade in goods that represented about €116,5 billion in 2015.¹² The trade relationships between the EU and Japan have traditionally been characterised by big trade surpluses in favour of Japan but trade figures have become much more balanced in recent years. Indeed, over recent years (from 2011 to 2015) EU imports from Japan have been declining slightly (-4.0 %), when EU exports to Japan have increased (3.6 %)¹³, which results in a limited positive balance for Japan in 2015 (€3.3 billion surplus for Japan) as compared with previous figures (e.g. €21.5 billion in 2011). However, the indicators for exports and imports have both been positive for 2014-2015 (respectively 5.9% and 6.2% growth rates).

In terms of **important sectors for business**, EU exports to Japan are dominated by a few high-technology sectors such as motor vehicles, machinery, pharmaceuticals, optical and medical instruments, and electrical machinery. Exports from Japan to the EU are also dominated by machinery, electrical machinery, motor vehicles, optical and medical instruments, and chemicals.

EU-Japan **exchanges of services** (e.g. finance, transportation, insurance) are also high, especially EU's exports of services which have been growing since 2013, up to €27,9 billion in 2015 (8.4% annual growth since 2011). The balance has been positive for the EU since 2011 and was highly positive in 2015 (€12.3 billion surplus for the EU).¹⁴

In terms of **foreign direct investments (FDI)** EU investments to Japan have been relatively constant at around €80 billion per annum over the last decade, although there has been a recent decrease in 2014 (of 10.2%, reaching €73 billion). Japanese investments to the EU 28 have been continuously increasing over the past decade and reached €166.3 billion in 2014¹⁵ as Japanese companies are seeking to grow

¹¹ Eva R. Sunesen, Joseph F. Francois and Martin H. Thelle, ASSESSMENT OF BARRIERS TO TRADE AND INVESTMENT BETWEEN THE EU AND JAPAN, for DG Trade, Final report, 2009. To be accessed at: <http://trade.ec.europa.eu/doclib/html/145772.htm>

¹² European Commission, European Union, Trade in goods with Japan, November 2016, <http://trade.ec.europa.eu/doclib/html/113403.htm>

¹³ European Commission, European Union, Trade, Japan Main Indicators, September 2016, http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_111836.pdf

¹⁴ Ibid.

¹⁵ Ibid.

business outside Japan's saturated home market and acquire European companies for market access, technology and global business footprint. The FDI balance is thus clearly in deficit for the EU.

Despite the intense and close working relationships between the EU and Japan, including the regulatory dialogue that has taken place for some years already, there are still many barriers for EU trade and investment in Japan, including discriminatory regulations, differences in standards and limitations in public procurement - that restrict economic cooperation between businesses and further integration within certain sectors.

Diplomatic relations between the EU and Japan are also well developed, and trade and industrial policy dialogue is ongoing. The EU and Japan cooperate in a number of international and multilateral for organisations (United Nations (UN), WTO, G8, G20...) and the EU and Japan continue to hold regular dialogues on issues such as the environment, information society, cyber-space, science and technology, food safety or human rights. Currently, the EU and Japan are working towards **two major new agreements** which together promise to mark an important step forward in the bilateral relationship:

- Negotiations on a **Free Trade Agreement between EU and Japan** started in 2013 and are ongoing (the 17th round of negotiations took place in September 2016¹⁶). The negotiations notably have for ambition to discuss a number of non-tariff barriers to trade that are considered by the EU as obstacles in accessing the Japanese market. Studies show that the successful conclusion of an ambitious free trade agreement between EU and Japan could deliver a potential 32.7% increase in EU exports to Japan. Japanese exports to the EU could rise by as much as 23.5%.¹⁷
- A **Strategic Partnership Agreement** between the EU and Japan is being negotiated in parallel which will cover political dialogue and policy cooperation, and cooperation on regional and global challenges, including the environment and climate change, development policy and disaster relief, and security policy.¹⁸

In addition to this, the Directorate-General (DG) for Internal Market, Industry, Entrepreneurship and SMEs has been engaging with the Japanese Ministry of Economy, Trade and Industry (METI) on an **industrial policy dialogue since 1998**. The aim is to further develop regulatory convergence and solve regulatory hurdles. The cooperation allows for better mutual understanding of respective policies, particularly relating to small and medium-sized enterprises (SMEs) and government procurement.¹⁹ A regulatory cooperation joint document was adopted in 2015 at the occasion of the 18th annual meeting of the EU-Japan industrial policy dialogue, which was a first step towards a deeper and enlarged regulatory cooperation between the EU and Japan and notably foresaw the enlargement of the existing cooperation to new areas such as robotics, construction and medical devices. The EU and Japan have implemented a specific **industrial dialogue on railways** since 2014 to facilitate bilateral

¹⁶ DG Trade, Japan country page, 2016. <http://ec.europa.eu/trade/policy/countries-and-regions/countries/japan/>

¹⁷ EU Delegation in Japan, Trade and Investment Relations. <http://www.euinjapan.jp/en/relations/trade/>

¹⁸ EU Delegation in Japan, EU-Japan Political Relations. <http://www.euinjapan.jp/en/relations/political/>

¹⁹ DG GROWTH, Industry, EU – Japan cooperation. <http://ec.europa.eu/growth/industry/international-aspects/cooperation-governments/eu-japan/>

trade in the railway sector, including procurement and purchases by private operators (in the frame of the FTA negotiations).²⁰

To further facilitate the trade relationships between the EU and Japan and entering the Japanese market for EU businesses, a number of informal bilateral dialogues have been established. These include:

- A **Cooperation Framework** aimed at promoting two-way investment via tangible actions, exists since 2004.²¹
- The **EU-Japan Business Round Table** - established in 1999 - allows for a dialogue and an exchange of views between EU and Japanese businesses²².
- The **EU-Japan Centre for Industrial Cooperation** is a unique venture between the European Commission and the Japanese Government, established in 1987.²³ It is supported by the Japanese Ministry of Economy, Trade and Industry (METI) and DG GROWTH of the European Commission through the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME). The Centre promotes all forms of industrial, trade and investment cooperation between the EU and Japan and aims to strengthen the technological capabilities and the competitiveness of the European and Japanese industrial systems. By facilitating exchanges of experience and know-how between EU and Japanese businesses the Centre helps to improve the competitiveness of both EU and Japanese companies. Its services also include access to training, including the Vulcanus in Europe and Vulcanus in Japan schemes²⁴ for young engineers. It is also the contact point for Horizon 2020 in Japan, and offers various other information services.
- Since 1979 the European Commission has been encouraging European enterprises to enter the Japanese market and has given them assistance through promotion programmes such as the **Executive Training Programme** (training programme for European executives to expand their business activities in Japan – the last cycle was 2014-2015) and the **EU Gateway Programme** (between 1994 and 2014). Concerning the latest, the EU is now exploring the possibility of supporting a follow-up programme, "**Green Gateway to Japan Programme**", which would aim to promote European green technologies and like previous editions of the Programme, would give the opportunity to EU companies to participate in market scoping missions as well as provide them with information on business opportunities, notably Japan's public procurement opportunities.²⁵
- The Japan External Trade Organisation (JETRO) is a non-profit organisation that works to promote mutual trade and investment between Japan and the world. JETRO is funded by the Japanese Ministry of Economy, Trade and Industry (METI) for the purpose of trade promotion. JETRO has offices in several EU Member States, including Belgium (Brussels).

²⁰ Ibid.

²¹ Cooperation Framework for Promotion of Japan-EU Two-Way Investment, 2004. Document to be accessed at: http://eeas.europa.eu/japan/docs/2004_invest_en.pdf

²² EU-Japan Business Roundtables. <http://www.eu-japan-brt.eu/>

²³ The EU-Japan Centre for Industrial Cooperation. <http://www.eu-japan.eu/>

²⁴ Vulcanus in Japan. <http://www.eu-japan.eu/events/vulcanus-japan>

²⁵ More information should follow on the EU Gateway dedicated website: <https://www.eu-gateway.eu/>

- EU Gateway / Business Avenues is an initiative funded by the European Union helping European companies to establish long-lasting business collaborations in Asia.

The European Business Council (EBC) in Japan represents the EU Chamber of Commerce in Japan and has been working to improve the trade and investment environment for European companies in Japan since 1972.²⁶ It currently “works for around 2,500 local European corporate and individual members [in Japan]”. The EBC regularly publishes reports on the business environment in Japan, and publishes “Eurobiz”, the monthly magazine for European businesses in Japan.²⁷

EU-Japan cooperation in the field of **Science, Technology and Innovation (STI)** continues to progress and diversify its activities. An EU-Japan **Science and Technology Cooperation Agreement** was signed in 2009 and came into force on March, 20th 2011. It established a Joint Committee on Scientific and Technological Cooperation, to exchange information and views on Science and Technology policy issues, identify priority areas for cooperation and promote reciprocal access to research and innovation programmes. **Areas of substantial cooperation** include Information and Communication Technology (ICT), aeronautics, and materials including Critical Raw Materials (CRMs). In addition to these areas, there is a mutual interest to increase cooperation in the fields of health/medical research, environment, energy, and high-energy physics in the future.

Cooperation is notably implemented through the European Union **Horizon 2020** programme, where Japanese participants can join projects in almost any area. Normally there is no EU funding for organisations in advanced countries like Japan, but there are some exceptions and financial support for Japanese organisations is now possible under a new Japan Science and Technology Agency (JSTA) **co-funding scheme** that started in October 2015. It initially covers two areas under Horizon 2020 Work Programme 2016-2017, namely **NMBP-02-2016**: “Advanced Materials for Power Electronics based on wide bandgap semiconductor devices technology”; and **NMBP-03-2016**: “Innovative and sustainable materials solutions for the substitution of critical raw materials in the electronic power system”.²⁸ “Coordinated” or “joint” calls for proposals have also been issued by the EU and counterpart ministries and agencies in Japan in areas of common interest, such calls in recent years have been issued in photovoltaics, superconductivity, aeronautics, critical raw materials, and Information and Communication Technology (ICT)²⁹ – and in 2016-2017 especially on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities as well as topics of 5G, IoT/Cloud/Big Data, and Experimental testbeds³⁰.

²⁶ European Business Council in Japan. <https://www.ebc-jp.com/index.php/about-the-ebc>

²⁷ Eurobiz. <http://eurobiz.jp/about-the-magazine/>

²⁸ Further information can be found on the Japan Science and Technology Agency website: http://www.jst.go.jp/sicp/announce_eujoint_03_GeneralInfo.html

²⁹ Information from EU Delegation in Japan, Science and Technology Relations. Additional information, notably for individual researchers (mobility opportunities) can be found on the same link. <http://www.euinJapan.jp/en/relations/science-research/>

³⁰ For updated information about topics of particular interest for cooperation with Japan, including joint or coordinated calls, and about available funding schemes in Japan that could provide support to Japanese participation in Horizon 2020, please see: http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020_localsupp_japan_en.pdf. Up to date information on EU-Japan STI cooperation can also be found on DG Research and Innovation dedicate page at: <http://ec.europa.eu/research/iscp/index.cfm?pg=japan>

2.3. Sectoral strengths

The Japanese economy is strongly led by the manufacturing industry, which is responsible for 90% of Japanese exports.³¹

A variety of sectors in Japan is well developed and present a market potential for European businesses. The Japanese External Trade Organisation (JETRO) offers an analysis of the attractive sectors in Japan, focused on ICT, life sciences, electricity and renewable energy³². Clusters can be found in all three sectors in Japan. The Japanese vehicle sector is also widely recognized in the world.

The Japanese definition of a cluster encompasses a wider range of structures compared to the European definition. In Europe, clusters are characterised as independent organisations supporting cooperation between local companies, universities and R&D centres including their internationalisation activities. On the other hand, in Japan, most of the cluster-like structures correspond to a system in which an R&D centre coordinates private companies, universities and public entities in the implementation of **very specific research projects** usually funded by public funds. Once the project is achieved, the cluster ends its activities. Therefore, the aim of a certain number of Japanese clusters is not really based on long term Research, Development and Innovation (RDI) cooperation or internationalisation but rather achieving the R&D task that was given to the research centre.

JETRO has notably identified automotive, renewable energy, ICT, life science and biotechnologies, aeronautics, mechatronics, electronics, as the priority sectors for business relations with Europe. The EU-Japan Center for Industrial Cooperation focuses on opportunities for cooperation in the health sector as well as ICT, with a focus on IoT, Machine-to-Machine (M2M), big data, cloud computing, and identified opportunities on gaming, and potential other areas in the future could be food and nanotechnologies. In addition to this, the [EU Gateway Japan](#) initiative focused on green technologies has been set up since 2017

Amongst the EU cluster partnership consortia going international (ESCP-4i)³³, seven projects target Japan, [bioXclusters plus](#) in the field of personalized healthcare, [AdPack](#) in the field of advanced packaging, [FoodPackLab](#) on food packaging, [New Frontier in Food](#) on food processing, and EACP ABROAD on aerospace, [EU4SPORTSCLUSTERSALL](#) on sports and leisure, and [WIINTECH2020](#) in industrial manufacturing & plastics – illustrating an interest from European clusters in these fields for Japan.

Below are some examples of industry sectors where collaboration between European and Japanese companies could be developed.

³¹ METI, Overview of the Manufacturing industry.

http://www.meti.go.jp/english/policy/mono_info_service/overall/index.html

³² JETRO, Investing in Japan, Attractive sectors, July 2016. <https://www.jetro.go.jp/en/invest/attract.html>

³³ European Strategic Cluster Partnership for internationalisation. For more information regarding the ESCP-4i, visit <http://www.clustercollaboration.eu/eu-cluster-partnerships>

Life science sector in Japan

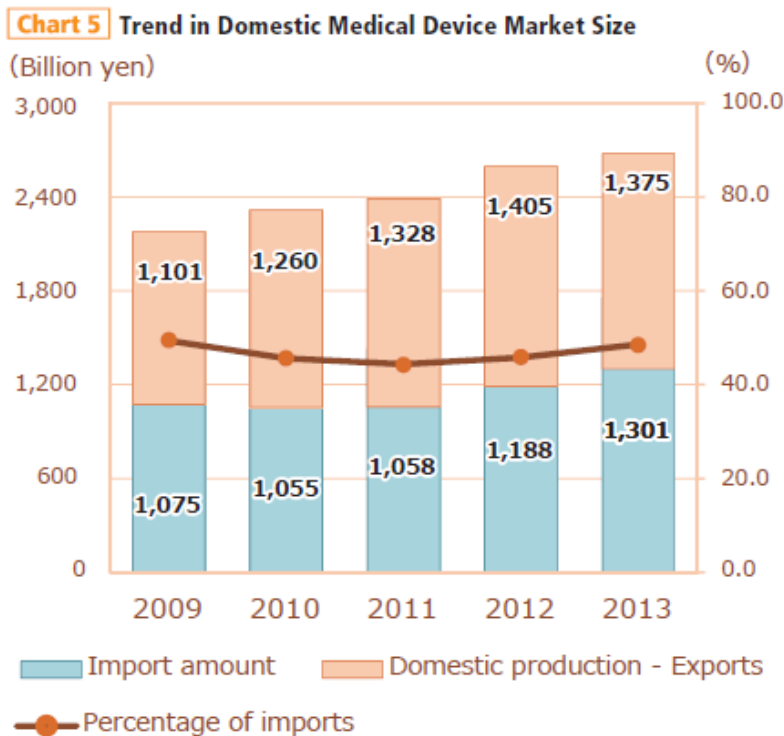
Japan, with a 10 percent share in both the global pharmaceutical product and medical equipment markets (10.3% of the global pharmaceutical product market and 9.1% of the medical devices market in 2014), holds the second place in terms of market presence after the US (respectively 32.6% and 39.3%). Several foreign companies have entered the Japanese market and are operating in various fields as major players.³⁴

The Japanese society is facing specific health challenges related to its demographic trends, similarly to the other main industrialised countries. Japan has a declining birth rate and aging population. The percentage of Japanese people over 65 years old is higher than that of any other developed country. This has led authorities to significantly improve the business environment in this domain over the past years. The Cabinet has approved a *“Healthcare and Medical Strategy”* in July 2014 to make the theme of *“life expectancy”* a key business sector, through **cutting-edge medical technologies and services**. The strategy notably aims at better connecting the different stages of product creation, from the R&D stage to the commercialisation stage. The broader aim is to provide world class medical services, promote the development of new health care services, nursing care, health promotion, disease prevention and everyday life support, and develop efficient and high-quality medical services by utilising ICT.

JETRO has identified the most attractive markets in Japan in the Life Science sector as the following:

- **The medical devices market:** The domestic market size of medical devices in 2013 was ¥2.6757 trillion, up to 103.2% from that of the previous year. The value includes imports of ¥1.3008 trillion from foreign companies, accounting for 48.6% of the total. The market is expected to continue to expand partly due to the Amendment of Pharmaceutical Affairs Law (PAL) in 2014 (which became the so called *“PMD Act”*) which eased the regulation on medical devices.

³⁴ JETRO, Attractive markets, Life science. July 2016.



*Source: Compiled by Yano Research Institute based on the "Annual Report on Statistics of Production by Pharmaceutical Industry" by the Ministry of Health, Labour and Welfare

FIGURE 1 - TREND IN DOMESTIC MEDICAL DEVICE MARKET SIZE³⁵

Markets that are expected to expand are notably those for endoscopic surgery, surgical support robots, and image diagnosis systems (MRI equipment). Companies that participate in the market include Olympus Medical Systems, MC Medical, Stryker Japan, Da Vinci (developed by the US company Intuitive Surgical, Inc.) leader in surgical support robots, Hitachi Medical, Toshiba Medical Systems, GE Healthcare Japan, Philips, and Siemens Japan.

- **The pharmaceutical products market:** imports of foreign drugs are expanding in Japan, facilitated by new regulations. The size of the domestic market of pharmaceutical products in 2013 was ¥9.8416 trillion, 101.9% of the previous year's total. The value includes imports of ¥3.0773 trillion from foreign companies. The percentage of imports has increased year on year, from 24.2% in 2009 to 31.3% in 2013, marking a 7.1% increase over a four-year period. The market has been evolving more slowly recently, as sales of generic drugs particularly spread.
- **The regenerative medicine market:** the market is expected to grow, facilitated by the law and regulations in force, and the framework for speeding up commercialisation (Act on the Safety of Regenerative Medicine). In parallel, with the help of the government, the industry has founded an industrial association, the Forum for Innovative Regenerative Medicine (FIRM), a

³⁵ <https://www.jetro.go.jp/france/documentation/en-ligne.html>

general incorporated association for developing the regenerative medicine industry in Japan, which 185 Japanese and foreign companies in the field have joined (as of January 2016).

- **Healthcare services:** given the characteristics of the Japanese population, medical expenses that have grown year on year and are expected to continue to increase more rapidly than the growth of GDP in the future. The healthcare fields with high potential include **nursing care ICT, personalised medicine, and self-care health promotion devices.**
 - The Ministry of Economy, Trade and Industry and the Ministry of Health, Labour and Welfare have implemented a “*Five-year plan for the development of robotic devices for nursing care*” since 2014, with the aim of encouraging the rapid and widespread use of robotic devices for nursing care. According to the “*Result of Survey on Robot Industry Market Trend*”, compiled by the Ministry of Economy, Trade and Industry, the market size of robotic devices for nursing care is projected to expand from ¥16.7 billion (€124 million) in 2015 to ¥404.3 billion (€3.0 billion) in 2035. Domestic companies such as Kikuchiseisakusho, CYBERDYNE, Fuji Machine MFG, and Panasonic are active in this domain.
 - The core of the tailor-made medicine market consists in molecular-targeted drugs, and is accompanied by diagnostic agents, contract laboratory tests as well as DNA chips. Due to the expansion of molecular-targeted drugs, the market is growing and is expected to increase from ¥710.8 billion (€5.3 billion) in 2014 to ¥914.3 billion (€6.8 billion) in 2018 (projection by Yano Research Institute).
 - The health promotion equipment and service markets for maintaining and improving health on people's self-initiative have been expanding. The market is composed of health monitoring equipment. The main players in these markets include Omron Healthcare, Terumo, and Panasonic.

This sector was also previously identified by the US as an attractive sector for US businesses in Japan³⁶.

JETRO provides a map of the geographical concentration of activities (or industrial clusters) in the life science sector in Japan.

³⁶ U.S. Department of Commerce, International Trade Administration, Japan's Manufacturing Competitiveness Strategy: Challenges for Japan, Opportunities for the United States, 2009.

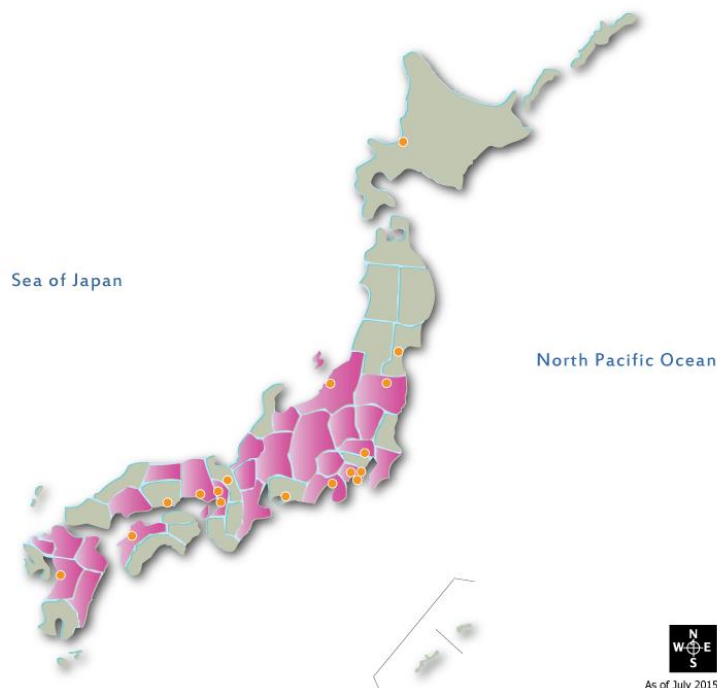


FIGURE 2 - INDUSTRIAL CLUSTERS IN THE LIFE SCIENCE SECTOR IN JAPAN - JETRO, 2015³⁷

The areas identified in pink are the areas corresponding to the concentration of life sciences cluster activities in Japan. The identified orange dots correspond to the location of Japanese industrial clusters in the life sciences domain in Japan.

Information and Communication Technologies sector in Japan

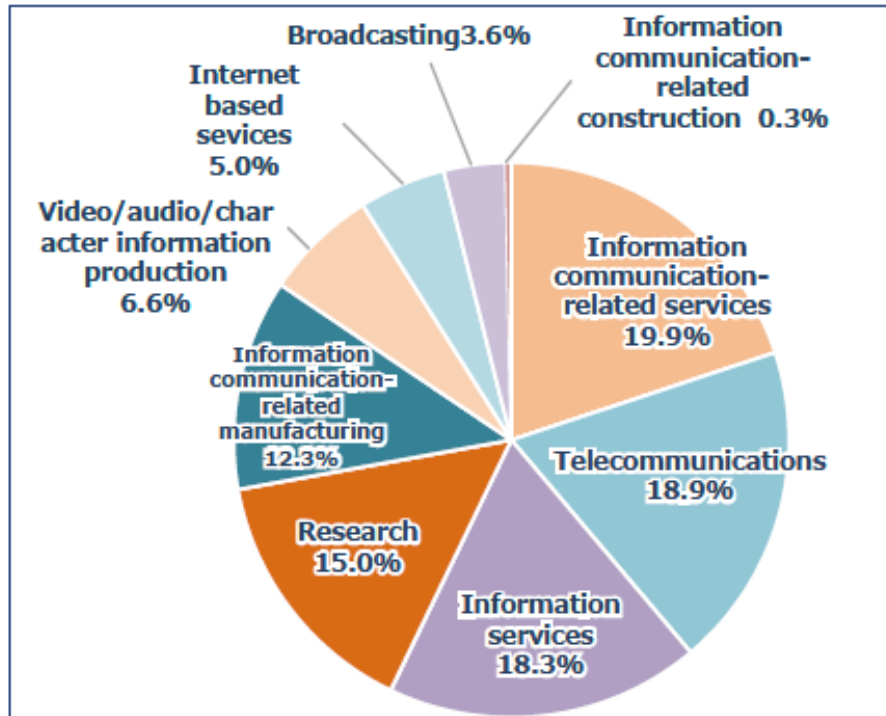
The ICT sector plays an important role in Japanese economic development and cultural prosperity, and technological developments have been widely embraced in areas such as mobile communications and multimedia applications. With an open domestic market and a reputation for excellence in science and technology, opportunities in the Japanese ICT sector are present in many different areas.

The domestic production of the ICT industry in 2013 in Japan was approximately ¥98 trillion (€804 billion). **Information communication-related services, telecommunications**, and information services rank high among all ICT industries, making up the majority of the total whilst the share dedicated to services is increasing.

³⁷ The cities in which life science clusters are located are: Fukushima, Tochigi, Gunma, Saitama, Chiba, Kanagawa, Niigata, Toyama, Nagano, Gifu, Yamanashi, Shizuoka, Mie, Fukui, Shiga, Kyoto, Hyogo, Osaka, Tottori, Hiroshima, Ehime, Fukuoka, Saga, Kumamoto, Miyazaki, Sapporo city, Sendai city, Koriyama city, Saitama city, Yokohama city, Kawasaki city, Sagami-hara city, Niigata city, Shizuoka city, Toyohashi city, Kitagoya city, Kyoto city, Kobe city, Osaka city, Sakai city, Okayama city, Matsuyama city, Kumamoto city, JETRO, <https://www.jetro.go.jp/en/invest/region/icinfo.html>, October, 2017



Chart 3 Component proportion of ICT Industry real domestic production (2013)



*Source: "Survey of ICT Economic Analysis" by the Ministry of Internal Affairs and Communications

FIGURE 3 - ICT INDUSTRY REAL DOMESTIC PRODUCTION COMPONENTS - 2013³⁸

Japanese authorities see the ICT sector as one of the main pillars of the future economic growth of the country. The Japanese government is looking to facilitate the shift towards a society massively utilising ICT to respond to social changes resulting from the advent of the IoT (Internet of Things), big data, and artificial intelligence era. The Ministry of Internal Affairs and Communications and the Japanese Ministry of Economy, Trade and Industry (METI) are therefore aiming to increase Japanese economy's productivity through the implementation of ICT in all types of business. The METI and especially the Industrial Structure Council are currently particularly interested in the **fourth industrial revolution**, as shown in the document "*Vision of New Industrial Structure - Japan's strategies for taking the lead in the Fourth Industrial Revolution*" elaborated in 2016 for the 18th General meeting of the Council.³⁹ Internet of things, big data and Artificial Intelligence (AI), as well as robotics, are at the heart of the fourth industrial revolution, that Japan intends to lead. As part of the government's efforts to accelerate the integration of IoT in society, the METI subsidises the cost of foreign companies in the IoT fields to set up innovation centers, or conduct experimental or feasibility studies (F/S) in Japan in cooperation with Japanese companies and other organisations in Japan.

³⁸ JETRO, Attractive Sectors, ICT, 2013.

³⁹ METI, Industrial Structure Council.

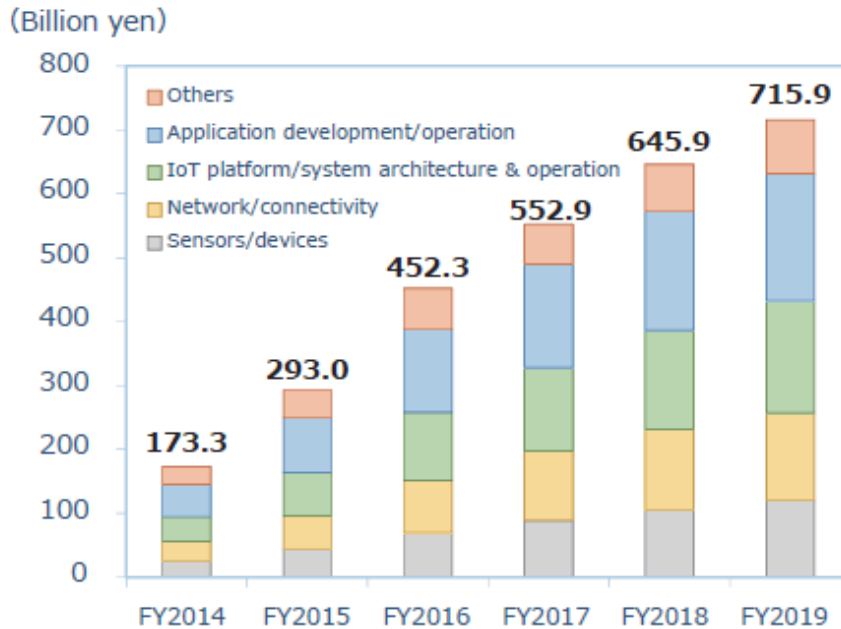
http://www.meti.go.jp/english/policy/economy/industrial_council/index.html

JETRO has identified six specific attractive markets within the ICT sector:

- **Data center market** – Main players in this market include Japanese companies such as NTT DATA and AT TOKYO and foreign companies such as IBM Japan (US) and KVH (US).
- **Cloud market** – this market is expected to keep expanding, as more and more companies use cloud based infrastructures. Main players in this market include Japanese companies such as NTT Communications and Internet Initiative, and US companies such as Amazon Web Service, Salesforce.com, Microsoft Japan, IBM Japan, and Google Japan.
- **AI market** – is a relatively new market in Japan, at an early stage of development, but with a great potential as artificial intelligence technologies are booming in various fields and able to have an impact on various industries. The USA is the dominant actor in this field, but there are stakeholders in Japan which have years of experience in AI research, classified broadly into large ICT corporations (including Hitachi, NEC, and NTT DATA).
- **FinTech market** - The market in which the integration of industry, finance and IT creates new services is a promising one. The FinTech market has a variety of business fields, in which several companies including venture companies participate. *"block chains"*, *"cloud-type accounting software"*, and *"social lending"*, are among promising fields. The market scale is expected to expand from ¥3.3 billion (€24.6 million) in 2015 to ¥56.7 billion (€423.4 million) in 2020.
- **IoT/Machine-to-machine (M2M) market:** The use of IoT has recently proliferated. A wide variety of objects including automobiles, home electric appliances, robots, and facilities are increasingly connected and exchange information over the Internet, creating new added-value and services. The domestic IoT market is expected to rapidly grow at an annual average rate of 32.8% from 2014 to 2019 thanks to improvements in costs and added-value products. The main participating companies to the IoT market in Japan are from Japan, the USA and South Korea.



Chart 12 Domestic IoT market scale



*Source: "Domestic IoT Market Scale (2014-2019)" by MM Research Institute

FIGURE 4 - PROJECTIONS / FORECAST OF IOT MARKET SCALE IN JAPAN 2014-2019⁴⁰

- **Sharing economy/net services market** – such services are expected to grow in the future (from ¥23.3 billion (€174,0 million) in 2014 to ¥46.2 billion (€345,0 million) in 2018 (projected). Vehicle sharing services account for the largest share of the market, but foreign tourism is expected to influence the sector and increase the market share of accommodation renting for instance.

JETRO provides a map of the geographical concentration of activities (or industrial clusters) in the ICT sector in Japan.

⁴⁰ <https://www.jetro.go.jp/france/documentation/en-ligne.html>



FIGURE 5 - INDUSTRIAL CLUSTERS IN THE ICT DOMAIN IN JAPAN - JETRO, 2015⁴¹

The areas identified in blue are the areas corresponding to the concentration of ICT cluster activities in Japan. The identified orange dots correspond to the location of Japanese industrial clusters in the ICT domain in Japan.

Electricity and renewable energy sector in Japan

The energy environment in Japan has significantly evolved over the last ten years. Japan has experienced a decline in energy self-sufficiency when shifting its energy source from coal to petroleum. In addition, the Great East Japan Earthquake in 2011 has caused a series of power plant shutdowns, notably nuclear plants (Japan energy self-sufficiency has declined from 19.9% in 2010 to 6% in 2013). Imports of fossil fuels have thus significantly increased to face this shortage. The energy environment in Japan has penalised the local industrial sector, including SMEs. It has also undermined the commitment of Japan in terms of environmental matters (such as CO₂ emissions). Under these circumstances, the Agency for Natural Resources and Energy (affiliated to the METI) compiled a "**Long-term Energy Supply and Demand Outlook (Energy Mix)**" in July 2015 as the **new energy policy toward 2030**. The Japanese government's objective is to reduce dependency on Middle East petroleum by promoting smart and finely-tuned energy conservation and multilateral energy procurement in Japan.

⁴¹ The cities in which the clusters are located are: Hokkaido, Iwate, Miyagi, Kanagawa, Ishikawa, Aichi, Kyoto, Nara, Shimane, Tokushima, Nagasaki, Sapporo city, Sendai city, Koriyama city, Saitama city, Yokohama city, Kawasaki city, Nagoya city, Kyoto city, Hiroshima city, Fukuoka city,
<https://www.jetro.go.jp/france/documentation/en-ligne.html>

The focus of the energy policy for **energy mix** is to ensure stable supply ("*energy security*"), secure low-cost energy supply ("*economic efficiency*"), and pursue environmental suitability ("*environment*") on the premise of "*safety*". According to the energy supply-demand forecast in 2030, **renewable energy power generation** will expand to a range of about 22% to 24% of the total energy supply. The government aims to push each individual power source to the maximum of its potential: photovoltaic, hydraulic, wind, biomass, and geothermal power generation. The **FIT (feed-in tariff) scheme** started in July 2012 to promote the spread of renewable energy involving higher costs compared to those of nuclear and thermal power generation, and was reviewed annually since then to balance the renewable energy mix. In addition to developing the energy mix towards renewable energy, Japan can also be considered on track towards focusing on the "*liberalisation of electricity systems and the gas market*" in the future (Policy on electricity system reform decided April 2013 and ongoing since 2015, and gas system liberalisation planned for 2017).

Three attractive markets for foreign businesses, notably European, have been identified by JETRO in the electricity and renewable energy sector:

- **Electricity retail market:** the scope of the electricity retail liberalisation market has gradually expanded since 2000, and was fully liberalised in 2016. It is now possible for new entrants or new electric power suppliers to sign a power contract of 50kW or less for general households and shops formerly provided only by the regional general electric utilities. Following the full liberalisation of the electricity retail sector, the number of pre-registered retail electricity suppliers, or business operators allowed to sell electricity to all consumers reached 310 corporations in June 2016. Such companies include electric power companies, gas companies, oil companies, trading firms, finance/real estate/developers, telecommunications companies, manufacturers, engineering companies, and energy management companies – most of them Japanese but international companies are expected to enter the market in a near future.
- **Renewable energy market, divided into:**
 - **Photovoltaic:** the market is dominated by public/industrial use (75%). It has been decreasing since 2015, and is expected to decrease until 2020, when the tendency should reverse positively (although the market of the PV system for residential use should remain stable). The leading players in the market include Japanese companies such as Panasonic, Sharp, Kyocera, Toshiba, Mitsubishi Electric, and Solar Frontier, as well as foreign companies such as Hanwha Q Sells Japan (Korea), Canadian Solar Japan (Canada), JA Solar Japan (China), Yingli Green Energy Japan (China) and Trina Solar Japan (China).
 - **Wind:** In the wind power generation system market, the focus is placed on offshore wind power generation in addition to the traditional land-based variety. Offshore wind development in the private sector is showing gradual progress, however it takes time for starting up new fields, especially due to the necessity to establish new infrastructure such as port facilities. The wind power generation system market is marked by a high share of foreign manufacturers. Major entrants include international companies such as Vestas Wind Technology Japan (Denmark), Japan GE (US), ENERCON Services Japan (Germany), and Japanese companies such as Mitsubishi Heavy Industries, Japan Steel Works, Ltd., and Hitachi, Ltd.

- **Others:** further development is expected in the future in the fields of hydraulic and biomass power generation facilitated by the FIT system. Besides, Japan is believed to have the world's third-largest potential for geothermal power resources, which are currently not effectively utilised due to the long lead time it takes to bring on line power plants.
- **Smart meter market:** The number of smart meters introduced to Japan was 3.66 million units in 2014 and 7.5 million units in 2015. In the three years from 2016, more than 12 million units are planned to be installed each year. According to the METI smart meter system study group, on the whole, smart meter installation for electricity across Japan is scheduled to be completed by 2024. Gas liberalisation is also scheduled for 2017, thus demand for smart meters is also expected in this regard. Players in the market include Japanese companies such as Osaki Electric Co., Ltd., Mitsubishi Electric Corp., Toko Toshiba Meter Systems GE Fuji Electric Meter and Itron Japan.

JETRO provides the following map of the geographical concentration of activities (or industrial clusters) in the environment and energy sector in Japan.

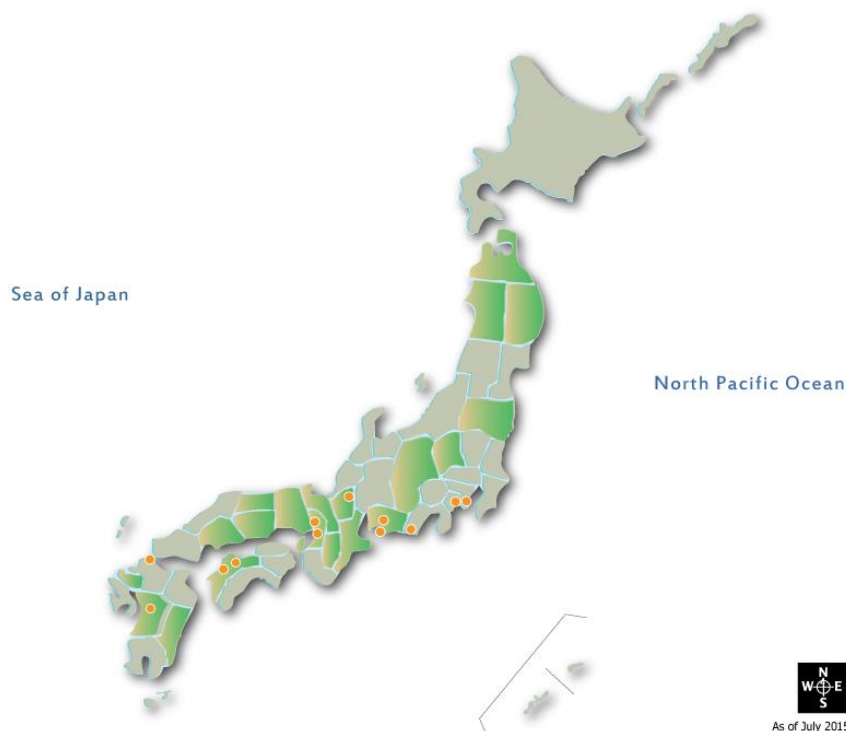


FIGURE 6 - INDUSTRIAL CLUSTERS IN THE ENVIRONMENT AND ENERGY SECTOR IN JAPAN - JETRO, 2015⁴²

42 Aomori, Iwate, Akita, Fukushima, Gunma, Nagano, Aichi, Mie, Shiga, Kyoto, Hyogo, Osaka, Nara, Okayama, Hiroshima, Ehime, Saga, Kumamoto, Miyazaki, Koriyama city, Niigata city, Kawasaki city, Sagami-hara city, Shizuoka city, Hamamatsu city, Nagahama city, Osaka city, Sakai city, Matsuyama city, Saijo city, Kitakyushu city, Kumamoto city, Tahara city, Toyota city. <https://www.jetro.go.jp/en/invest/region/icinfo/>, October 2017

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The areas identified in green are the areas corresponding to the concentration of environment and energy cluster activities in Japan. The identified orange dots correspond to the location of Japanese industrial clusters in the environment and energy domains in Japan.

The Japanese automotive sector

Japan is a world leader in automotive manufacturing and technology, and one of the world's top 3 car producing countries since the 1960's. Some of the most well-known Japanese global brands belong to the automotive industry: Toyota, Honda, Nissan, Mitsubishi, Subaru, Daihatsu, Fuso, Hino, Mazda, Lexus, and many more.⁴³

The automotive industry is one of the Japanese economy's core industrial sectors. Automobiles are the focus of an extremely wide range of industrial and related activity in Japan, from materials supply and vehicle production to sales, servicing, freight shipping and other auto-centred operations. Auto-related employment in Japan at present totals 5.29 million people in 2016 (or 8.7 % of the Japanese workforce).

Besides, as vehicles have become more complex, nowadays consisting of over 20,000 individual parts, the industry has evolved into an integrated supply chain of companies in Japan. Beyond the main car manufacturers in Japan (mentioned above), Japan's automotive component industry encompasses great diversity, with companies whose business areas include chemicals, electronics, textiles, and mechanical components.

Domestic auto production has been steadily rising since 2012. The automotive production is also highly internationally oriented in Japan. In 2014 automotive exports accounted for 17.5% of the total value of Japan's manufacturing shipments and automotive shipments (including motorcycles, auto parts, etc.) in value terms totalled ¥53.3 trillion (€39.8 billion) in 2014. Automotive exports grew 7.5% from 2014 to 2015 (also in value terms), amounting ¥15.9 trillion (€11.9 billion) in 2015, and automotive imports increased by 1.6% year-on year, to ¥2.1 trillion (€15.6 billion) in 2015.⁴⁴

JETRO provides a map of the geographical concentration of activities (or industrial clusters) in the automotive and transport equipment sector.

⁴³ Japan Industry News, Article « The Japanese Automotive Industry », March 2016.

<https://www.japanindustrynews.com/2016/03/japanese-automotive-industry/>

⁴⁴ Japan Automobile Manufacturers Association, Inc. (JAMA), The Motor Industry in Japan 2016, 2016.

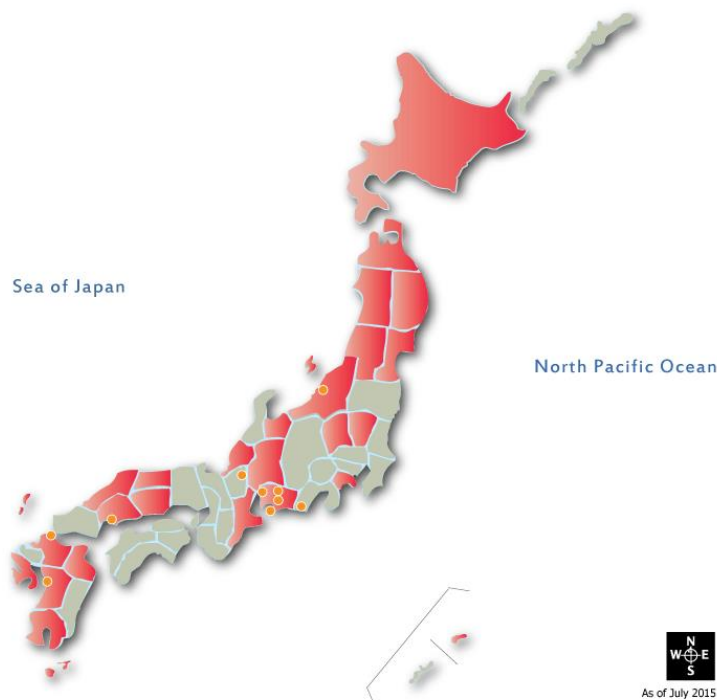


FIGURE 7 - INDUSTRIAL CLUSTERS IN THE AUTOMOTIVE AND TRANSPORT EQUIPMENT SECTOR IN JAPAN - JETRO, 2015⁴⁵

The areas identified in red are the areas corresponding to the concentration of automotive and transport equipment cluster activities in Japan. The identified orange dots correspond to the location of Japanese industrial clusters in automotive and transport equipment domains in Japan.

3. Cluster community in Japan

Japan benefits from an important cluster community (at least **51 cluster organisations** were identified by the EU-Japan Centre for Industrial Cooperation in 2016). Most cluster organisations were initiated and funded by the Ministry of Economy, Trade and Industry (METI) or the Ministry of Education, Culture, Sports, Science and Technology (MEXT) that introduced a form of quality label for the cluster community in 2001. However, the cluster community in Japan seems highly concentrated in the following sectors: pharmaceuticals, biotechnology, healthcare, medical and welfare, although cluster initiatives in other sectors exist, such as in IT, energy or automotive. According to a recent interview with JETRO, there is currently an important growth in the number of cluster organisations in Japan,

⁴⁵ Hokkaido, Aomori, Iwate, Miyagi, Akita, Yamagata, Tochigi, Gunma, Kanagawa, Niigata, Toyama, Nagano, Gifu, Aichi, Mie, Fukui, Shiga, Tottori, Shimane, Okayama, Hiroshima, Fukuoka, Nagasaki, Kumamoto, Oita, Kagoshima, Niigata city, Sagami-hara city, Shizuoka city, Hamamatsu city, Toyota city, Toyohashi city, Tahara city, Kitanagoya city, Nagoya city, Tsushima city, Nagahama city, Hiroshima city, Saijo city, Kitakyushu city, Kumamoto city, <https://www.jetro.go.jp/en/invest/region/icinfo/>, October 2017

despite the decrease of governmental support. There are cluster initiatives in all regions of Japan but mapping of all these initiatives based on a common and shared cluster definition is not available.

3.1 Characteristics of clusters in Japan

As explained before (section 2.3), the definition of clusters varies between Japan and Europe. In Japan, most of the cluster-like structures correspond to a system in which an R&D centre coordinates private companies, universities and public entities in implementing **very specific research projects** usually funded by the public sector. Once the project is achieved, the cluster ends its activities. Therefore, the aim of a certain number of Japanese clusters is not really based on long term RDI cooperation or internationalisation but rather achieving the R&D task that was given to the research centre. Other clusters are acting as a “*communication network*” aimed at sharing information and do not have any real “*physical*” entity.⁴⁶ Such initiatives can however be of interest to the European cluster community, in view to engage in cluster based collaboration in Japan.

There are nonetheless some other **Japanese clusters organisations** that correspond well to the EU definition of a cluster. A sample of these is analysed in more details in section 3.3. of this report.

There are also “**industrial clusters**” in Japan: these clusters comply with the traditional definition of industrial clusters, a concentration and agglomeration of companies operating within a specific sector in some regional areas, although not having any *de facto* “*cluster organisation*” to coordinate them. The industrial clusters can eventually be supported by local development agencies. In some cases, local Regional Industrial Promotion Agencies (RIPA) are supporting companies in their internationalisation activities.

3.2 Mapping of clusters in Japan

JETRO has developed a [mapping tool](#) that provides information on the **industrial clusters** (major companies, related research institutions, main sectors, etc.) in various regions and sectors of Japan, (mainly Automobiles and Transport Equipment, Aircraft, Food manufacturing, ICT, Electronics, Life Sciences, Environment and energy, Service, Tourism). As stated before, the industrial clusters are not necessarily supported by a dedicated cluster organisation, but they are localised on a map which allows external parties to identify regional and local strengths.

In 2013, the **EU-Japan Center for Industrial Cooperation** published a [report](#) on cluster mapping in Japan. The report is based on a survey, in which 50 Japanese cluster organisations were contacted. Data was collected on 45 of them. Since the report release in 2013, the cluster environment in Japan has changed with many entities listed in the report ending their activities simply because they had reached the end of their expected lifespan as defined at the time of their creation, or due to lack of new financial resources to continue their activities once the governmental support ended. Following a fresh screening of the internet completed in May 2016 by the EU-Japan Centre for Industrial Cooperation, many other entities (either missing in 2013 report or in some cases recently established)

⁴⁶ The analysis is the results of interactions with the EU-Japan Centre for Industrial cooperation.

were identified⁴⁷. The ongoing international relations of the clusters were further assessed by the EU-Japan Centre. This situation illustrates the changing nature of the cluster environment in Japan and the need to work closely with relevant intermediary organisations.

The search based on the information available in the official website of each cluster organisation (most of the time only in Japanese) provided the following results:

- **Pharmaceuticals, biotechnology, healthcare, medical and welfare clusters:** 28 clusters;
- **Environment, energy clusters:** 3 clusters;
- **IT clusters:** 2 clusters;
- **Automobile-related industry clusters:** 2 clusters;
- **Electronic components, devices and semiconductors clusters:** 6 clusters;
- **Precision manufacturing clusters:** 2 clusters;
- **Aerospace:** 2 clusters;
- **Food:** 2 clusters;
- **Other sectors:** 4 clusters.

When assessing the internationalisation activity level of the clusters by browsing their websites and in some cases contacting them, two factors were verified as follows:

- **The internationalisation process of the cluster**, looking at ongoing/past relations with the EU: 13 clusters showed recent ongoing activities with EU organisations and 8 clusters had past relations with EU counterparts between 2001 and 2012 but no other information could be identified after 2012. 10 clusters are only targeting Asia or America, 7 clusters are open to internationalisation but without detail on target areas, 9 clusters do not provide any info about internationalisation strategy if any, and 4 clusters clearly stated that they were not interested on internationalisation.
- **The overall “activity” of the cluster** (looking at whether the website of the cluster (in Japanese and/or English) is kept updated with recent posts, organizing events etc....): with respect to these criteria, 38 clusters were providing actively maintained websites and 13 Clusters showed not so active websites. Out of the 51 identified Japanese clusters organisations, 9 provide an active English website, 18 provide a static or non-updated English website and the other 24 clusters only provided Japanese language websites.

Several organisations have mentioned the need for a cluster mapping project in Japan, mapping cluster initiatives in the different sectors and regions that would be similar to the European Cluster Cooperation Platform (ECCP). Organisations have also mentioned how difficult it is to identify the cluster initiatives in Japan. The lack of such tools and necessary budget for mapping cluster organisations in Japan can constitute a barrier to international cooperation with Japanese cluster organisations.

⁴⁷ EU-Japan Center cluster mapping in 2016. <http://www.eubusinessin japan.eu/library/publication/report-cluster-mapping-in-japan-2016>

3.3 Clusters in the four sectors in Japan: life science, ICT, energy and automotive

The following list of cluster organisations in the four previously identified sectors was selected with the support of the EU-Japan Centre for Industrial Cooperation based on key criteria such as openness and readiness for international cooperation with European clusters/SMEs.

Life science sector

Pro-Cluster KOBE and the Kobe Biomedical Innovation Cluster (KBIC)

Pro-Cluster KOBE was established in 2005. Pro-Cluster Kobe is particularly involved in supporting business development for companies in the **Kobe Biomedical Innovation Cluster (KBIC)** (presented below) and also SMEs located in Kobe in general. Its activities also consist in networking and fostering collaborations with **foreign life science clusters**. Pro KOBE has a team of 13 experts coordinating and managing the activities of the cluster.

In terms of support to businesses, the cluster runs the programme “*Medical Devices Developing Platform*” providing business support services such as expert consultation on drug discovery and medical device development, business matching, consultancy on regulation and patent issues, or market reports and surveys. The cluster also promotes the commercialisation of medical devices, through a platform “*Kobe Support Platform for Promoting Medical Device Commercialization and Marketing (KSP)*” established under industry-academia-government collaboration.

In terms of cluster **international cooperation**, Pro-Cluster KOBE particularly supports business development opportunities for companies in KBIC and SMEs in Kobe. Pro-Cluster Kobe has a collaboration with Flanders biotech cluster “*Flanders Bio*” in Belgium, on business as well as research in the life sciences field. Pro-Cluster KOBE signed an MoU with the “*Medicon Valley Alliance*” in Denmark and Sweden. More information on such cooperation is included on the website at: <http://www.ibri-kobe.org/english/cluster/international.html>.

Kobe Biomedical Innovation Cluster (KBIC) is one of the largest biomedical clusters in Japan. It defines itself as *forming “an integrated system from basic research to clinical applications (translational research) and industrialisation.”* It is promoted and supported by the City of Kobe. It is highly specialised in research, development and innovation, from basic research to the development of clinical applications and commercialisation. Its main fields of R&D are **medical equipment, clinical research on pharmaceuticals, and regenerative medicine**, and members’ activities are related to a variety of themes including treatment, diagnosis, prevention, caregiving, welfare and other fields.

The cluster brings together research institutes, highly specialised hospitals and multiple medical companies. The cluster indeed involves research institutes and facilities such as the Institute of Biomedical Research and Innovation; the RIKEN Centre for Developmental Biology (CDB); the Kobe Translational Research Informatics Centre (TRI); and the RIKEN supercomputer, and K computer. The

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cluster also encompasses highly specialised hospitals such as the Kobe Minimally Invasive Cancer Centre. These research organisations collaborate with over **260 companies and groups** to develop clinical and practical applications of drugs, regenerative medicine, medical equipment, and more.

The cluster is also active internationally, and its links with other Asian countries are a good example.

Both cluster organisations have a website, available in English: **Pro Cluster Kobe** <http://www.ibri-kobe.org/english/cluster/> and **Kobe Biomedical Innovation Cluster (KBIC)** <https://www.kobe-lsc.jp/en/>.

Northern Osaka Bio Medical Cluster⁴⁸

The cluster in Osaka is managed and supported by “*Osaka Bio Headquarters*”, an organisation attracting biotechnology companies to Saito Life Science Park. The cluster is based on the strengths of an accumulation of industry, academia and government actors in the field of life sciences in Osaka. It aims to create innovative pharmaceuticals, medical equipment, regenerative medicine and products. The cluster aims to further develop the life science industry. It promotes business development across the cluster, organises the communication in the cluster, and support the internationalisation of the cluster looking for networking cooperation opportunities with other overseas clusters.

The website of Osaka Bio Headquarters lists the major Life Science related universities and research institutions in Osaka, such as QBIC (Riken Life Systems Research Centre), the National Cardiovascular Research Centre, the CINET (Brain Information Communication Research Centre), the Technology Research Institute of Osaka, the National Institute of Advanced Industrial Science and Technology Kansai, and others. There are more than 300 pharmaceutical companies in Osaka city, especially in the north of the city. The headquarters of major pharmaceutical companies representing Japan, such as Shionogi Pharmaceutical Co., Ltd., Mitsubishi Tanabe Pharma Co., Ltd., Dainippon Sumitomo Pharmaceutical Co., Ltd., and Takeda Pharmaceutical Co., are based in Osaka. It is one of the biggest industrial hubs in medical and pharmaceutical domain in Japan.

Utsukushima Next-Generation Medical Industry Agglomeration Project

Fukushima Prefecture is one of the leading Japanese prefectures for the production of medical devices including research and development (R&D). Main actors in the R&D field are local universities including Fukushima Medical University, Nihon University College of Engineering, Fukushima University, and the University of Aizu. Around **50 medical device manufacturers** operate in Fukushima Prefecture such as Novo Nordisk Pharma Ltd., Hakuzo Medical Corp., Fuji Systems Corp., and Tomy Inc. Fukushima Prefecture has the production sites of major leading corporations such as Olympus Medical Systems Corp (Aizu Olympus and Shirakawa Olympus corporate divisions) which manufactures approximately 70% of their gastrointestinal endoscopes in Fukushima Prefecture. Fukushima Prefecture also has the production sites of the leading U.S. medical device manufacturers: Johnson & Johnson K.K., Becton, Dickinson and Company.

Based on these strengths, Fukushima Prefecture launched “**Utsukushima (Beautiful Fukushima) Next-Generation Medical Industry Agglomeration Project**” in 2005 to promote the **regional integration of medical device related industries**. The clustering project is based on industry-academia-government

⁴⁸ Osaka Bio Headquarters: <https://osaka-bio.jp/>

collaboration. The objective for Fukushima Prefecture is to become a “*world-class leading centre of medical related industries.*”

The activities of the cluster are notably:

- Business matching services;
- Support SMEs in market development;
- Promote R&D of medical devices utilising technology innovations from universities;
- Support SMEs to handle approval and licensing procedures under the Pharmaceutical Affairs Act;
- Grants for medical industry;
- Hosting of seminars on medical and healthcare devices and on human resources development through medical-engineering collaboration.

An MoU between Fukushima Pref. and North Rhine-Westphalia (NRW) in Germany was signed through RIT* programme support by JETRO.

The cluster has a website in English: <http://fuku-semi.jp/iryou-pj/English/index.html>

Kanagawa Healthcare and Life Innovation Cluster

The Kanagawa Prefectural Government has developed a group of new policies called “*Healthcare New Frontier (HCNF) Policy*” to address the challenge of aging population in Japan. The Health Care New Frontier promotion headquarters office is responsible for promoting their various initiatives, such as the Kanagawa healthcare life innovation centre. The Government of Kanagawa Prefecture (Kanagawa) is planning to establish the “**Life Innovation Centre**” at Tonomachi area in the City of Kawasaki, which is located near Haneda (Tokyo) International Airport. Already, many companies and institutions involved in the life-sciences field are located in this area. The Life Innovation Centre is primarily a scientific laboratory, but also conducts the following six activities:

- R&D;
- Prototype;
- Production;
- Clinical practice;
- Human resource training;
- Support for Industrialization.

Scotland International Research Agency installed an office in this area. Several MoUs have been signed with European projects and organisations in the EU such as Cell Therapy Catapult- UK, Oulu-Finland, CVT Valorisation in the South of France.

The centre has a webpage in English: <http://www.pref.kanagawa.jp/mlt/f531223/p1002234.html>

ICT sector

Yokosuka Research Park

Yokosuka Research Park (YRP) is an R&D cluster on ICT based in the southern suburban area of Yokosuka City, Kanagawa Prefecture since 1997. It is especially focused on radio and communications

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technologies and commenced its activities in October 1997. There is a number of national and private research institutes and companies, performing R&D activities gathered in the area. Various R&D facilities and test facilities are provided in YRP, and forums and committees offer opportunities to discuss new technologies and their applications. Events are held regularly to promote domestic and international exchange as well as industry-academia-government collaboration, and training courses for human resource development are also provided all through the year.

There is a website available in English: <http://www.yrp.co.jp/en/index.html>

The Okinawa IT Shinryo Park (OITSP)

The Okinawa IT Shinryo Park (OITSP) is an important project of the Okinawa Prefecture. It aims to create a **major site** for ICT affiliated industries, both domestic and foreign companies. The objectives of the Okinawa IT Shinryo Park (OITSP) is to promote ICT industries in Okinawa Prefecture, generate ICT industry clusters (with focus on R&D), and contribute to enhancing the international competitiveness of the ICT industry in Japan. The park acts as a cluster organisation whose mission goes beyond the management of a technology park.

One goal of the cluster agenda is to connect Japanese and Asian organisations working on ICT, and act a “bridge”, acting notably through training and exchange of IT personnel. Internationally, the cluster particularly targets Asia nowadays. There is a website available in English: <http://www.it-shinryo.org/en/index.html>

Electricity and renewable energy sector

Kyushu Recycle and Environmental Industry Plaza (K-RIP)

K-RIP is an organisation defined as an industry promotion association for the renewable and environmental industry located in Kyushu. It was created in 1999 and gathers representatives of the government, industry and academia, established to develop and promote the environmental and recycling industries in the Kyushu region, with a focus on SMEs. K-RIP has been one of the 19 projects supported under the Japanese Industry Cluster Programme in 2001 (until 2009). The focus of the cluster organisation is to support environmental businesses in their development, through providing information, supporting them on funding opportunities and technology development. It has a team of specialised experts and notably supports its members individually in developing business plans. Other services by the cluster include human resources development programme, networking, business matching services, support for market development, support to internationalisation and event and news information. K-RIP also intends to promote the Kyushu cluster internationally. Nowadays, its international focus is Asia, as K-RIP has concluded industry exchange agreements with organisations, such as cluster organisations, industrial parks and governmental organisations, in China, Malaysia, and South Korea.

The cluster has a website, only available in Japanese and a brochure in English at: <http://www.k-rip.gr.jp/publication/detail02/>

Kawasaki Green Innovation Cluster

Kawasaki Green Innovation Cluster is a network established in April 2015 for promoting the four axes of the “*Promotion Policy on Kawasaki Green Innovation*”. Many environmental technologies were accumulated in the area of Kawasaki City after the city suffered serious air and water pollution in the past. The cluster aims to improve the environment through industry-university public-private partnerships and promote industries and international contribution. Applications examples of the green innovation cluster include decarbonisation, waste disposal, water business, hydrogen, smart city. Several examples of projects conducted in these application fields are mentioned on its website.

The cluster is particularly oriented towards enhancing the creation of new projects and supporting business development. It provides:

- A consultation office supporting organisations, notably about the Kawasaki City rules and measures – one-stop consultation;
- Support to businesses in providing and sharing information on projects and clusters, and funding opportunities and holding seminars on public programmes;
- Support for the creation of businesses and support to RDI projects;
- Promotion of the environmental technologies and services developed in Kawasaki City.

In terms of internationalisation, the cluster proposes seminars to its businesses on overseas development, and proposes participation to the Kawasaki international Eco-Tech Fair (business matching services organised). There is a website available in English: <http://www.kawasaki-gi.jp/english/>

Nagasaki Marine Industry Cluster Promotion Association⁴⁹

Nagasaki Prefecture is a seafront prefecture and much of the economy is linked to ocean trade and maritime industries. Nagasaki prefecture has a vast area of sea and many islands and a great potential with respect to ocean energy such as offshore wind power generation and tidal power generation. It benefits from the technical strength of the shipbuilding industry and the energy industry which is the core industry of the prefecture. Nagasaki Prefecture launched the “*Nagasaki Maritime and Environmental Industry Base Special Zone*”, in July 2013, with the aim of creating new employment by forming bases of marine and environment related industries. The Cluster Promotion Association is a quite new organisation created in 2014. It is made up of local industrial businesses⁵⁰, and is Nagasaki Prefecture's first marine industry cluster promotion association. The ambition of the cluster is to form a group of internationally competitive businesses in the field of marine industry, with a focus on **marine renewable energy**. Nagasaki prefectural administrative agencies, universities and research institutions are also members of the cluster association. The main goals of the cluster association are the promotion of the participation of local businesses in projects related to marine renewable energy in three Nagasaki prefectural areas of the sea – including research and demonstration projects; and the creation of new projects, notably in the fields of ocean robotics, cooperation between fishing industries, and local production of electricity intended to local consumption. The cluster association

⁴⁹ Cluster website (Japanese): <http://namicpa.jp/>

⁵⁰ A list of members of the cluster with website link is available on the association's website at: <http://namicpa.jp/memberinformation/>

provides its business members with information on large projects in the ocean area. It also looks at strengthening their business activities and development, and providing them with opportunities to gain experience. The association also intends to fulfil a role of facilitator as to cooperation between industries, academia and government, particularly representing the industry in this process. The cluster is strengthening its cooperation with the Scottish government (recent visits were notably organised in the frame of JETRO Regional Industry Tie-up (RIT) Programme), the EMEC (European Marine Energy Centre) and overseas companies with advanced technology, which represent the cutting edge of the maritime renewable energy demonstration field, and with an a clear strategy for global expansion.

Automotive sector

Automotive Embedded System Industry Forum⁵¹

Tokai district occupies the leading position in Japan in the field of manufacturing, but in the software field it is heavily dependent on other regions, such as the Kanto and Kansai regions. In the automotive industry, the importance of embedded software is increasing fast as performance and safety technologies are improving. The Automotive Embedded System Industry Forum (ASIF) was established in 2008 with the objective of developing the in-vehicle embedded software industry in the Tokai district. ASIF is a group of industry-academia collaborative research groups working on embedded software for the automotive sector. It gathers together more than 80 members, especially businesses, notably many large companies. Its core activities are research and information dissemination on standard specifications related to software (including international standards, foreign national standards), youth training and human resources and conducting technology-related seminars. It created two activity groups (SIG: Special Interest Group): a study group dedicated to gather and build on fundamental knowledge and state-of-the-art of technology for in-vehicle software development, composed of members of ASIF; and a seminar group for planning seminars such as general technical seminars with a focus on in-vehicle software and more general public relations seminars. The study group intends to improve skills of participating companies. The ASIF web site does not mention any international cooperation activity or target countries.

Next generation Automobile Cluster of Chubu region⁵²

The Next Generation Automobile Cluster of Chubu region was entrusted by the METI "*Heisei 20 Growth Industry Clusters Creation Infrastructure Building Support Project (Next-Generation Automotive Technology Advancement and Other Field Development Support Projects)*". The METI aims to promote the Chubu region to become the "*world's strongest manufacturing advancement region*", and to strengthen the competitiveness of automotive-related industries, which is the core industry of Chubu region. Next generation Automobile Cluster has signed an MoU with CFK Valley (Germany – composite material, Pôle de compétitivité EMC2 (France – composite materials) and NCC National Composites Centre (UK - composite material www.nccuk.com).

⁵¹ ASIF website (in Japanese): <http://www.as-if.jp/index.html>

⁵² Website of the Next Generation Automobile Cluster of Chubu region <http://www.nisri.jp/jisedai/>

Next-Generation Automobile Miyagi Prefecture area

The Next-Generation Automobile Miyagi Prefecture area consists of an industry-academia-government innovation collaboration network for developing the next generation vehicles through the development of new products and new systems from university. The cluster focusses on Tohoku region, on the Miyagi Prefecture, as a major integrated regional hub in automobile industry in the mid-to-long term. The cluster aims at utilising the world's most advanced methods and techniques, including the ones from Tohoku University. The two main objectives are to become a research and development base for the next generation automobiles, and reinforce technical capabilities of the regional organisations and SMEs. Next Generation Automobiles in Miyagi Area is implementing the following three support programmes (from July 2012 to March 2017): building of knowledge network, human resource development programmes for innovation, and sharing research equipment and devices of endowed institutions / universities. This initiative is supported by the Ministry of Education, Culture, Sports (MEXT) in the context of the *"East Japan great earthquake disaster reconstruction aid"*. The cluster has a website available in English: <https://www.miyagicar-en.com/>

4. Cluster policies and programmes in Japan

Regional industry players in Japan have become concerned by the industrial decline of Japanese regions caused by globalisation, and consequently, the importance of regional innovation through scientific advancement/progress has gained recognition in Japan. National level **Cluster Plans** have been implemented and adjusted by the Japanese Government to become effective policies for regional innovation and job creation. Japan has had a clear cluster policy implemented by the Ministry of Economy, Trade and Industry (METI), the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and also by regional authorities. However, the lack of sufficient funds hinders its full-implementation.

In 2001, the **METI** established an industrial cluster policy. Twenty industrial cluster projects were launched within the first period, closing in 2005, aimed to enhance the competitiveness of Japan through industrial clusters. Between 2006-2010, Japanese cluster policy entered the second stage known as the *"industrial cluster development period"*, during which the aim was to develop specific types of businesses, promoting reforms in corporate management and the creation of start-up companies. Currently the third stage of the plan has been reached: the *"autonomous growth period"*, in which the industrial cluster projects are now expected to be led by their local governments, collaborating with their local academia and industry for further advancement. The METI does not have a substantial budget allocated to clusters in 2017. The findings of the 2016 cluster screening made by the EU-Japan Centre for Industrial Cooperation showed that during this period most of the cluster projects ceased their activities. METI is still supervising the existing ones and provide *ad hoc* (financial)

support in case of necessity such as the Fukushima region located “*Utsukushima (Beautiful Fukushima) Next-Generation Medical Industry Agglomeration Project*”.⁵³

The **Ministry of Education, Culture, Sports, Science and Technology (MEXT)** had likewise a cluster support policy called “**Knowledge Cluster Initiative**”⁵⁴. Knowledge clusters, Japan's unique formulation, referred to a system for technological innovation, made of a local initiative around universities and other public research institutions with original R&D topics. It also featured the participation of companies inside and outside the region. The programme was in operation up until 2011. In addition, in 2010, MEXT launched the **Project for Developing Innovation Systems** which aimed at establishing and improving the systems that enable individual regions to create proactively innovations through the industry-academia-government collaboration policy. As part of this national project, two programmes were created: the **Regional Innovation Cluster Programme**⁵⁵ and the **Regional Innovation Strategy Support Programme**⁵⁶. Both MEXT programmes have now ended and the 2016 mapping showed that almost all clusters supported through the above programmes have ceased their activities.

However, some financial supporting programmes have been recently launched that could be utilised by existing clusters as well. These annually budgeted programmes aim to provide funding (incentives / subsidies) to develop projects to improve regional industries.

The “*regional innovation ecosystem creation programme*”⁵⁷ is a regional innovation ecosystem-building programme supported by METI, the Ministry of Agriculture, Forestry and Fisheries (MOFF) and the Ministry of Internal Affairs and Communications (MIC). Targeting research institutions and local governments, the programme was launched after the purely academic Knowledge Cluster Building Programme ended. The aim is to enter a new phase, building a successful model to commercialise the technology assets in the region. The programme notably supports regional innovation hub centres, as well as networking activities between industry, academic institutions and local governments.

The “*regional core business creation support programme*”⁵⁸ is a yearly programme launched to financially support industries in a region to facilitate matching with local networks, market research, human resources development etc. Local companies and organisations such as clusters can apply to the subsidies through the Bureau of Economy, Trade and Industry in their region. Regional Industrial Promotion Agencies are also providing similar incentives / subsidies with the same aim.

⁵³ METI. http://www.meti.go.jp/policy/local_economy/tiikiinnovation/industrial_cluster_en.html

⁵⁴ MEXT. http://www.mext.go.jp/a_menu/kagaku/chiiki/cluster/index.htm

⁵⁵ http://www.mext.go.jp/a_menu/kagaku/chiiki/budget/budget.htm

⁵⁶ http://www.mext.go.jp/a_menu/kagaku/chiiki/program/index.htm

⁵⁷ MEXT http://www.mext.go.jp/a_menu/kagaku/chiiki/program/1367366.htm

⁵⁸ METI http://www.meti.go.jp/main/yosan/yosan_fy2016/pr/i/i_chiiki_02.pdf

The Centre of Innovation (COI) programme⁵⁹

The Centre of Innovation (COI) programme is one of the main funding programmes under the Centre of Innovation Science and Technology based Radical Innovation and Entrepreneurship Programme (COI STREAM) which was launched in 2013 by MEXT and is managed by the Japan Science and Technology Agency.

Regional Industry Tie-up programme developed by JETRO⁶⁰

This is a programme supporting the internationalisation of Japanese regions. It was developed by JETRO and has been running since 2007. In the Regional Industry Tie-Up (RIT) Programme, JETRO supports business networking and meetings between industry clusters of Japanese SMEs (in this case cluster is meant as an area with a concentration of companies operating in the same sector) and those from overseas regions, aiming to facilitate export, technological partnerships and joint development of products in software, processed food as well as manufacturing and environmental areas.

On average every year, 15 projects are implemented, targeting specific regions of the world and industrial sectors. In the past three years, through the RIT programme, JETRO supported cooperation with nine EU Member States (five in Germany, two in France, one in the UK) and in some cases EU clusters were also involved in the process.

Some examples of Japanese/European cluster collaborations include:

- Yonezawa City – Sachsen, Germany: cluster active in organic electronics and related parts;
- Toyama Prefecture – Ile de France: cluster active in the medical sector;
- North of Ibaraki Prefecture and nearby area – Baden-Württemberg, Germany: cluster active in the automobile industry;
- Kobe City – Northern Germany: cluster active in life sciences;
- Kitakyushu City - Baden-Württemberg, Germany: cluster active in industrial equipment and machinery;
- Saga Prefecture – France: cluster active in the cosmetic industry;
- Nagasaki Prefecture – Scotland UK: cluster active in renewable energy;
- Fukushima Prefecture – North Rhine Westphalia Germany: cluster active in renewable energy;
- Greater Nagoya – Western region of Switzerland: cluster active in micro-nano technology industry.

5. Conclusion

Japan is a highly developed economy, a major industrial country with high technology assets, and is also a major global trader and investor, which makes Japan an important partner for the EU.

Several sectors present potential for EU clusters and companies to engage in collaboration and seek market opportunities. This report focussed on the life sciences sector, the ICT sector, electricity and

⁵⁹ JST <http://www.jst.go.jp/tt/EN/platform/coi.html>

⁶⁰ JETRO <https://www.jetro.go.jp/en/jetro/activities/business/> and https://www.jetro.go.jp/ext_images/en/jetro/activities/business/rit.pdf

renewable energy, in line with the JETRO analysis. These sectors, as well as the automotive sector, are the main industrial sectors in Japan where cluster approaches have more potential to deliver on business development.

Japan has developed a cluster policy in the past with several ministries involved. Today, most programmes supporting clusters have stopped in Japan. Although, there are other programmes, dedicated to regional innovation hubs for instance, which can support cluster organisations.

An important drawback in detecting cluster organisations in Japan is the absence of a comprehensive (and comparable) cluster mapping like the ECCP's. Attempts to develop such network have been initiated by JETRO. In short, cluster organisation development in Japan is hindered by the lack of institutional support as well as an evolving EU/Japanese institutional framework. Currently there are three important business and innovation support organisations: JETRO, the EU-Japan Center and the EU Gateway. Each organisation offers a distinctive set of services.

Concerning future European/Japanese cluster collaborations, this preparatory briefing has allowed for an initial identification of some of the most relevant areas for cooperation, which concern pharmaceuticals, biotechnology, healthcare, medical and welfare areas. These are not only the sectors assembling the most cluster organisations in Japan today; these are also the sectors in which the Japanese government has chosen to focus from a policy and institutional perspective in the coming years. Consequently, the aging/medical/health welfare sector as well as the electricity and renewable energies sector are two areas of strong potential for future cluster based collaboration between EU and Japan. The renewable energies sector presents notably a strong potential based on the Japanese government's plan to increase energy self-sufficiency in the next decade.

Projects with strong cluster potential identified by organisations JETRO and the EU-Japan Centre organization and that should present an increased interest on the part of Japanese and European policy makers for cooperation in the future include the following:

- Biotechnology clusters:
 - Pro-Cluster KOBE;
 - Kobe Biomedical Innovation Cluster (KBIC);
 - Northern Osaka Bio Medical Cluster;
- ICT clusters:
 - Yosuka Research Park;
 - Okinawa IT Shinyro Park (OITSP);
- Electricity and renewable energy clusters:
 - Kyushu Recycle and Environmental Industry Plaza (K-RIP);
 - Kawasaki Green Innovation Center;
 - Nagasaki Marine Industry Promotion Association.

Several international events have been identified by JETRO and the EU-Japan Center as providing strong potential for developing cluster facilitated ties between European and Japanese businesses. Several events worth mentioning include **CEBIT 2017**, **BIO Japan** and **IT Trade Week**. At CEBIT 2017 where Japan had been appointed official partner country, the EU-Japan Center had its own stand and

a delegation of some hundred Japanese enterprises active in the health/digital sector has attended. The BIO Japan event in October 2017 was an international event for the global biotechnology industry. The EU Japan Centre organised an event at the 2016 edition, and again this year, gathering a high number of SME and cluster participants in this event. Lastly, the Japan IT Trade Week 2017, the largest IT services and software show is a good occasion for cluster matchmaking opportunities between European and Japanese businesses active in these sectors.

6. Interviews and contributions

- EU-Japan Center for Industrial Cooperation: Jessica Michelson, Marketing & Communication manager and Alessandro Perna - interviews in May 2016, and interview in January 2017
- Japan External Trade Organisation (JETRO) – Office in France dealing with France and Europe: Susumu Kataoka, Civil Administrator for the Ministry for Enterprise, Trade and Industry of Japan and General Director for JETRO in France