

Appendix A

An Overview of Trends and Prospects of Japan's Investment in Water Markets in Asia and the Pacific

EXECUTIVE SUMMARY

Water has risen as one of the most serious concerns in the Asia and Pacific region. Efforts of many countries in order to ensure the availability of water have been shown mainly as Official Development Assistance (ODA). Japan has been one of the most active contributors to the improvement of water and sanitation in developing and under-developed countries.

Specifically, Japan has developed a steady track of assistance in water and sanitation to the Asian region in the form of either bilateral or multilateral aid. By launching Water and Sanitation for Broad Partnership Initiative (WASABI) in 2006, Japan set basic guideline and policies for international collaboration on water issues. Japan's effective water-related projects have been well led and supported by various agencies: Ministry of Foreign Affairs (MOFA); Japan International Cooperation Agency (JICA); Overseas Economic Cooperation Funds (OECF); Poverty Reduction Fund (PRF); Overseas Development Cooperation (ODC); and Japan Bank of International Cooperation (JBIC) and etc.

Along with the assistance activities through ODA, Japan has been increasing its chances to advance into water markets in the Asia and the Pacific region. As a way to effectively advance into foreign water markets, Japan focused relatively on establishing public-private partnership (PPP). Japanese government strategy has welcomed the inclusion of private companies for adequate business and facility management.

However, in contrast to the consistent footprint of the Japanese ODA on water sectors, the track of profit-based water initiatives lacks regularity and systematic expansion. The trend of PPP has lost his original emphasis and significance, which resulted in the lack of consistence of performance. Historically, the private sector's role in Japanese infrastructure projects has been limited to the construction and financing of public assets, with a limited scope of service provision, which can cause problems of effectiveness.

Despite this, Japan possesses a great potential in successfully expanding its investments in the global and the Asia Pacific water markets, particularly in the ASEAN sub-region. Japanese government has kept putting efforts on developing water business and revising PFI Act. Advance of Japan's water business into the global market is still promising enough.

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ABBREVIATIONS

ASEAN: Association of South East Asian Nations
BCH: Berlinwasser China Holdings
BOO: Build-Own-Operate
BOOT: Build-Own-operate-Transfer
BOT: Build-Operate-Transfer
EPC: Engineering Procurement and Construction
IWRM: Integrated Water Resource Management
JBIC: Japan Bank of International Cooperation
JICA: Japan International Cooperation Agency
JWF: Japan Water Forum
LLP: Limited Liability Partnership
METI: Ministry of Economy Trade and Industry
MOFA: Ministry of Foreign Affairs
NRI: Nomura Research Institute
NRW: Non-Revenue Water
O&M: Operation and Maintenance
ODA: Official Development Assistance
ODC: Overseas Development Cooperation
OECF: Overseas Economic Cooperation Funds
PFI: Private Finance Initiative
PPP(s): Public-Private Partnership(s)
PRF: Poverty Reduction Fund
PWRP: Philippines Water Revolving Fund
SDG(s): Sustainable Development Goal(s)
SEA: South-East Asia
SSWA: South and South-West Asia
TOT: Takeover-Operate-Transfer
TWJ: Team Water Japan
UNDP: United Nations Development Program
UNICEF: United Nations Children’s Fund
USAID: United States Agency for International Development
USD: United States Dollar
WASABI: Water and Sanitation for Broad Partnership Initiative
WSCJ: Water Security Council of Japan

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INTRODUCTION

Water is one of the growing concerns in many emerging countries. It has stimulated an increase in the demand for water infrastructure. Water markets in emerging countries in Asia and other regions have presented huge opportunities for Japan. This paper presents an overview of the investment trends and opportunities available in the water and sanitation markets in Asia and the Pacific.

Japan has been providing a great assistance in water and sanitation sectors on the basis of its experience, expertise and technology to emerging countries in the form of Official Development Assistance (ODA) programs and grant aid programs. ODA has been one of the most vital tools for Japan not only to achieve its domestic interests but also to promote the prosperity of developing countries. Since the 1990s, Japan has been the world's largest donor country in the water and sanitation sector. By sharing its experience with the countries in need, Japan has been actively contributing to ensuring availability and sustainable management of water and sanitation for all, which is indicated in the Sustainable Development Goal 6 (SDG 6).

Japan's implementation of assistance in water sector does not stop just at the stage of assistance. It can be considered as a vital strategic approach for Japan to take a farther step to make inroads into water markets in Asia Pacific region.

By participating in overseas water projects primarily in forms of Official Development Assistance (ODA) programs, Japan has been increasing its chances to advance into water markets in Asia and the Pacific and generate profits.

JAPAN'S ASSISTANCE IN THE WATER AND SANITATION SECTOR

Japan's ODA in the water and sanitation sector

Japan's ODA in the water and sanitation sector can be divided into two ways: by category and by region. By category, it is mainly divided into six sub-sectors: water supply and sanitation-large systems; river development; water supply and sanitation-basic systems; waste management and disposal; water resources protection; and water resources policy and administrative management. Among six sub-sectors, water supply and sanitation-large systems has taken a great portion. By regions, it is categorized into five: Asia; Africa; America; Oceania; and Europe. Asia occupies the greatest portion of assistance by Japan. In terms of the volume of water investment in recipient countries in the form of ODA, Japan has accounted for 24.2%, which is ranked as the highest among donor countries as of 2011¹.

In February 2015, Japan set policies and principles under the Development Cooperation Charter approved by the Cabinet. Under the Charter, four stages of policy and implementation exist in a vertical order: Country Assistance Policy; Sectoral Development Policy; Priority Policies of Development Cooperation; and Rolling Plan. Water and sanitation issues are mainly dealt with in the stage of Sectoral Development Policy.

Japan's ODA is based on two main types: bilateral aid; and multilateral aid. Bilateral aid supports developing countries and region in a direct way while multilateral aid is an indirect contribution to international organization such as United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP) and the World Bank.

Bilateral aid can be divided into two main pillars: grants and government loans. Grants consist of Grant Aid and Technical Cooperation, which also include contributions to specific projects implemented by international organizations. Government loans include ODA loans and Private-Sector Investment Finance.

In 2006, Japan launched Water and Sanitation for Broad Partnership Initiative (WASABI) in Mexico at the Fourth World Water Forum for the purpose of serving as Japan's basic guideline for international collaboration. Basic policies of WASABI are following below:

- Pursuing the sustainability of water use
- Emphasizing the human security perspective
- Emphasizing capacity development

¹ A Study on the Korea's Water Industry Advancement to Abroad: Focusing on the Country-Customized Entry Strategy Establishment (1st year), 2013

- Pursuing synergistic efforts through cross-sectoral measures
- Considering local conditions and appropriate technology.
- In order to effectively utilize its experience, expertise and technology, five concrete measures were provided as well.
- Promotion of integrated water resource management (IWRM)
- Supply of safe drinking water and sanitation
- Support for water use for food production and other purposes
- Water pollution prevention and ecosystem conservation
- Mitigation of damage from water-related disaster

There are various agencies which work on various water-related projects for countries in Asia Pacific region including Ministry of Foreign Affairs (MOFA), Japan International Cooperation Agency (JICA), Overseas Economic Cooperation Funds (OECF), Poverty Reduction Fund (PRF), Overseas Development Cooperation (ODC) and Japan Bank of International Cooperation (JBIC). It is a matter of course that there are more than these agencies mentioned above.

Japan international cooperation agency (JICA)

JICA is one of the main actors in Japan's aid system. JICA mainly contributes to bilateral aid in the form of Technical Cooperation, Grant Aid and Government Loans.

JICA's cooperation and assistance in the field of water and sanitation can be divided into six areas:

- 1) Reliable water resources management based on real observation data
- 2) Improvement of access to water supply in urban areas:
- 3) Contribution to reduction of non-revenue water (NRW) and improvement of water/energy use efficiency
- 4) Sustainable rural water supply
- 5) Promotion of Improved sanitation
- 6) Integration of structural and non-structural measures and promotion of community-based disaster prevention in water-related disasters

Below is a brief explanation of each area:

1) Reliable water resources management based on real observation data

JICA provides assistance in the estimation of water resource availability primarily through the collection and analysis of hydro-meteorological data. Based on results, JICA then helps formulate master plans for resource development and management.

2) Improved access to water supply in urban areas

JICA offers assistance in water supply facilities in urban areas through ODA loans and Grant Aid. It also collaborates with local governments in Japan in terms of transferring technologies and operational

expertise. In addition, it also implements group training courses on urban water supply for workers of the water utilities in developing countries with the cooperation of the Waterworks Bureaus of Sapporo, the Tokyo Metropolitan Government, Yokohama, Nagoya, Osaka, and other major cities.

3) *Contribution to reduction of non-revenue water (NRW) and improvement of water/energy use efficiency*

With the cooperation of Japanese water supply utilities, JICA supports water operators in developing countries in reducing non-revenue water and improving efficient use of water and energy.

4) *Sustainable rural water supply*

Groundwater is used as the water source through grant aid.

5) *Promotion of improved sanitation*

Projects provided educational activities for the improvement of hygiene practices at schools and in surrounding communities.

6) *Integration of structural and non-structural measures and promotion of community-based disaster prevention in water-related disasters*

JICA has been incorporating non-structural measures into the conventional hardware measures in ODA loan projects for flood control and river improvement.

An overview of the domestic water market situation in Japan

The expectation on the future prospect of Japan's domestic water market is not so optimistic. This discouraged outlook has been presumed from the situation of its domestic water market in the recent past. The present state of the water market is slightly different for each sector, however, a gradual decline can be assumed in general after the scale of the domestic water market reached its peak in 2012. Along with Japan's low economic growth, a growth rate of domestic water market is expected to gradually decrease at least by 2018. As of data in 2014, the market value of drinking water system was around USD 7.2 billion. At the same time, it was estimated that the market value of drinking water treatment plant was around USD 2.3 billion and that of sewage treatment plant was about USD 3.4 billion in 2014.

Japan has been pushing forward with the establishment of water industry cluster partially to support the expansion of its investment in foreign water markets systematically. Because it has become more and more difficult for Japan to create demand for water infrastructure, many Japanese companies have been seeking new markets in abroad.

Until now, Japanese water industries have been mostly managed at a municipal governmental level, which is very different from Europe where water services were privatized from the very beginning. The market has been partially open to the private companies in the water sector. As of 2013, 20 private companies had been involved in the water management market. Opportunities for foreign companies in the Japan's domestic water market are very limited. Veolia, the French water company is the only one that succeeded in running its business stably in Japan. There is not enough expertise in the private sector on maintenance and management of water services and water treatment membranes. As a result of this domestic situation, Japanese companies could not easily expand water treatment industries overseas as well.

On 30 January 2009, Japan established the Water Security Council of Japan (WSCJ). WSCJ was created as an organization for the purpose of active cooperation between public and private sectors in water sector. Under the name of "Team Water Japan" (TWJ), activities on both domestic and global water issues have been assisted by WSCJ in collaboration with private companies, academic experts, government ministries, local governments and civil society. WSCJ is an organization of multi-stakeholders. Stakeholders report policy recommendations through discussions from three Special Committees: 1) basic policy, 2) technology and system, 3) cross-sectoral collaboration.

WSCJ has launched Action Teams to work on the issues of finance, planning, health, infrastructure, agriculture, energy, environment, disaster management, water, and other water-related portfolios. Policy recommendations are compiled from the three Special Committees by analyzing the issues and challenges raised by each Action Team. The recommendations are to focus on the improvement of sustainable water cycles both domestically and globally, based on the experience and technology developed by Japan so far.

The advance into the global water market

In the situation of decreased domestic water demand caused by lower economic growth, it has been expected that the scale of Japan's domestic water market would stagnate at around 77 billion USD. The stagnation of demand for domestic water and wastewater infrastructure has led Japan's water industries to strive for a breakthrough in foreign water markets. With the increasing importance of investment in global water markets, Japan has promoted policies for the creation of a water industry cluster and the support for the investment in foreign water markets. The country established a national level strategy in 2010 on the purpose of fostering water industries and creating around 37,000 water-related jobs. Water markets in Asia and the Pacific offers challenges and opportunities for the revitalization of Japan's economy in the long term.

In 2010, Water Partnership (Public-Private Council for Overseas Water Infrastructure) was established. As of 2013, 186 organizations participated in the partnership as members. The partnership aims to share information among public and private sectors on overseas projects for water infrastructure. In 2010, the Study Group for International Development of the Water Business was organized by the Ministry of Economy, Trade and Industry (METI) for developing Japan's water industry in a global market. It set a target to reach a global market share of around USD 15.4 billion by 2025.

One of the most competitive water sectors for Japanese water companies has been the water treatment (membrane and sea water desalination) and waste water treatment (recycling) sectors (Figure 7 and 8). According to the Ministry of Economy, Trade and Industry, the global water treatment business is expected to grow into a USD 700 billion market by 2025 and membrane technologies account for 60% of the global water treatment market.

Japan's water services are highly reliant on its municipal governments. This has led to a dearth of expertise in the private sector on the maintenance and management of water services. Japanese private companies have not been able to fully advance into the global water treatment market because unification of strategies by the individual companies has not been well implemented in terms of providing equipment such as water treatment membranes. To stimulate the unification of strategies and cooperation between industrial, governmental and academic sectors, the Water Security Council for Japan was formed in 2009. Moreover, the Limited Liability Partnership (LLP) Global Water Recycle System Association was also created in 2009 by fourteen water-related companies in order to encourage Japan's water businesses to enter into the global water market by conducting collaborated market research and technology development.

Japan has been seeking a way to make profits and produce economic benefits to both the countries engaged in and Japan.

Japan has sought to develop a stable water industry in mid and long term perspective through meeting growing water demand in developing countries.

The main sectors in water business can be divided into four:

- 1) Key technologies and devices (supplying parts and components, and providing technology)
- 2) Plant engineering, procurement and construction
- 3) Operation and maintenance
- 4) Business management, customer management and fee collection

Japan has a huge advantage in a number of key water and waste water technology sectors (especially pumps, ozonation, sewage disposal and construction of facilities). However, international awareness of Japanese companies is still low in point of operation and maintenance sector.

According to a survey carried out by Nomura Research Institute (NRI) in 2010, Asian countries have a common awareness that Japan's water service infrastructure is highly qualified but too expensive. This result tells the necessity of Japanese companies' efforts to better understand what developing countries want through cooperation and consultation with local governments.

It is estimated that more than 9000 management bodies dealing with drinking water and wastewater treatment services exist. This means that there are too many and too dispersed players in water industries, which act as a huge obstacle for effective advances into foreign water markets.

Lack of laws or regulations for the advances into global water markets poses another challenge. Laws such as local public enterprise law or waterworks law only cover the issues of supply of domestic water services.

Japanese water companies lags around 30 years behind European water companies in terms of overseas venture. Based on “Japanese-style international development model linking economic cooperation and business”, Japan should find out the best way to expand the water business, especially in Southeast Asian countries.

Japan lacks experiences and expertise on the field of operation and maintenance compared to other pioneer countries in a global water market. Thus, rather to approach a global water market comprehensively, it is recommended to strategically select target countries and cities in long term perspective.

The development of private and PPP initiatives

Demand for water supply and water treatment in developing countries keeps increasing as a result of urban population growth. Consequently, increasing extensive amount of fund is required to meet the demands for the development and renewal of facilities for water supply and wastewater treatment. Resource flowing from private sector initiatives in the form of public-private partnership (PPP) can provide an effective contribution to address these expanding needs, additional and complementary to those provided by own funds and development partners. Private sector can also play a fruitful role regarding the provision of technology and expertise for adequate business and facility management².

Under these circumstances, Japanese government strategy welcomes the inclusion of private companies in the global water market. Japan International Cooperation Agency (JICA) correspondingly adopted since 2008 an approach of collaboration with the Japanese private sector based on the conduction of feasibility studies on water infrastructure development. The JICA office for Private Sector Partnership established in 2008, and upgraded later to the Private Sector Partnership and Finance Department, aims to strengthen the cooperation with private corporations. Many PPP proposals have been submitted up to now.

In the water sector, this trend induced some initial results. Some examples of these initial outcomes are the Water Supply Improvement Plan for Ho Chi Minh City, in Vietnam; or the US-Japan Philippines

² (JICA, 2012)

Water Revolving Fund (PWRF). The PWRF was established with the objective of mobilizing private funds for the water sector through the leverage of a JBIC loan and the USAID credit guarantee.

In the last years, however, this trend has lost his original emphasis and has become less significant. Recent examples of PPP or private investment initiatives on the water sector are rarely seen. It can be therefore useful to identify some of the main constraints that hinder the development of water investment initiatives that involve the engagement of private actors. In order to better distinguish these constraint, we will first briefly summarize some of the main Japanese companies and initiatives that have consummated a relevant performance in the water sector in the Asia-pacific region. This will help us to determine their main features and limitations.

The Advance into Water Markets in Asia Pacific region

The demand for water infrastructure is correlated with increasing urbanization and economic expansion. Association of South East Asian Nations (ASEAN) countries where the rate of urbanization is more than 50% are the potential markets for Japan. Their demand for investment in water treatment has been expected to increase. The average annual growth rate of the water and wastewater market in Asia and the Pacific at 4.8%³ is the highest of all regions globally.

Since 2007, privatization of water supply has highly increased in Southeast Asia. This coupled with its huge population indicates that the region will become the largest global water market.⁴ The main water business type in Asia is BOT of water purification plants.

Japanese companies such as Marubeni, Mitsui & Co., Ltd., Sumimoto Corp. have advanced into the Chinese and Thailand water markets. Additionally, the Japanese local governments have been actively implementing technical transfer programs to ASEAN countries, resulting in the acceleration of the export of water infrastructure to ASEAN countries.

Indonesia is one of the biggest water markets for Japanese companies in East Asia. With its huge economy and a population of about two hundred million inhabitants, the country has a Gross Domestic Product (GDP)- PPP of around USD 846 billion. The potential and opportunities available in Indonesia's water and wastewater markets is enormous as projection estimate that the size of water market in Indonesia will be USD 15 million in 2017.

In Thailand, maintenance of water service is in progress. Since the recent implementation of a new law on PPP, the future of PPP on local water service has been bright. However, political instability seems to be a potential obstacle.

³ JRI (Japan Research Institute) 2014

⁴ JRI (Japan Research Institute) 2014

In Vietnam, based on a new development goal announced in 2009, the country has achieved the goal of providing water supply to all of its urban populace and about 85% of its rural populace. Local governments have been presenting several policies to pursue PPP. However, due to difficulties in reaching an agreement on water utility fees, the policies have been facing difficulties.

Actors and initiatives

There are several Japanese business entities that have been able to develop a track of investment in the water sector in the region. They include:

Japan Water Forum (JWF)

JWF was created as a network for exchange and cooperation among water stakeholders in Japan and abroad. Their main objective is to enhance knowledge about the fundamental impact of water on human lives, and launch effective measures and strategies that are needed to address water related issues.

JWF seeks to share the lessons and challenges experienced by Japan by coordinating efforts with UN agencies, international organizations, development banks, governments, private companies, researchers, and NGOs. Individual and corporate members support the activities of JWF. Some relevant corporate members include Kajima Corporation, Kurita Water Industries, Swing Corporation, or Metawater Co.

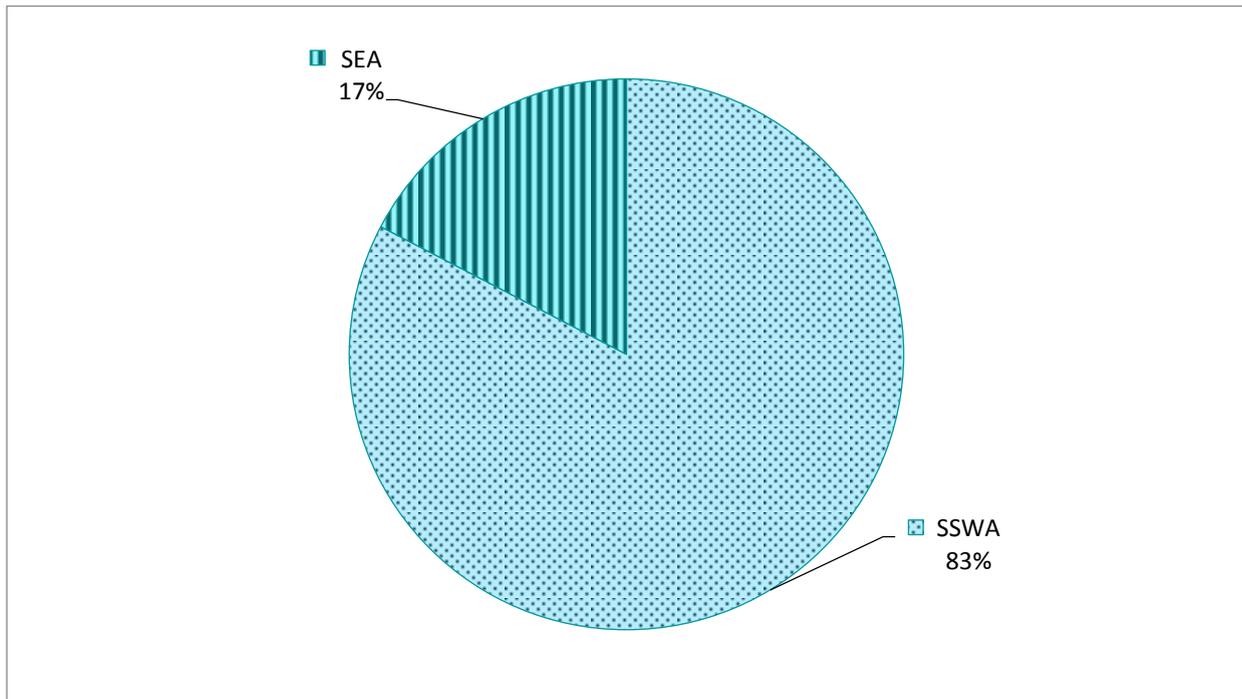
JWF activities are developed in four major areas: Policy recommendations, Knowledge transfer, capacity development and awareness rising, and Grass-root activities. Grass-root activities include assistance through the Japan Water Forum Fund (JWF Fund), assistance through the joint projects with JWF member companies, assistance through the Darvish Yu Water Fund (Nepal, Cambodia, Kenya, Sri Lanka, and Bangladesh), emergency assistance in times of water disaster or the Toilet Changes the World Project.

JWF Fund was established in 2005. It provides grants up to US\$1,000 funded by membership fees and donations from JWF's "Charity for Water" to selected grass-roots organizations in developing countries addressing the water-related issues. Projects are expected to be implemented by local organizations in cooperation with stakeholders, and under provision of proper technology⁵. During the last decade, a number of 150 projects have been implemented, with a total fund amount of US\$148,577. Among these, a total of 75 projects have been carried out in the Asia-pacific region.

⁵ (JWF, 2016)

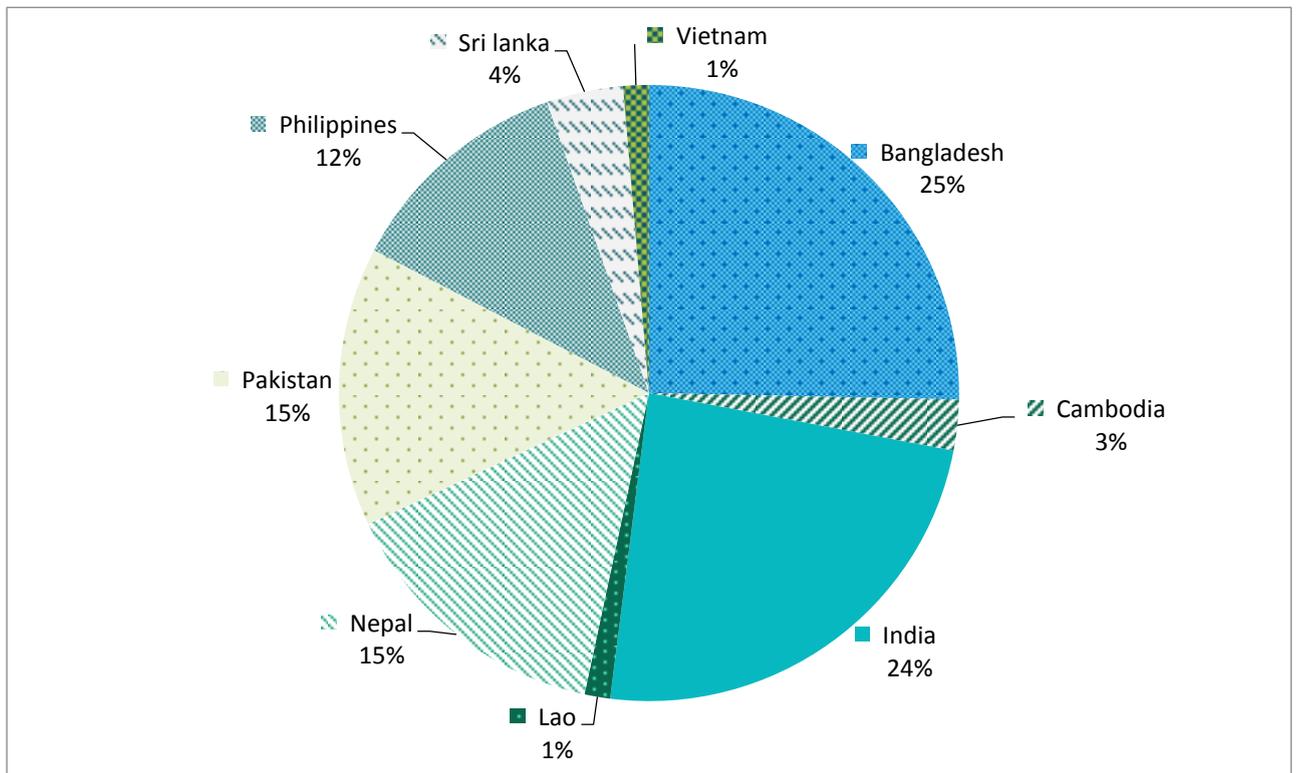
The focus of the JWF fund in Asia is limited to SEA and SSWA. The share of projects in the SSWA region accounts for an 83% of the total, with 62 projects. SEA received less attention, with only 13 projects (17%) implemented since 2005.

Figure 1. Geographical breakdown of JFW fund investment projects in the water sector by number of projects by sub-regions



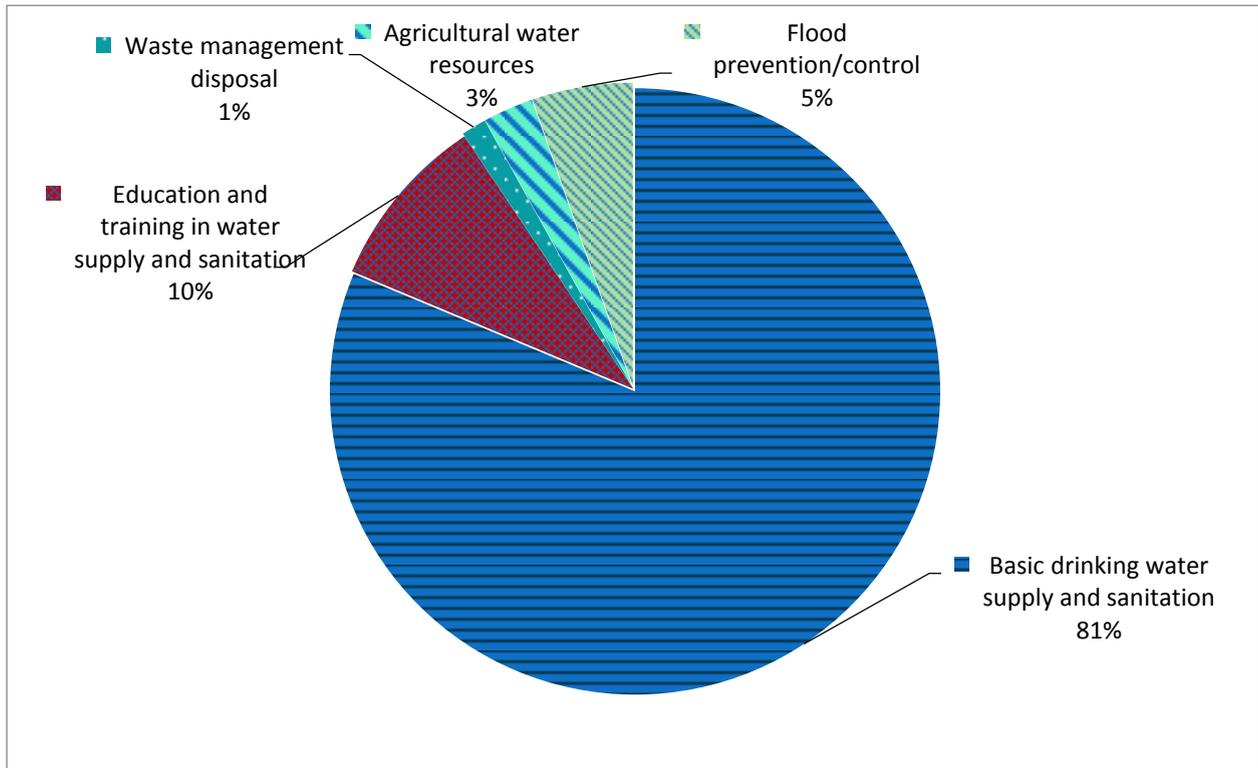
In the SSWA region, Bangladesh is the country that received the largest amount of projects, with 19 projects accounting for the 25% of the total. India follows Bangladesh with 18 projects (24%). These two countries account for almost half of the projects that were carried out. 11 projects were conducted in Pakistan and 11 in Nepal, each accounting for 15% of the total. Only 1 project (4%) was implemented in Sri Lanka. SEA track has mainly consisted in 9 (12%) projects in Philippines. Additional efforts in SEA were limited to 2 projects in Cambodia (3%), 1 project in Lao (1%) and 1 project in Vietnam (1%).

Figure 2. Geographical breakdown of KWF fund investment projects by number of projects by countries



Due to the small size of the JWF fund grants, only small scale system projects can be covered. Therefore, most part of initiatives developed small scale options for basic drinking water supply and sanitation. This sector accounts for 81% of total, with 61 projects. Among them, however, many included additional activities related to education, awareness and advocacy. Education and training in water supply and sanitation has been the second priority, with 7 projects (10%) focusing exclusively on this sub-sector. Projects addressing flood prevention or control represent 5% of the total, followed by agricultural water resources projects (3%) and waste management disposal (1%).

Figure 3. Sub-sectoral breakdown of JWF fund investment projects in the water sector by number of projects



Swing Corporation

Swing Corporation is a company with wide engineering expertise in water business that has built up a Japanese know-how network of operation and maintenance (O&M) of water supply and sewage systems. Swing activities cover design, construction and O&M of water treatment facilities, but provide also additional services such as business financing proposals and public-private initiatives. It has expanded its focus towards regional and global water markets, having launched solutions in 500 sites in 50 countries. Swing provides services for industrial water/wastewater treatment plants, as well as for public ODA water/sewage treatment projects. Their overseas services focus on Engineering Procurement and Construction (EPC) and O&M. They try to tailor these services to local circumstances through overseas offices that try to get advantage of local expertise. In spite of its wide record, specific data on projects is not available. Some of its major track record initiatives are included in the table 3.

Swing business operations have been reinforced by the capital participation of Mitsubishi Corporation and JGC Corporation, after acquiring in 2010 a 33.3% share of Ebara Corp's, and establish Swing Corporation as a joint enterprise. Individually, these three companies have also traced a path in the water sector.

JGC Corporation

JGC Corporation has been since 2004 investing in overseas water projects. His focus has been centered on business development to help to solve issues of extreme shortage of water in emerging countries. In Asia, JGC has developed efforts in the field of water management by investing in two purification projects and one seawater desalination project in partnership with Singapore's Hyflux in China. However, after 2012, and since the completion of these three projects, JGC has shifted its attention from this area.

Kurita Water Industries

Kurita is a water treatment company primarily focused on the development water treatment chemicals, water treatment facilities and maintenance services. Its main sub-areas of work are groundwater remediation, chemical cleaning, tool cleaning, water quality analysis, and environmental analysis. The corporation is one of the most relevant companies in the industrial water market in Japan. As a basic component of its growing strategy, Kurita seeks to expand its overseas business. Currently, it provides services and products to private clients in East Asia and Southeast Asia. To serve to that task, it operates together with overseas subsidiaries and affiliates.

Kubota group

Kubota provides water treatment services through engineering, procurement and construction (EPC) activities and manufacturing products. It was one of the first Japanese companies that expanded its water related business to Asia, by implementing a water works project in Cambodia during the 1950s. Currently, the company maintains its regional focus in Asia, having carried out several activities related with water infrastructure.

For instance, Kubota has provided infrastructure products such as iron pipes and pumps for the construction of water purification and sewage treatment plants in industrial parks of Southeast Asian countries. It's currently authorized to construct facilities in the Thilawa Special Economic Zone in Myanmar, which have been in operation since August 2015. The company is also constructing a wastewater treatment plant in the Phong Ke Industrial Park in Vietnam. Additional examples of launched projects include ductile cast iron pipes in China, a water draining facility in Bangladesh for flood prevention and agricultural development, septic tanks to respond to the needs of clean water in Vietnam, reconstruction of water supply systems in Cambodia, or water removal pumps for the relief of 2011 Thailand floods.

Metito

Metito is a market oriented company with a wide investment track in the water and wastewater sectors. Its services range from project design to engineering and financial structures, or water management solutions. Metito has engaged in Greenfield and Brownfield projects under Build-Own-Operate (BOO), Build-Operate-Transfer (BOT), Build-Own-operate-Transfer (BOOT), Takeover-Operate-Transfer (TOT), full concession, and Public Private Partnership (PPP) business models.

In its Greenfield initiatives, the company not only assumes the financial responsibilities of the project, but also undertakes design, construction, and commissioning activities. The Nanchang Qingshanhu BOT Wastewater Treatment Plant, in China, provides an example of regional Greenfield project. Brownfield projects consist in small capital investment flow of income which is steadily provided during long term periods of 20 to 30 years. The Hefei Wangxiaoying TOT Sewage Treatment Plant in China, serves as an example. The company has also achieved strategic acquisitions in Asia in order to expand its market share. In 2008, Metito acquired 51% of Berlinwasser China Holdings (BCH) Company. In 2011, they acquired the rest of the stake. As a consequence, Metito holds thought its subsidiary BCH concessions and long term O&M contracts in China serving the cities of Nanchang (3.9 million inhabitants) and Hefei (4.9 million inhabitants) via BOT and TOT business models respectively.

Additional examples of Greenfield and Brownfield projects and strategic acquisitions are not available. Metito also provides water management services addressing network efficiency and maintenance. However, specific information about the implemented contracts is not available.

Main constraints for PFI and PPP in the water sector

In the last decade, there have been clear efforts by the Japanese government to encourage private and PPP investment initiatives to assist developing countries. 70% of funds flowing from developed countries have come in the last years from private sources in different sectors. In 2011, the Japanese government reviewed the Act on the Promotion of Private Finance Initiative (PFI Act), aiming to incentive PFI projects. In June 2013, the government launched a “Japan Revitalization Strategy”, which projected an aggregated investment requirement of USD 120 billion for PPP and PFI projects over the next 10 years. However, regarding Japanese companies’ investments in the water sector, progress have been limited.

As we’ve analyzed, grants coming from the JWF fund are very narrow in amount. In some other examples, such as the JGC Corporation case, the investment trajectory has been short or irregular. Furthermore, there’s a remarkable lack of data and information respecting the initiatives carried out by companies such as Swing Corporation, Metito, or Kurita water industries. There’s also an absence of examples of recent JICA and private sector partnership activities in the water sector.

In conclusion, we encounter that there are some constrains that hinder the development of Japanese private or PPP initiatives on the water sector. If compared with the case of Korea and its governmental agency K-water, with an intense overseas activity on comprehensive water resource

development, we find that Japan doesn't hold any agency with an equivalent role. While in the recent years K-water has launched grants that usually exceed the size of 110 million USD, Japanese initiatives have tended to be less ambitious and irregular, especially during the last five years.

Bellow we provide a brief insight on the main problems we've distinguished. Historically, the private sector's role in Japanese infrastructure projects has been limited mainly to the construction and financing of public assets, with a limited scope of service provision. Due to this constraint over its focus, projects tend to be primarily based on inputs rather than outputs. This can create problems of effectivity, especially beyond the construction phase of a project.

Moreover, as we've identified, projects with small capital value tend to prevail. This is because private companies cannot adequately finance large construction costs from their own revenues, mainly obtained from water users. Financing for relevant projects will hence predominantly rely on public support. This fact is exacerbated by the traditional substantial role of Japanese government subsidies in the water market, which is a very distinctive feature of Japan not transferable to many other countries⁶. The projects and activities we've listed have also a very local focus in their respective scenario of implementation.

Together, all this factors can undermine the interest of Japanese domestic market in PFI and PPP water initiatives. Additional obstacles are also posed by the lack of awareness and participation from international market participants or by the tax structure restrictions over the long term financial equity⁷.

⁶ (The World Bank, 2006)

⁷ (JETRO, 2010)

CONCLUSIONS

After our analysis we can identify the following concluding findings.

As the largest public donor in the water and sanitation sector, Japan has developed a steady and effective track of assistance to emerging countries in the form of ODA. This track has been supported by policy strategies such as the Development Cooperation Charter approved in 2015, and initiatives such as WASABI. JICA has been the main agency responsible for the management of Japanese aid record in the water and sanitation sector, by providing Technical Cooperation, Grant Aid, and Government Loans.

In contrast to this perspective, the track of profit based initiatives presents a more inconsistent footprint. In the Japanese domestic water market, municipal governments have traditionally kept a very relevant role, thus restricting the opportunities for private companies. Primarily, the role of Japanese companies has been limited to the construction and financing of public assets. Additionally, private sector has encounter difficulties to access the technical knowledge developed by private authorities through their extensive path in the water sector. Those limitations of the domestic markets have also been shaping the behavior of Japanese investment actors in the international environment. Due to their traditional partial scope, Japanese companies present a lack of capabilities in comparative terms with international water investment entities such as the Korean governmental agency K-water.

As a result, the advance into the global and Asia-pacific market has been irregular and weak. From a sub-sectorial perspective, while water supply and sanitation-large systems projects received the largest share of support from ODA, the trend of PFI and PPP investment seems to be focused on Basic drinking water supply and sanitation, according to our observations on JWF initiatives and individual case projects. The main reasons of this are precisely the constraints over the private sector that we've been tracing. Furthermore, lack of transparency of information and data regarding water related projects lead by private capital is also a prevalent issue.

In spite of this, potential windows of opportunity are still existent in the global and Asia-Pacific water market, particularly in the ASEAN sub-region. Japanese government has already taken some steps to fill this gap, such as the development of a Study Group for the International Development of the Water Business by the MITI, or the revision of the PFI Act. Further efforts are needed in this direction.

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ANNEX: TABLES AND FIGURES

Table 1: Rate of GDP growth, water usage and wastewater system in Thailand, Indonesia and Vietnam

A number of East Asian countries began to provide opportunities of investment for private companies in markets of water purification and desalination plants. And this situational flow is indeed a chance for Japanese companies as well.

	Thailand	Indonesia	Vietnam
GDP(PPP)(2011)(Billion USD)	346	846	123
Growth Rate of GDP (2006-2011)(%)	11%	18%	15%
Rate of water usage (2010)(%)	48	20	23
Rate of wastewater system (2010)(%)	96	54	76

Source: IMF Data, WHO/UNICEF Data

Table 2: Analysis and prospects of Japan's advance into water markets in East Asia

Background of Marketability	The implementation of PPP in water supply is one of the high priorities for East Asian countries. The estimated market value of it is around USD 528 million. Even though the lack of leadership and coordination skills works as an obstacle, the water business where private and public companies can advance into is indeed bright.
Environment for Competition	Japan needs to improve more competitiveness in water equipment sector. The competitive market price is also necessary. It has been shown that some EPCs (Engineering-Procurement-Construction) that consider the reduction of OPEX (Operating Expense) important began to use Japanese products.
Current Advance of Japanese Companies into East Asian Market	Cooperation between local EPC and Japanese companies has been shown.
Prospects of Advance into East Asian Market	The most promising markets are water and wastewater services and desalination.

	Cooperation with local EPC is indeed needed. The implementation of O&M and consulting led by private companies to local companies needs to be more facilitated.
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Source: JRI 2014

TABLE 3: SWING CORPORATION MAJOR INITIATIVES

Project	Outline
Indonesia: Jakarta city, Sewage Treatment Plant for Senayan City Shopping Center	Applied MBR (Membrane Bioreactor) to enhance treatment capacity, also playing role in the facility's operation & maintenance
Malaysia: Shorubber (Malaysia) Sdn. Bhd. Rubber-processing Factory's Wastewater Treatment Plant	Application of latest denitrification technology and MBR (Membrane Bioreactor) to treat wastewater with high BOD (Biochemical Oxygen Demand) and nitrogen load
Vietnam: Hanoi City, North Thang Long Water Treatment Plant	Engineering/Procurement/Construction of full set of mechanical and electrical equipment for water treatment
Vietnam: Ho Chi Minh City Sewage Treatment Plant	Engineering/Procurement/Construction of full set of mechanical and electrical equipment for sewage treatment
Private recipient	Facility
Senayan City Shopping Center (Jakarta city)	Wastewater treatment(MBR) with operation and maintenance
Beverage Factory (Indonesia)	Wastewater treatment 1,350 m3/da
Food Processing Factory (Indonesia)	Wastewater treatment 2,000 m3/day (2013)
Thang Long North-Van Tri Urban Water Treatment Plant (Vietnam)	Capacity : 50,000m3/day Equipment: Coagulation and sedimentation treatment+rapid sand filtration (GreenLeaf Filter)

Binh Hung Wastewater Treatment Plant (Vietnam)	Binh Hung Wastewater Treatment Plant
Water Treatment Plant for Thang Long Industrial Park (Vietnam)	Water treatment capacity : 2,000m ³ /day+ 4,500m ³ /day Wastewater treatment capacity : 3,000m ³ /day
Wasterwater Facility for Chemical Factory (China)	Capacity : 1,150 m ³ /day Raw water quality:CODcr=1,500~2,500mg/l Treated water quality:CODcr ≤50mg/l
Sewage Treatment Plant	Capacity : 6,400 m ³ /day Equipment: Pre Sand filter→2stage RO→UF
ShorubberSdn.Bhd. Wastewater Treatment Plant for Rubber Processing Factory (Malaysia)	(MBR)Denitrification treatment facility
Centralized Sewerage System for Kuching City Centre (Package 1)	Capacity : 32,500 m ³ /day

FIGURE 1. GEOGRAPHICAL BREAKDOWN OF JFW FUND INVESTMENT PROJECTS IN THE WATER SECTOR BY NUMBER OF PROJECTS BY SUB-REGIONS

Region	Number of projects
SSWA	62
SEA	13

FIGURE 2. GEOGRAPHICAL BREAKDOWN OF KWF FUND INVESTMENT PROJECTS BY NUMBER OF PROJECTS BY COUNTRIES

Country	Number of projects
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Bangladesh	19
Cambodia	2
India	18
Lao	1
Nepal	11
Pakistan	11
Philippines	9
Sri Lanka	3
Vietnam	1

FIGURE 3. SUB-SECTORAL BREAKDOWN OF JWF FUND INVESTMENT PROJECTS IN THE WATER SECTOR BY NUMBER OF PROJECTS

Project type	Number of projects
Basic drinking water supply and sanitation	61
Education and training in water supply and sanitation	7
Waste management disposal	1
Agricultural water resources	2
Flood prevention/control	4