OPEN ACCESS

The 4th World Sustainability Forum
1 - 30 November 2014

http://www.sciforum.net/conference/wsf-4

World Sustainability Forum 2014 – Conference Proceedings Paper

Sustainable Development Goals: How Can Japanese Local Governments help?

Kanayo Hara[1], Peter Newman[2] and Yasuo Takao[3]

[1] 2-1-16 Nishida, Kagoshima-city, 890-0046, Japan
[2] Curtin University, GPO Box U1987, Perth, Western Australia
[3] Curtin University, GPO Box U1987, Perth, Western Australia

E-Mails: kanayo.hara@student.curtin.edu.au (K. H.); p.newman@curtin.edu.au (P. N.); Y.Takao@curtin.edu.au (Y. T.)

* Author to whom correspondence should be addressed; E-Mail: kanayo.hara@student.curtin.edu.au ; Tel.: +81-992-54-9728; Fax: NA

Received: / Accepted: / Published:

Abstract: The Millennium Development Goals (MDGs) were set to eradicate extreme poverty in 2000-2015, and the Sustainable Development Goals (SDGs) are set to replace the MDGs after 2015. The United Nations (UN) is leading several initiatives to elaborate on the SDGs and has recognised the difficulty of achieving all goals together. According to the UN initiatives, achieving the SDGs will be an agenda for everyone, regardless of countries, to prioritize ending extreme poverty and inclusive development for all as well as achieving major global sustainability issues like climate change. This paper explores the Japanese way of achieving the SDGs both in theory and practice. Municipalities are one of the most appropriate scales to enable sustainable development, thus three case studies on Japanese municipalities have been conducted to see if the early stages of achieving SDGs can be enunciated.

The results suggest that Japan through the Japan International Cooperation Agency (JICA) can facilitate the coordination of the most suitable sustainability practices including environmentally friendly technology transfer to aid-receiving areas in Asia. Its accumulated experiences with the MDGs and human security systems associated with JICA's approach will make the Japanese way of dealing with SDGs unique.

There are significant opportunities for Japan to help the Asian region reach their SDGs and Japanese municipalities should be preparing for these.

Keywords: Sustainable Development Goals, Japan, Local Government, Asian Region, Spidergram

INTRODUCTION

Sustainable development is now firmly entrenched in world politics nearly thirty years after it was first defined in the Brundtland Report [1]. It will however become even more significant as part of global governance when the world adopts the SDGs in 2015. This paper is about how they are developing and the importance of preparing to deliver these goals at all levels. It will focus on Japan but every nation must do similar preparatory work.

This paper aims to explore what are the SDGs and how Japanese national and local government can help deliver the SDGs in theory and practice. Four questions are explored:

1. What are the SDGs?
2. What are Japan's uniqueness and challenges associated with the SDGs?
3. How can Japanese local governments help on the SDGs?
4. What are some local case studies of how Japan can best help on the SDGs?

1. SUSTAINABLE DEVELOPMENT GOALS (SDGs)

1.1 The initiative process of the SDGs

The world has been focusing on the Millennium Development Goals (MDGs) since 2000 and are set in place to achieve their goals by 2015 [2]. The SDGs will be added to the UN's global policy agendas after 2015, and the SDGs together with other agendas, such as war and peace, nuclear weapons and reforming the global financial system [3] (pp.34-35). According to the outcome document of the UN's MDGs Summit in 2010 [4] (p.29), the post-2015 development agenda issue was first requested by the Secretary-General to make recommendations for broadening the global agenda beyond the MDGs as its focus had been on poverty reduction only and now needed to include broader sustainability goals.

The UN Conference on Sustainable Development in 2012, so called the Rio+20, directed prioritizing eradicating poverty *and* setting sustainability in the major stream of development for the post-2015 agenda [5] (p.1). Table 1 lists the identified global issues to be continuously focused for the post-2015 agenda.

Table 1: Identified Global Issues under Rio+20 Outcomes [5] (pp.21-46)

poverty eradication	regional efforts
food security and nutrition and sustainable agriculture	disaster risk reduction
water and sanitation	climate change
energy	forests
sustainable tourism	biodiversity
sustainable transport	desertification
sustainable cities and human settlements	land degradation and drought
health and population	mountains
oceans and seas	chemicals and wastes

small island developing states	sustainable consumption and production
least developed counties	mining
landlocked developing countries	education
gender equality and women's empowerment	Africa
promoting full and productive employment, decent work for all and social protection	----------

The SDGs have not yet been finalised [6] (p.4) but have three characteristics:
1. They must balance social, economic and environmental aspects and are consistent with all the UN conference and summit outcomes, including the MDGs.
2. They are action-taking, universally applicable to the differentiated circumstance of each area and involve all stakeholders.
3. Scientific data will be the basis for targets and indicators which assess the goals [5] (p.47).

1. 2 The suggested SDGs

Table 2 lists suggested SDGs by the two different organizations, the High Level Panel (HLP) and the Sustainable Development Support Network (SDSN). Both organizations set target periods from 2016 to 2030 [7, 3] (p.13, viii).

Table 2: Suggested SDGs [7, 3], (pp.30-31, 28-31)

High-Level Panel		SDSN
End poverty	**1**	End extreme poverty including hunger
Empower girls and women and achieve gender equality	**2**	Achieve development within planetary boundaries
Provide quality education and lifelong learning	**3**	Ensure effective learning for all children and youth for life and livelihood
Ensure healthy lives	**4**	Achieve gender equality, social inclusion, and human rights
Ensure food security and good nutrition	**5**	Achieve health and wellbeing at all ages
Achieve universal access to water and sanitation	**6**	Improve agriculture systems and raise rural prosperity
Secure sustainable energy	**7**	Empower inclusive, productive, and resilient cities
Create jobs, sustainable livelihoods and equitable growth	**8**	Curb human-induced climate change and ensure clean energy for all
Manage natural resource assets sustainability	**9**	Secure ecosystem services and biodiversity, and ensure good management of water and other natural resources
Ensure good governance and effective institutions	**10**	Transform governance for sustainable development
Ensure stable and peaceful societies	**11**	----------

Create a global enabling environment and catalyse long-term finance	**12**	----------

Whatever emphasis is finally taken or detailed indicators are chosen, it is clear that there will be around ten SDGs and that they will be incorporating the MDGs and a new set of global sustainability goals. Thus the SDGs will go beyond the poverty eradication agenda that has been mostly the aid development agenda, and will now be something that impacts on every area of development. It will almost certainly impact on all nations at every level of governance.

2. JAPAN'S UNIQUENESS AND CHALLENGES IN RELATION TO THE SDGs

2.1 Country Profile of Japan

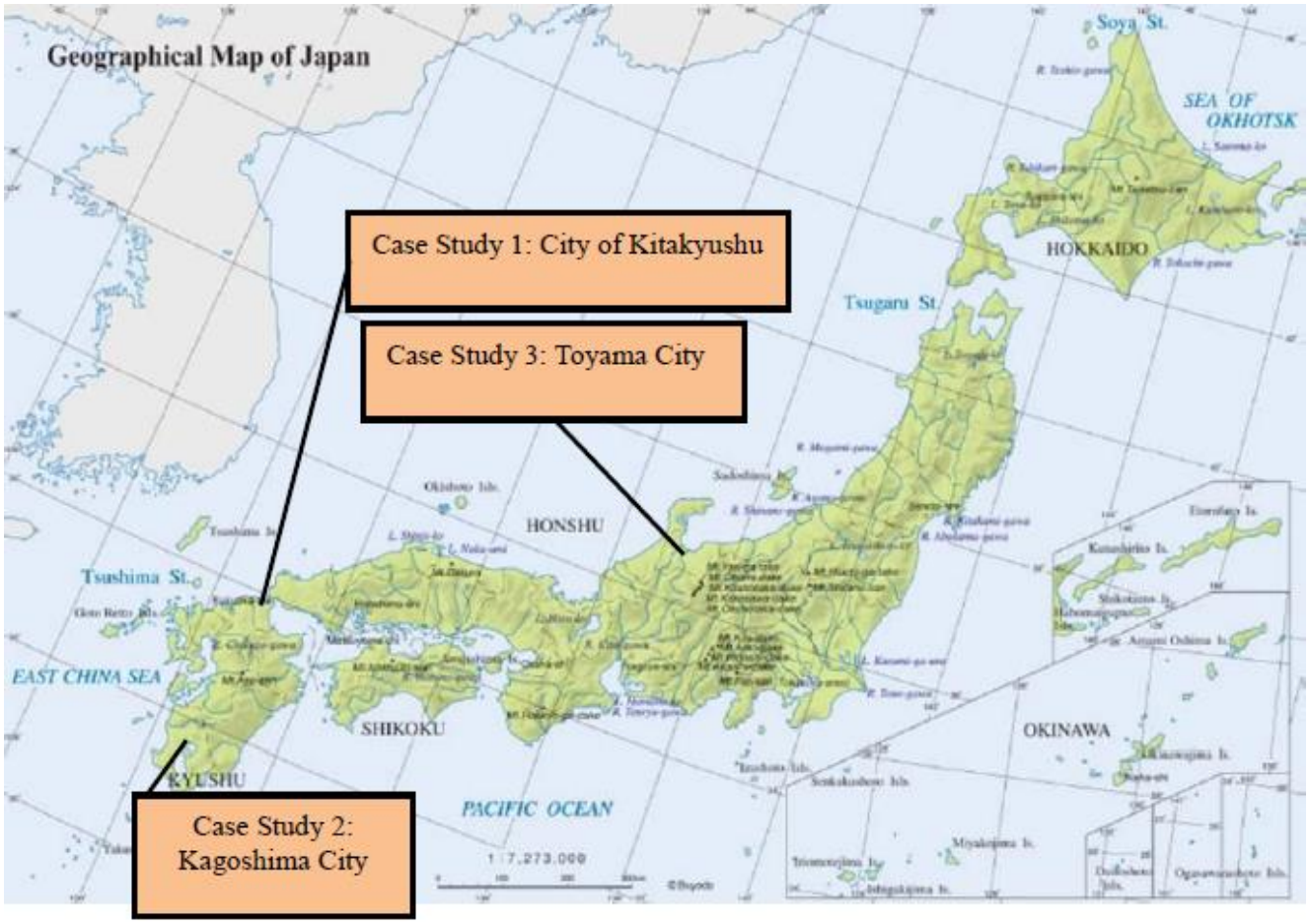
This section tries to describe Japan's development condition based on data from broad aspects which will be the base to relate Japan and the SDGs in the later section.

Japan has a very diverse series of landscapes and cities with a long history of resilience to natural disasters from its volcanic activity and its predilection to landslides. This is a common experience throughout Asia and is one reason Japan is able to assist the Asian region in its development. Map 1 shows the country and the sites of the three case studies examined in this paper.

If the Kyoto mechanisms credits are taken into account, Japan is likely to meet the Kyoto Protocol's goal, reducing their GHG 6% below 1990 level for the first commitment period [8]. The government has progressively revised their policies relating to global warming to demonstrate improvement [9] (p.119). The increased efforts include promoting environmentally friendly technologies to move to low-carbon cities, enhancing diverse cooperation among private and public sectors [9] (p.123), implementing the layers of policies enhanced by assessment and further improvement, and transferring low-carbon technologies to other countries through international cooperation [9] (pp.124-125).

Six principles are applied to Japan's measures and policies for achieving its carbon goals: fundamental change of the socioeconomic system and physical structure, multi-stakeholder involvement, reducing resource consumption, energy efficiency in every direction, the GHG emission reduction from every source, and changing lifestyle and work style [9] (pp.130-131). 'Reduce, Reuse and Recycle' are highly promoted [9] (p.164). Some of the policy examples are greening cities [9] (pp.171-172) and the carbon tax which was imposed on all fossil fuels with some exceptional cases since 2012 [11]. The effects on households from this tax are expected to remain low, 100 yen per month for average households [11]. The Japanese government's carbon emissions trading scheme is currently called the J-Credit scheme which promotes GHG emission reduction from small and medium companies, agriculture, forestry, transportation sectors and communities with the help of large companies [12] (p.5). It enables technology transfer from the large companies to the smaller companies and the other sectors, and the large companies can gain the credit that can be used to meet its own voluntary emission goals [12] (pp.12-13).

Map1: Japan [10] **and the Location of Case Studies**



2.2 Japanese Bilateral ODA, Revised Policies and the MDGs

Japan was the world's largest ODA donor country throughout the 1990s until 2000 fluctuating around US$10 billion [10] (p.122). Then, the ODA size in recent years ranked as the fifth largest in the world, while the US sharply increased the ODA since 2000 and maintained the largest donor position reaching US$30 billion in 2010 [10] (p.123). The ODA has two major assistance channels: one is bilateral between donor and recipient countries, and the other is to fund through multilateral institutions such as the World Bank and the UN agencies [10] (p.121). All top five donor countries spent over two thirds of the ODA on bilateral aid in 2010 [13] (p.238). The SDSN [3] (p.25) suggests 0.7% of gross national income should be directed to the ODA to achieve the SDGs, and Japan's portion was only 0.28% in 1995 and was 0.20% in 2010 [10] (p.122).

On the other hand, assistance in the form of bilateral investment by business and industries accounted for nearly 77% of Japan's total assistance value of US$61,828 million in 2011, already playing a large role compared to the ODA's share of 17.5% and voluntary group's share of 0.8% respectably [10] (p.122). The larger donor countries show a clear trend for this private financial investment over the ODA. The total ODA by the member countries of the Development Assistance Committee of the Organisation for Economic Co-operation and Development (OECD) was US$128,466 million, while the private flows of the member countries totalled at US$341,368 million in 2010 [13] (p.244).

Japanese ODA allocation to Asia, the largest recipient region of Japanese ODA, fell from 54% to 21% between 1995 and 2011, whereas the ODA to Africa increased since 1995, allocating the largest share of 27% of the total ODA to Sub-Saharan Africa in 2011 [10] (p.124). Also, 70% of Japanese ODA has an infrastructure focus such as education, health, water, transport and electricity, and the proportion is much higher than other major donor countries [13] (p.242). This inclination to economic infrastructure projects are often internationally and domestically criticised [14] (pp.256, 270).

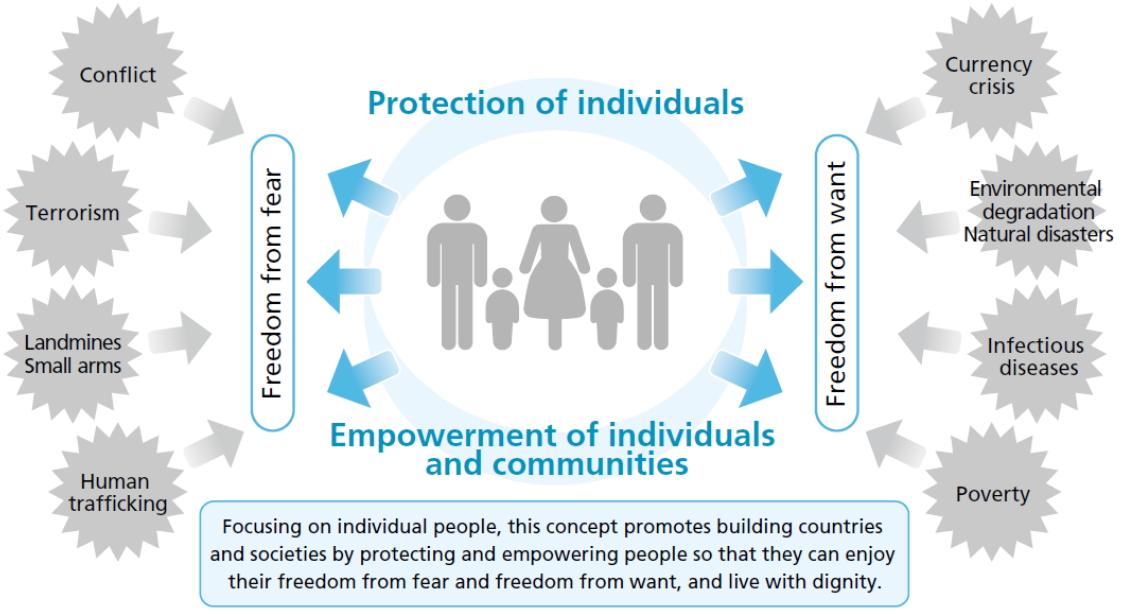
Another criticism is the lack of both aid philosophy and strong leadership for Japanese ODA as the result of different intentions of economic, political and fiscal purposes by some influential ministries [14] (p.261). Also, budgeting is not coordinated among each ministry and agency, and the JICA is only responsible for implementing ODA support [14] (p.263). Another concern is the unfavourable outcome against ODA policies of avoidance on military expenditure and on countries which prioritise military expenditure [14] (pp.260, 270). Thus, the efficiency and usefulness of Japanese ODA is questioned [14] (p.270).

In response to these criticisms and global issues particularly climate change, the ODA Charter was revised in 2003 "to contribute to the peace and development of the international community and thereby to help ensure Japan's own security and prosperity" [13] (p.216). The new Charter has five policies: assisting empowerment and capacity building of recipient countries, human security, fairness, applying Japan's experiences and enhanced partnership with broader stakeholders [13] (p.217). Then, they were detailed in the Medium-Term Policy on ODA in 2005 [13] (p.173). Also, after the ODA review in 2010, transparency was strengthened by shared program objectives by broad stakeholders, consistency with recipient's needs, evaluation, information disclosure, better public relations and external audit [13] (pp.173-175).

Importantly, the new JICA Guidelines for Environmental and Social Considerations was adopted in 2010 [13] (p.176). These show more actions on climate change issues. The accumulated value of the ODA between 2009 and 2012 was US$17.6 billion [15] (under "Japan's Bilateral Climate-Related Aid"). Mitigation assistance accounted for 49% of the total accumulated amount, adaptation assistance accounted for 15%, and combined mitigation and adaptation projects accounted for 36% respectively [15] (under "Japan's Bilateral Climate-Related Aid"). Considering that Japan's annual ODA is some US$10 billion in recent years [10] (p.122), the climate change mitigation and adaptation assistances have the largest share. According to an email communication [16] with an officer at JICA, a holistic approach is the most difficult challenge as Japanese governments, recipient countries and JICA take a segmented approach for each climate change issue. However, JICA has developed mitigation and adaptation guidelines to tie together both development projects and climate change measures so in this regard they are probably one step ahead of the rest of the world. This task will be high on the agenda of every nation once the SDGs are agreed and delivery is the focus.

On the other hand, capacity building is the primary ODA policy for Japan [13] (p.217), and what makes the particular Japanese way of achieving the MDGs. Thus human security is likely to be continuously applied to the SDGs [13] (pp.7-8). Figure 1 explains the concept of human security that enables individuals to work for their own needs and their own community.

Figure 1: Human Security [13] (p. 8)



Its emphasis is on equal access to the necessary assistance and inclusive economic growth, so that everyone can participate in the progress that can lead to further prosperity for an entire society [13] (p.8). Importantly, protection from the threats associated with climate change and associated security issues become crucial and have been integrated, in addition to empowering the citizens in the developing countries to achieve the MDGs [13] (p.8).

Human security became one of the principles in the UN through Japan's initiative and funding to establish the Commission on Human Security co-chaired by Sadako Ogata and Amartya Sen [17] (pp.125-126), issuing a report named *Human Security Now* in 2003 [17] (p.127). However, this remarkable achievement is not entirely welcomed, because of Japan's somewhat weak HDIs. Despite economic success, gender inequality, trust on national governments and the social side of satisfaction are weak, and especially the highest suicide ratio is remarkable [18] (pp.156, 174). This sad fact challenges the possibility of human security pursued by the Japanese government. How this will work out over the SDGs will be an interesting question. Perhaps Japan may come to terms with these weak HDI's when they are exposed more and more on the global stage as nations try to achieve all the SDGs together.

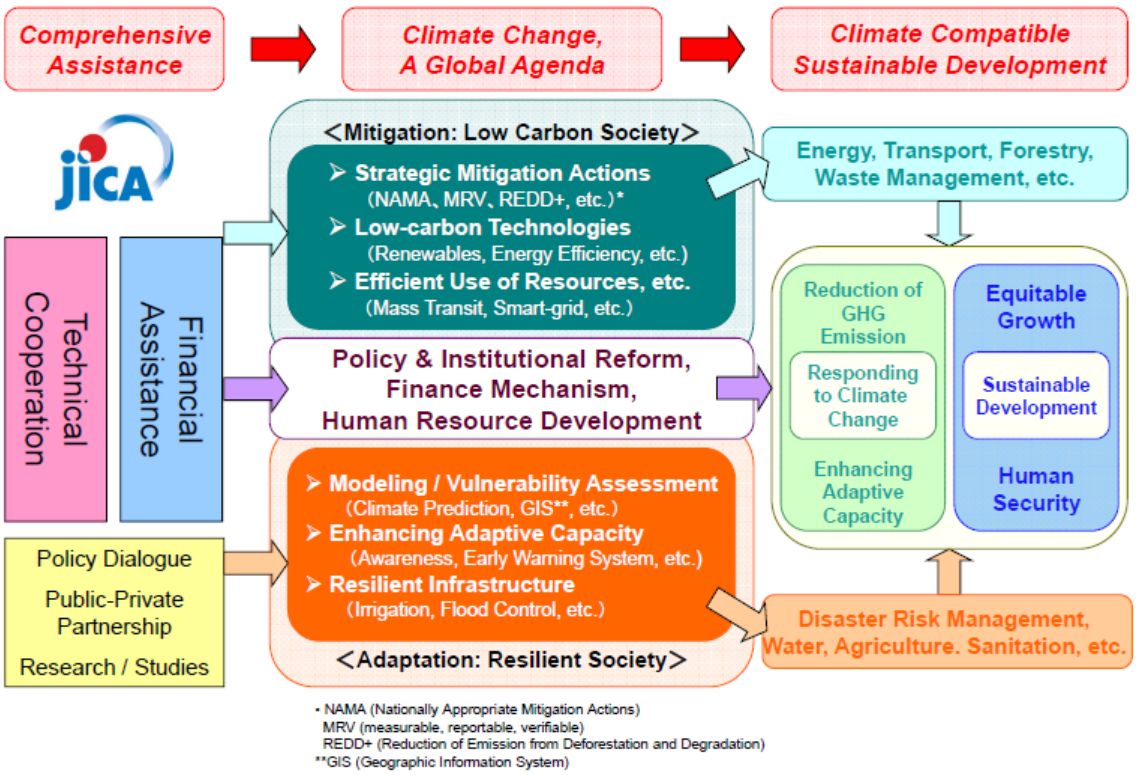
The positive side is that the leadership of Ogata starting from 2004 resulted in a fundamental shift, parting from a business as usual approach to the outcome focused human security approach [17] (p.129). A comment on this transformation by a JICA officer introduced in Kurusu and Kersten's [17] (p.130) research was "the Ogata shock was considerable, and I felt that I had been slapped with the reality that the way we had been doing things so far was no longer acceptable."

2.3 JICA and the MDGs in a Sustainable Way

JICA is responsible for implementing Japanese ODA based on the ODA policies described in the previous sections [13] (p.157). JICA provides technical cooperation, loans and grants [13] (p.157), and its activities are directed with implementation policies of mutual partnership with recipient countries, consideration to their particular circumstances and needs, and expansion of partnership with NGOs, businesses, universities, local governments, international organisations and other countries [13]

(pp.158-159). Currently, a sustainability approach is not strongly emphasised compared to the human security approach, but JICA has a comprehensive strategy for climate change issues (Figure 2).

Figure 2: JICA's Approach for Climate Change Issues [19].



Mitigation focuses on low-carbon development, appropriate mitigation actions, GHG emissions inventory and efficient resource use. Adaptation focuses on precautionary and no-regret policies appropriate to local conditions and science-based analysis such as using geographic information systems [20] (under "III. Concrete Responses and Direction").

The implementation broadly covers social and economic areas as follows [20]:

- Applying smart grid systems and renewable energy technologies, and increasing energy efficiency at households for reducing energy use.
- Developing urban public transport such as subways and light rail.
- Constructing semi-aerobic landfill and recycling methane gas at the landfill for comprehensive waste management.
- Applying satellite images and afforestation for forest management.
- Conducting emergency training against disaster and developing early warning systems for disaster prevention.
- Applying water-saving irrigation system for agricultural sectors in drought regions.
- Implementing precautionary measures against malaria and other risks of climate change, especially improving examination and diagnosis for the expected risks with medical-practitioners.
- Constructing flood control facilities, water supply facilities in drought affected areas.
- Conducting policy and institutional reform and providing financial incentives and supports.
- Empowering human resource including community members through various training [20]

(under “III. Concrete Responses and Direction”).

Also, to increase the disaster-resilience of community, Japan’s experience from disasters is applied to enhancing the preparedness of community members and local government workers for disaster through training, education and developing early warning systems [21].

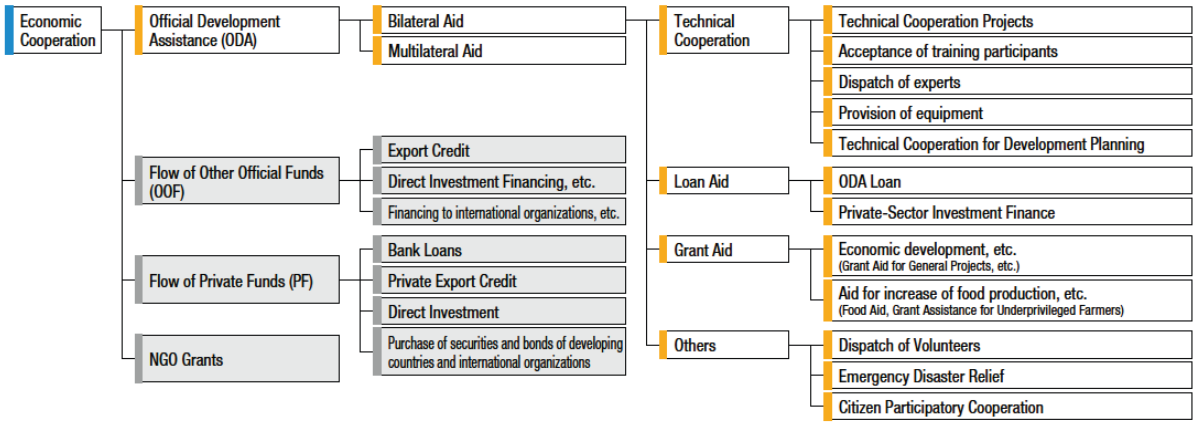
In practice, JICA’s implementation starts with providing basic infrastructure which aims to provide accessible and affordable services to the poor and economic opportunities simultaneously, and the infrastructure building includes good governance, institutional building, maintenance without environmental degradation and impacting on the life of the poor [22] (p.9). The implementation process values the holistic approach taking multi-sectoral, top-down and bottom-up views; strengthened and broadened partnership and risk management against expected and unexpected risks are also integrated [22] (p.24). The expected outcome is a win-win condition for all [22] (p.25). To enhance partnership, a research partnership for sustainable development in Japan and other Asian countries has been developing since 2008 [13] (p. 99).

2.4 What Can Japan do to achieve the SDGs?

This section focuses on JICA’s current programs and projects that are exemplary for the SDGs. Currently, JICA is utilising several systems to achieve development assistances. Figure 3 shows Japan’s entire economic cooperation, and JICA’s role is to undertake those in the orange colour parts under “Bilateral Aid” [23] (p.12).

Loans are mostly used for infrastructure and need repayment with low interest rates while grants are often used for low-income countries to cover broad projects without repayment [23] (pp.12-13).

Figure 3: Principle Schemes of JICA [23] (p.12).



Unique schemes are:

1. Conducting training in Japan under technical cooperation;
2. Sending volunteers to recipients under other schemes and
3. Private-Sector Investment Finance under the loan aid scheme [23] (p.12).

As a result of Japanese ODA experiences, Japanese society has benefitted in four ways to encourage the emerging awareness of shared concern on global issues in Japan, rather than just providing assistance to developing countries [24] (pp.1-2, 5):

1. Training programs enhance mutual learning and networking between Japan and the recipient country on a local level.

2. Good overseas experiences are applied in Japanese local communities.

3. The volunteer's experiences are benefiting Japan directly in every sector and profession.

4. JICA activities are empowering Japanese local governments and communities [24] (pp.1-2).

These are all going to need to grow as the SDGs begin to emerge as the major global focus. The paper takes the fourth point a step further by evaluating how local government can assist with the SDGs.

3. LOCAL GOVERNMENTS APPROACH TO THE SDGS

3.1 Best Scale for Sustainable Society

Newman and Kenworthy [25] (p.6) point out that the city became the best scale to work towards a sustainable society. Conventional economic focused development led by the developed countries cannot cope with growing population, limited resources, environmental degradation and community livability [25] (pp.3-4). Especially environmental problems need to be fixed at their origin, due to the complexity of earth's ecosystem [26] (pp.6-7) by considering area specific social and ecological conditions [26] (p.16). Then, the Extended Metabolism Model of Human Settlements can apply to city planning to decrease impacts of human activities and resource use while increasing livability [27] [25] (pp.7-9). This model sees the city similar to human metabolism: food in-take and the faeces relation are similar to the energy and resource use for inputs and wastes and pollution for the outputs [25] (p.8). Reducing the inputs reduces the output or impacts on the surrounding environment: the model is applicable for various scales and activities such as the manufacturing process, household and infrastructure [25] (pp.9-10).

To reduce resource inputs for the city, a dense urban area with mixed land use connected with good public transportation is important [25] (p.165). The urban centre can be livable by increasing comfort for walking and cycling, attracting the public with safety, good design and providing diverse services and different types of housing [25] (p.165). Good sustainable cities are emerging such as Vancouver in Canada, Fremantle in Australia [25] (p.167), and Munich in Germany [25] (pp.172-173).

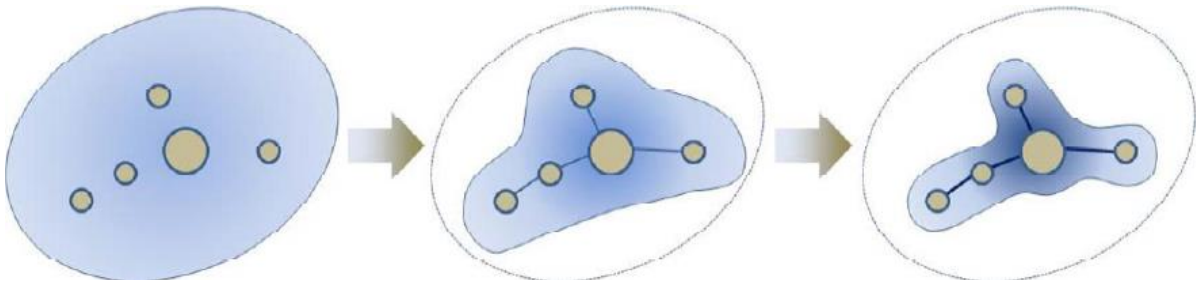
Japan's local governments are well situated to take a leading role toward the sustainable city. One of the new Japanese economic policies is to promote small-scale or decentralised energy systems to make communities more sustainable and low-carbon [28] (p.182). The strategy is to combine local financial institutions that hold enough funds available for appropriate investment and the local governments who have authority to promote suitable businesses which will bring social benefits and employment opportunities based on locally available resources [28] (p.181). This will have significant benefits for the SDGs as decentralised renewable power systems and their local governance will be a key feature of integrating several SDGs.

Also, the Japanese revitalising plan is supported by developing regional centres and sub-centres into highly urbanised centres to reduce migration flow to the mega-cities, Tokyo and Osaka, thereby reducing the concentrated environmental pressures [28] (pp.183-184). In addition, enhancing energy efficiency, renewable energy and environmental policies is one of the current national priorities [28] (p.34). The new technologies are costly until widely diffused, but they can dramatically reduce energy bills. When the revitalising of the local economy, environmental conservation and low-carbon technologies are tackled together for the benefit of the local community, the outcome of these policies could be a remarkable transformation of local areas. This will also be of significance for the SDGs.

Furthermore, Japanese cities already have some ability to become model sustainable urban cities as described in the above section. Japan's passenger transport depends mainly on railways that accounted for 72.7% of total domestic passenger transport in 2011 [10] (p.99). Total waste generation for both industrial and household wastes show a declining trend, and some 13% of the total wastes declined between 1990 and 2010 [10] (p.158). Especially, recycling was highly promoted due to the scarce space for landfills and illegal dumping, and the recycling technologies largely contributed for the industry sector [10] (p.157). The industrial recycling ratio reached 53% and the non-industrial recycling reached 21% in 2010 [10] (p.158). Japan's energy efficiency technology is remarkable, and a recent focus is promoting stable renewable energies to cope with climate change and earthquakes [10] (p.79). Current energy conservation research focuses on reusing the low-temperature waste heat in Japan [29] (p.21).

In addition, the Japanese government regulated a policy for building eco-cities called the Low Carbon City Act in 2012, and every local government is taking action according to the national government's technical guidance which can be utilised for the local conditions [30] (p.1). Figure 4 is the image of a Japanese low-carbon compact city. City formation of this kind is what Newman and Kenworthy [25] (pp.28-29) refer to as the transit city. Citizens will have easy public transportation access to the convenient city centre and sub-centre where everyday needs are all available, thereby reducing car use and increasing public transport use and walking [30] (p. 3).

Figure 4: Concentrated Urban Function Connected with Public Transportation [30] (p.3)



This Act also aims to tackle Japan's challenges: to provide services needed by the ageing population and to reduce the financial burden for local governments [30] (p.2). The low-carbon compact city is the strategy to reduce GHG emissions from the city which accounts for nearly half of Japan's total GHG emissions [30] (p.3). Suggested technical methods are greening the city, improving public transportation services and increasing efficient energy and livability of the city [30] (p.5). However, the approaches to transportation policy are inconsistent. Congestion improvement is one of the recommended approaches by the MLIT, and this includes methods to reduce car use such as car sharing and mobility management reducing heavy car use [30] (p.28). The other method is to improve car flow on roads by taking the business as usual methods of expanding road network and building overpassing or under passing interchanges [30] (pp.28-29); this improved car flow rather encourages car use, as road supply only encourages car use [25] (pp.141-142). Improving car flow might improve the energy efficiency of the cars, but the most important object with a low carbon city is to reduce GHGs by shifting from car use to public transportation [25] (p.143).

Despite this inconsistency, the overall suggested strategies are comprehensive. They are the improved energy efficiency through passive design buildings [30] (p.33); the new technologies such as

cogeneration and decentralised energy supply system [30] (pp.35-36); the recycled wasted energy from the plant, the sewerage facility, the river and the ocean [30] (pp.39-40) and the renewable energy use [30] (pp.44-45).

Also, non-technical efforts are necessary. Two articles from a monthly magazine issued by the ECCJ [29] highlights the importance of integrating team work spirit and innovative technologies. One article is about a famous urban developer whose concept is Vertical Garden City. The developer initiated the company-wide climate change strategy, and the Metropolitan Government of Tokyo awarded the developer for the sustainable building management [29] (p.6). The reason for the recognition is due to energy efficient facilities and support by the tenants gained through good communication [29] (pp.6-7). The other article is about a small company who has limits on the capability to implement something new, due to cost and management conditions and other various reasons [29] (p.73). However, this company's experience of reducing 40% energy use between 2007 and 2010 largely depended on the low-cost employee efforts in addition to new energy efficient facilities [29] (p.73). A large number of trials and errors for any improvement were made and incentivised: the energy saving goal was set on the ratio of energy cost per 10,000 yen sales [29] (pp.72-73). The employee efforts began when the company applied the GHG emission analysis program offered by the Tokyo Metropolitan Government (TMG), and the employees learned the entire sources of GHG emission at their office and factory [29] (p.72).

This support seems to be a part of the TMG's mandatory cap-and-trade scheme. The TMG started the scheme for industrial and commercial sectors since 2010 [31] (p.11), and the scheme will end in 2020 to make sure the mitigation actions are firmly established [31] (p.12). Some 8,000 personnel from the targeted facilities participated in the briefings for this program, and the TMG provided technical supports for the smooth implementation [31] (p.28). The TMG aims to expand to other prefectures for a regional scheme [31] (pp.28-29), and other sub-national regions in the world [31] (pp.29-30).

All of these initiatives are extremely relevant for the delivery of SDGs in the Asian region.

3.2 Network Governance for Integration

Japanese local governments need to cope with their limited autonomy and accountability when they exercise their duties. Japan has two levels of local government: the upper level of 47 prefectures or *ken* in Japanese and the lower level of some 1,742 municipalities which are wards, cities (*shi*), towns (*cho*) and villages (*son*) in 2013 [10] (p.194). The number of local governments has reduced from 3,232 in 1999 to improve administrative and fiscal conditions [10] (p.194). The bureaucrats in various ministries of the national government delegate their functions to prefectural governments and designed municipal governments in a highly controlling way [32] (pp.23-24). However, the national-local government relationship entered a new phase of promoting local government autonomy in recent years through administrative and regulatory reforms which enhanced the local governments' own decision-making to meet different needs [28] (p.189).

According to Takao [33] (pp.781-782), climate change issues necessitated multi-level partnerships between the supranational organizations and sub-national institutions, such as local government, NGOs and business sectors. Japanese local governments follow this trend, expanding ties with different levels of governments and various types of private organisations across the border in search of information exchange and mutual learning [33] (pp.782-783). Particularly, Takao [33] (pp.783-784)

has emphasised the "network" of international environmental coalitions initiated by some innovative Japanese local governments with broader cooperation. For example, the International Lake Environment Committee was created by Shiga prefecture in 1986, Niigata prefecture works with the Monitoring Network in East Asia since 1998, and the City of Yokohama actively engages with CITYNET that aims to encourage cooperation between developing countries [33] (pp.783-784).

To support this expanding cooperation and partnership beyond levels previously considered, Yamagishi [34] (p.297) points out that Japan is in a situation which the opportunity-seeking attitude brings more benefit than making a commitment for their own group's stability. Commitment and a collective approach worked well in the 1950s and the 1960s to pursue economic development [34] (pp.295-296), however Japanese society has been influenced to change by globalisation, economic trends and other factors to become a more 'trustful civil society' in recent decades [34] (pp.281, 296). The increased trust led to the opportunity-seeking approach that is more advantageous to take social risk which is a more Western type of approach [34] (pp.293, 295).

One of the influential factors of opportunity-seeking in Japan can be the first baby boomers (known as the *Dankai no Sedai*) who were born between 1947 and 1949. Takao [35] (p.868) points out the political power of the retired baby boomers who are larger in numbers and richer than other generations. They increasingly engage in volunteer works for social needs and natural disaster more than other generations, and one of the largest baby boomer civil network tries to find a solution to the concentrated burden on younger generations [35] (p.869). Kyosei is a Japanese word which means equality and inclusiveness and is adopted by local governments for a policy base [35] (p.870). The baby boomer was highly active in their youth and became active senior citizens with concerns for younger generations' burden especially in the urban area, so that they were expected to contribute equal and inclusive community development through Kyosei rather than majority rule [35] (pp.871-872). Volunteers like these can be an important resource for delivering SDGs.

3.3 Training Arm for JICA

An alternative way for network expansion in Japanese local governments is JICA's training scheme as chapter two explains. Local governments are making efforts on mitigation and adaptation for climate change issues based on local environmental and social conditions, and the progress of activities is reported by the MOE of Japan [36] every year. The lessons learned from the efforts can be shared through the training, because the JICA's domestic offices are always looking for suitable sites and organisations for the training, and it maintains contact with the training participants to provide the best training appropriate to their needs [23] (p.126). As the country profile of Japan explains, Japanese society is diverse, and the variety can offer a different set of experiences to share with the various needs of developing countries.

As small to medium businesses are predominant in the Japanese economy [10] (p.33), it is possible to link their businesses and JICA's programs in a way that can benefit the local community in both Japan and the recipient countries [23] (p.18). JICA now provides market research with help from MOFA, METI and the Small and Medium Enterprise Agency to assist overseas expansion of small business that has beneficial technologies for low-carbon society [23] (p.105).

In addition, some local governments are even capable of participating in international cooperation projects, and the JICA Partnership Program has been developed for international cooperation projects from NGOs, universities, local governments and private companies [23] (pp.110-111). The City of Yokohama used JICA's private partnership program to assist Metro Cebu in the Philippines for its urban development planning with the focus on public services [23] (p.23).

When the Japanese community is revitalized through networking participated by the retired baby boomers [35] (pp.871-872) and utilising JICA's various programs [23] (pp.105, 110-111), it can meet the goal indicated by the MIC of Japan [28] (pp.173, 181). By connecting this revitalisation and their previous experience and actions, Japanese local government can contribute to share their own experiences with other areas domestically and internationally. This is a firm foundation for a Japanese role in assisting the region achieve their SDGs as well as their own.

4. CASE STUDIES

The following three case studies will be used to assess whether local authorities in Japan are ready and able to help with the SDG agenda.

4.1 City of Kitakyushu

Figure 5 expresses what Kitakyushu achieved in recent times. The smaller three pictures were taken in the 1960s when the City became one of the most heavily industrialised and polluted areas in Japan, and the bottom picture is the current environment gained through the two decades of efforts among community, local government and industries [37] (pp.3-4).

Figure 5: City of Kitakyusyu/ Kitakyusyu-shi
[37] (p. 2)

Photos: City of Kitakyusyu [37] (pp.3-4)

Most importantly the City does not just keep its expertise in cleaning up to itself but has expanded its networks to share its experience and innovative technologies through official aid [37] (pp.7-8) and business investment [37] (pp.11-12).

4.1.1 What happened at the City

Kitakyushu is situated on the coast and functions as an essential gateway to the Asian continent throughout history, so that the continent's influence such as new technology, culture, religion and trade has influenced the development of the city [38] (pp.10-11, 13). The first impact of the Asian continent was rice farming and metal production in ancient times [38] (p.10), and the region's prosperity was targeted by domestic and international military threats in history [38] (pp.11, 14-15). The pre-war industrialisation of Japan depended on coal fuel which was locally available: the coal fuel enabled the City to build a large comprehensive steel manufacturing facility in the Yawata area of the current Kitakyushu. This led the City for the first time in Japan, to further develop national heavy industry in the area [38] (pp.24-25). The steel demand from the First World War and other wars mainly benefitted the City's industry [38] (p.35). The previously built military base, port facilities, railways and the coal based industrialisation maintained Kitakyushu's predominant prosperity until the post-war recovery period when petroleum became the major energy in the 1930s [38] (pp.32, 35).

On the other hand, other industrial areas in Japan started shifting petroleum centred industries, and this change also influenced the closure of the coal mining sites and the migration of unemployed workers to the other industrial areas [38] (p.32). Five cities became the current Kitakyushu to stimulate the economy in 1963 [38] (p.35). Kitakyushu satisfies certain demographic conditions for the Cabinet-Order designated cities which enable them to hold authoritative power similar to the prefecture level [10] (p.194).

Unfortunately, the prosperity of the coal fuelled industry came with negative side effects. Chikazawa and Ohashi [39] (p.264) point out that the pollution from the industrialisation peaked between 1968 and 1969. The criticism against polluters was taboo which continued until around 1965, because the city was highly influenced and economically benefited by the national policies of industrialisation and large factories owned by Japan's leading companies [39] (p.261). However, people who raised the concern were the local mothers' association, and half of the members belonged to the workers of a large steel manufacturing company, a major polluter [39] (p.275). They were considered as elite women in the city, but the association was not supported by the company's labour union and their husbands [39] (p.277). Their pollution campaign lasted twenty-one years based on pollution studies with the experts, pollution observation, data gathering, dialogues with the polluters and the mayor, and awareness-raising [39] (pp.266-277). Especially the mothers' association harshly criticised the local government's weak action against the pollution [39] (p.266).

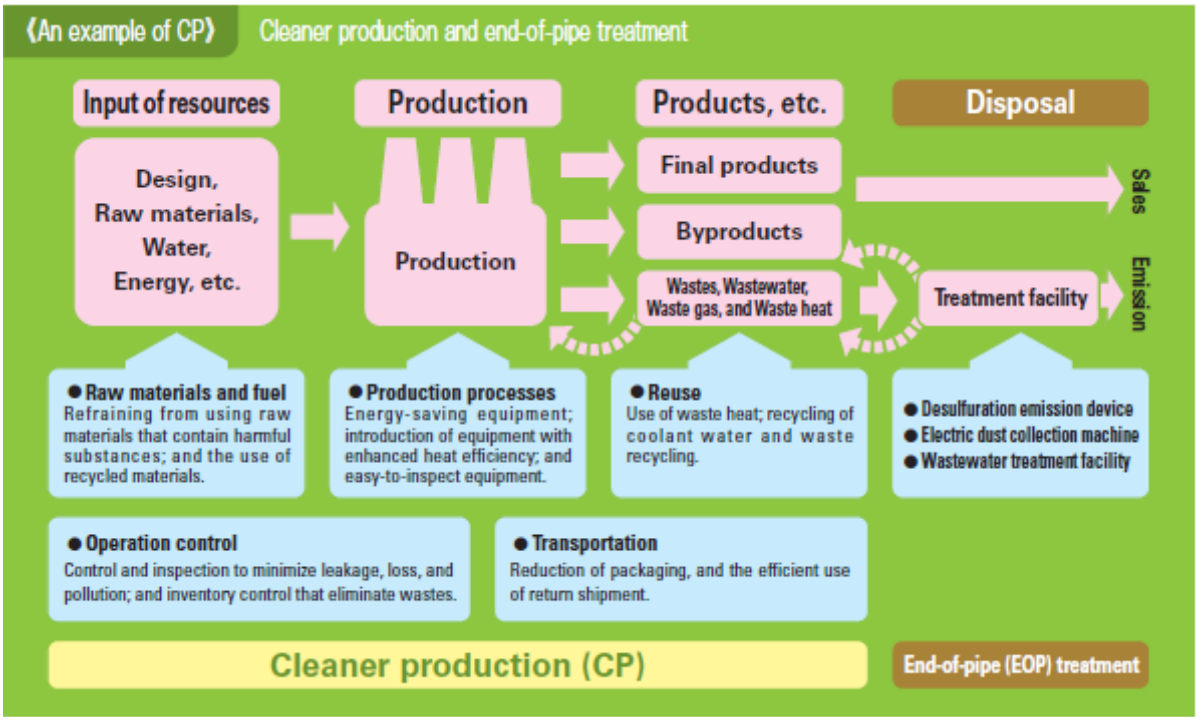
From the local government's point of view, Nomura [40] (p.13) points out the stable political environment, the expanded power due to the amalgamation and the cooperative attitude between the community, local government and the polluters worked well. The political stability comes from a long term leadership of four mayors since 1963, and the expanded power enabled onsite inspection at factories and enhanced monitoring by the increased number of staff [40] (pp.13-14). Especially the second Mayor Tani's time, 1967-1987, was the most important phase for the drastic environmental improvement, because the Japanese government implemented the national pollution laws and policies to manage the severe pollution occurring at many parts of Japan during the 1970s [40] (pp.14-15). An ordinance of Kitakyushu sharply limited a pollutant release despite being only 10% of the national requirement, and the City's pollution control section expanded with the increased number of staff and the issues to cover from greening the city to sewage management [40] (pp.15-16).

In response, the efforts made by the polluters who had the technology and finance dramatically contributed to lowering the pollutant level [40] (p.16). Major factories in the City's newly established pollution control section around 1969 committed to the required changes, greenery covered 10 % of

factory area, and the polluting companies covered 70% of the sludge removal cost from the combined treatment works [40] (p.16). Expensive devices for dust collection, desulfuration and denitration devices were installed at the factories [37] (p.5). These companies' approach is very similar to the concept described in chapter three where the concept sees a city as an organ that metabolizes. These companies' strategy is called cleaner production and end-of-pipe treatment (Figure 6).

The selection of safer raw materials, energy and material efficient equipment, recycling wastes and bi-products are monitored to avoid leakage and losses from the input side; waste treatment and recycling were undertaken before the final disposal; and product package and transportation were also considered in the entire production process which resulted in a better profit margin for the companies [37] (p.5). Between 1970 and 1990, the steel industry of the City succeeded to reduce sulphur oxides emission from 27,575 tons to 607 tons which is a 97.8% reduction [37] (p.6).

Figure 6: Cleaner Production and End-of-Pipe Treatment [37] (p.5)



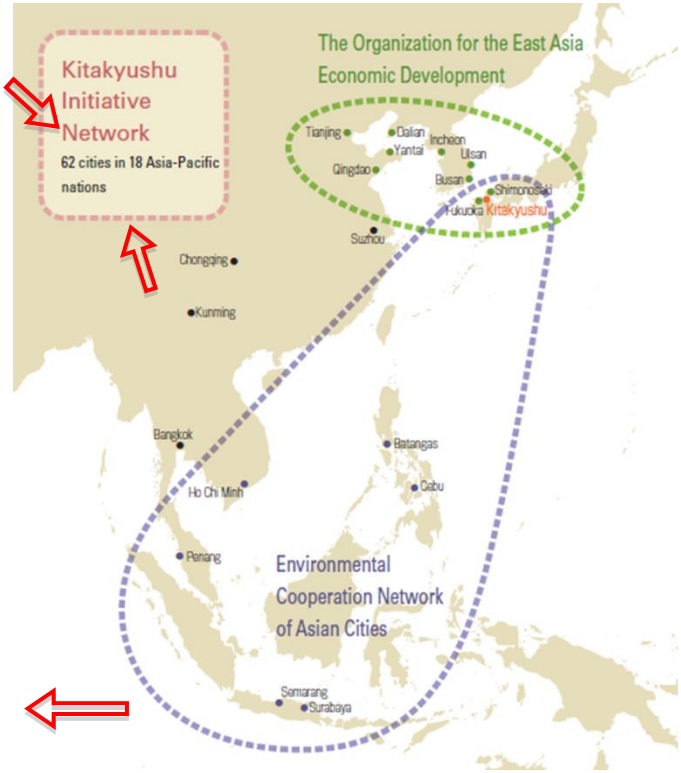
4.1.2 Shifting from pollution to climate change issues

The Mayor Tani also promoted international cooperation based on the City's pollution control technologies and revitalising the local economy through the establishment of the Kitakyushu International Techno-Cooperative Association (KITA) in 1980 [40] (p.17). The City's efforts were awarded the Global 500 Prize by the UN Environmental Programme in 1990 [40] (p.18). The third Mayor Sueyoshi's term, 1987-2007, was an economically stagnant time, and the linkage between environment and business through the development of environmentally friendly urban infrastructures and technologies was prioritized [40] (pp.17, 19). The City's pollution control and waste management offices were merged to become the International Environmental Cooperation Bureau. This contributed to the environmental improvement of the City's Sister City, Dalian in China through Japan's ODA [40] (p.18). The Dalian project was the first case in which a local government's international cooperation took place through the ODA, and Dalian was also awarded the Global 500 Prize in 2001

[37] (p.10). Dalian was also heavily polluted in the 1980s [40] (p.18), and Kitakyushu supported developing an environmental master plan through monitoring and sewerage treatment for the first time in China [37] (p.8). This experience with Dalian led to other business opportunities with Chinese cities [40] (p.18). Considering the pollution mitigation needs in many Asian cities, the role of Kitakyushu is never small. The SDGs will need this kind of cooperation.

The City's network has expanded to some Asian countries and beyond (Figure 7). For example, an organic waste composting project was launched to reduce wastes and to improve sanitation at Surabaya in Indonesia in 2007, and the project expanded to other Asian cities [37] (p.10). The Bureau internationally promotes environmental business with the cities of neighbouring countries and locally revitalizes business by participating in the national government's eco-town project which aims to promote environmental business and comprehensive resource recycling [40] (p.18).

Figure 7: City of Kitakyushu Expanding Network [37] (p.10)



Kitakyushu Eco-town, Japan's first carbon-free recycling industry area, occupies 2,000 ha in the City's Bay area providing 1,200 employees for nineteen research institutions and twenty-five companies [36, 39] (pp.14-15, 18). The Eco-town visitors totalled 568,000, and 70% of investment largely came from the private sector [37] (p.15). Nomura [40] (p.18) points out that the enabler of this project was the City's International Environmental Cooperation Bureau, which functioned as the convenient one-stop service centre for the smooth participation by multi-stakeholders. In addition, the vast cheap land area, high technology, multi-stakeholder cooperation, services covering for the wider area, well developed infrastructure, rapid paperwork procedure and the citizens' support also encouraged and appealed to private business [40] (pp.18-19).

From the business side, Takasugi [41] (p.134) interviewed one of the principal persons, a Mr. Kawasaki, who established a PET bottle recycling company at the Kitakyushu Eco-town. Mr. Kawasaki entered at a steel manufacturing company in Kitakyushu when the pollution had peaked in the 1960's, and his career began as an engineer lasting for a long time until 1991 [41] (p.134). Then,

he unwillingly moved to another section, because the company was undertaking organisational change [41] (pp.139-140). His job was to explore new business from the beginning, and nobody was teaching him what to do [41] (p.140). Then, considering this era's need, he came to a conclusion that he needed to focus on the environment and information technology and started studying about environment [41] (pp.140-141). Soon he heard about the Eco-town project and he began meeting with other company people and officers from the City's International Environmental Cooperation Bureau [41] (pp.141-142). Remarkably Mr. Kawasaki was a positive minded pioneer about integrating environment into industry at the Eco-town site, and his vision was to develop an international environmental business and to benefit the local community simultaneously, because the City's concern was the life of local small businesses and pollution regulation [41] (p.142).

Kitakyushu enhanced cooperation with academics and companies to make the Kitakyushu Eco-town happen [41] (p.143). From these meetings Mr. Kawasaki learned about the low PET bottle recycling rate, the prospective job opportunities for the local smaller companies and the willingness of local governments in recycling the PET bottles [41] (pp.142, 144-145). Since the PET bottle recycling business was a new industry, Mr. Kawasaki started the business with some uncertainty [41] (pp.135, 145). Mr. Kawasaki found considerable success with his business that matched the need of this era, and the importance of commitment by the infrastructure related industries and partnership with local governments [41] (pp.146-147). Takasugi [41] (p.146), also points out the importance of appropriate policies, and Mr. Kawasaki was convinced there was a growing business in the recycling society because of the Container and Packaging Recycling Law which provided the path for full material circulation from production to recycling. Mr. Kawasaki is a baby-boomer generation [41] (p.136), and he further emphasises the experiences of the older generation who endured the post-war recovery period and knew how to live with limited resources [41] (p.147).

Kitakyushu's environmentally friendly Eco-town and pollution control suggests two important lessons. Historically Japan's economic development was pro mass-consumption based on the policies influenced by bureaucrats, large companies and politics: local communities and citizens' well-being are less prioritized [41] (p.97). This type of governance can become politically unstable influenced by the strong frustration from the neglected people in the communities [41] (p.99). The first priority therefore is to include citizens' voices in development planning [41] (p.101). Secondly, citizens who are also supporting mass-consumption need to understand that economic development and waste management must come together, so that both the production side and consumption side together need to find a way to balance [41] (pp.103-104). Kitakyushu Eco-town is one of the best examples of achieving that balance [41] (pp.148-149).

Mr. Kawasaki and Takasugi [41] (p.135) both agree there was an accumulated energy for the shift from mass-production to a recycling society in Kitakyushu. They take this economic stagnant period positively before the next phase of environmentally friendly based economic development. Importantly, this change could not happen without the citizens' support. The City promotes industrial tourism which includes educational facilities for anyone [37] (pp.17-18). Also, the City co-hosts a festival-like environmental event with citizens, the NGOs and companies, and the number of participants shows an increasing trend reaching to 370,000 participants in 2006 [37] (p.13). Another example is to reward an individual's actions by utilising the local currency. The citizens receive reward points in return for reducing their GHG emission, and the reward points enable them to buy environmentally friendly products or the citizen can donate the rewards to NGOs [37] (p.13).

4.1.3 Advancing Kitakyushu

The current mayor intends to further expand the networking with other overseas cities and increase the efforts of the City for sustainability [40] (p.19). Kitakyushu and the neighbouring Fukuoka-city are selected to implement an innovative national government development policy for the Japanese government's strategy of Green Asia International Strategic Comprehensive Special Zone [42] (p.4). Also, The City's master plan tries to promote more connection with other neighbouring prefectures for domestic and regional development [43] (p.167).

As described in the chapter three, all Japanese local governments are now planning towards the low-carbon compact city [30] (p.1). The City's actions are comprehensive. Eco Keeper Jono aims to achieve a carbon free higher-density residential town [44] (p.12). Solar powered carbon-free buses run in the City's industrial area [44] (p.50). New technology is not the sole way for sustainable Kitakyushu. Cycling paths, extended bus lanes and comfortable stations increased the access to better public transport services [44] (pp.17-18, 24).

A mega-solar power plant has been in operation since 2013 to commemorate the City's 50th anniversary, being partially funded by the companies and the citizens [44] (p.29). The maintenance project is underway to extend the life span of a 30 year old monorail infrastructure for another 70 years [42] (p.13). Achievements in 2012 were: Kitakyushu Smart Community Project which reduced by 45% the City's CO_2 emissions; the City's Biotope which was the largest in Japan and welcomed more than 20,000 visitors; and launching the Kitakyushu and Surabaya Environment Sister City [45].

Unfortunately, with all the above efforts the City's CO_2 emissions increased from 16,176 tonnes to 17,305 tonnes between 2005 and 2010, and a primary emitter was industry which accounted for 67% of total CO_2 emission in 2010 indicating the industry dependence of the City's economy [44] (p.3). The emissions increase was mainly due to the economic recovery from the financial crisis in 2008 and the increased electricity use being affected by the summer heat and the colder winter [46]. On the other hand, households reduced CO_2 emission by 12.8% and the wastes sector was reduced by 32.8% in 2010 [44] (p.3).

In the future the City expects the reduction largely to come from the environmentally friendly technology transfer to Asia, in addition to its own efforts for the long term goal [44] (p.6, 8). Their own efforts can come from the adaptation to a lesser electricity supply for the entire Japanese society, because Japanese nuclear power plants are not running after the Great Eastern Earthquake occurred in 2011 [44] (p.1). In response, the private sector will be leading the smart grid system combined with natural gas and renewable power in the industrial area starting from 2015 for cleaner, cheaper and more stable electricity supply to the entire City [44] (pp.52-53, 57).

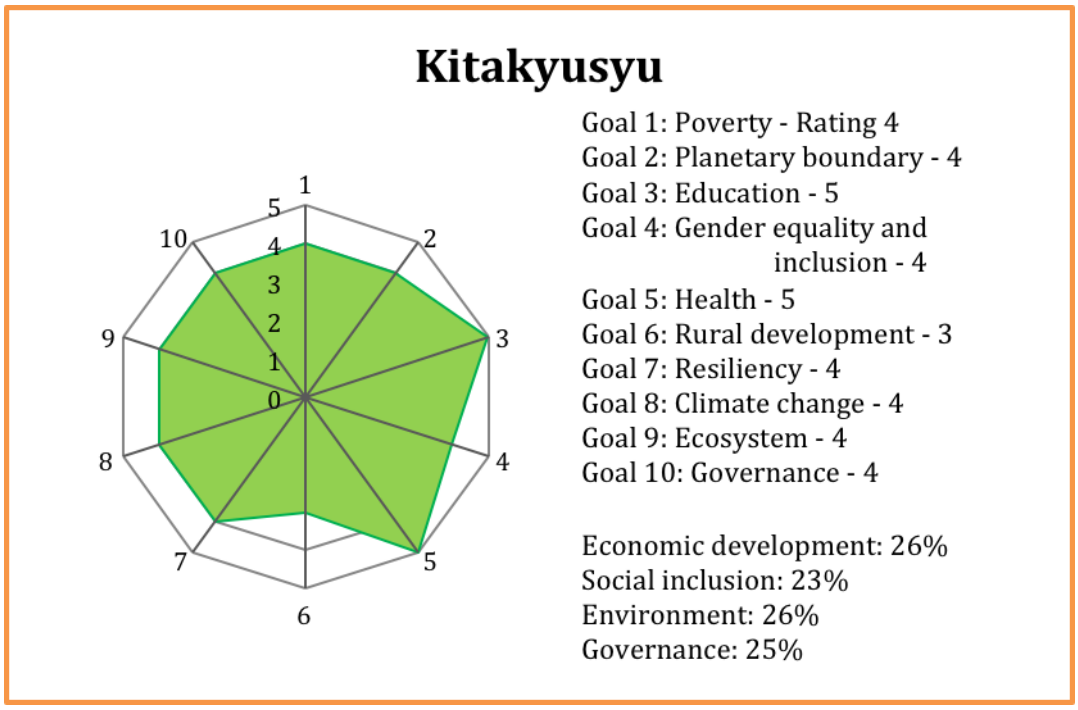
4.1.4 The SDGs and the City of Kitakyushu

The City's innovative responses to its challenges were awarded the best Sustainable City in 2007 and 2008 by a Japanese NGO, and the City continues to make such efforts [40] (p.19). Also, Kitakyushu was chosen for Environment Model City for its innovative challenges by the Japanese government in 2008 [44] (under "Hajimeni") and Green Growth City by the OECD in 2011 [44] (p.1). The City entered a phase to assess and analyse the previous experiences until 2018 for further progress [44] (p.9). Viewing Kitakyushu's achievement from the perspective of the SDGs can lead to further possibilities for sustainability of the City.

Graph 1 and Table 3 explored how Kitakyushu's actions can relate to the SDGs, and this paper uses the one suggested by the SDSN. The SDSN [3] suggest that in evaluating how well a policy or project or even City has contributed to the ten SDGs that a numerical assessment based on best practice is

made. Points are awarded for the outcomes in: data availability, signs of implementation, the level of action, and national government policy. The score of each goal ranges between zero and five. A larger number means better achievement (Graph 1).

Graph 1: Kitakyushu and the SDGs



Then, each action is checked with the four dimensions of economy, society, environment and governance to see how these goals of the SDSN meet with the four dimensions of sustainability. Generally, each action covers more than one dimension, and whenever one action meets any dimension, the action receives one point. The points were totalled to see the balance among the four dimensions. Results are fairly even. The bottom of Table 3 shows this evaluation.

Table3: Kitakyushu's SDGs based on four dimensions (SDSN suggestion)

Kitakyushu's SDGs	Ec	S	En	G
1. End extreme poverty including hunger	2	2	2	1
Japan is a high income country [47] (p.113)	■	■	■	■
ODA participation through JICA's training to vulnerable countries [37] (p.5)	■	■	■	
2. Achieve development within planetary boundaries	3	1	3	1
** Rare metal recycling from used small-sized electric products: 5t	■		■	
** Plastic container recycling rates: 44.1%	■		■	
Awareness raising project: Eco Life Stage - 738,619 citizens [48]	■	■	■	■
3. Ensure Effective Learning for All Children and Youth for Life and Livelihood	4	4	4	4
** Eco tour participants: 120,000	■	■	■	■
** Environmental school trip: 15 schools (1,200 people) and 3 organisations (200 people)	■	■	■	■
** Environmental education for the schools: 146 schools participated	■	■	■	■

** Eco school projects: green curtain, mist curtain equipment, Solar PV, LED installation for school gym				
4. Achieve Gender Equality, Social Inclusion, and Human Rights for All	8	8	8	8
** Promoting volunteer opportunities and community activities for the aged persons				
** The availability of the specialised support for the disabled children: 114 schools				
** Improving the medical rehabilitation programmes for the disabled persons				
Kitakyushu Forum on Asian Women [43]				
** Enhancing the total support for the disabled persons				
** Awareness raising to care for the vulnerable persons through the partnership with businesses				
** The education on the dimensions for the citizens: 37,816 participants				
** Satisfaction for the community support for raising children: 55.2%				
5. Achieve Health and Wellbeing at All Ages	5	5	3	5
** Promotional campaign for maintaining good health				
** Facility renovation for the medical emergency treatment at night time, Sundays and public holidays				
** Improving the medical rehabilitation programmes				
** Health care campaign for the aged persons				
** Promoting regular physical exercise beyond the curriculum at schools				
6. Improve Agriculture Systems and Raise Rural Prosperity	1	1	2	2
Volunteering for planting trees at the City's water catchment in the rural area. [42]				
Planning to expand networking with neighbouring rural areas [43]				
7. Empower Inclusive, Productive, and Resilient Cities	4	4	5	4
** Developing better public transportation services, cycling paths, modal shift				
** Better cycling environment was planned.				
** 6,900 tonnes of CO2 emission reduction from modal shift				
** Development of the data centre for quicker disaster recovery: 17,000 m^2				
Inclusive decision making for city planning (university, businesses, NGOs), [42]				
8. Curb Human-Induced Climate Change and Ensure Clean Energy for All	9	9	9	9
** Comprehensive regional energy policy was developed.				
** 15 R&D projects for green technology				
** Kitakyushu Smart Community Project achieved 45% CO2 emission reduction.				
** Electricity use of the city's facilities and buildings:10% reduction				
** LED for the roadside light: 1,900 lights				
** Subsidy for energy saving facility for small to medium business: 125 cases				
** Amount of additional solar power energy in 2012: 10MW				
** Wind power implementation was planned.				
45 committed NGOs and companies for various sustainable activities [48]				
9. Secure Ecosystem Services and Biodiversity, Ensure Good	3	3	3	3

Management of Water and Other Natural Resources				
** Planting 1,000,000 trees project: 67,000 planted				
** Maintaining the number of endangered species at Sone Beach				
** Establishing Hibikinada Biotope				
10. Transform Governance for Sustainable Development	4	1	3	4
** Research for the Kitakyushu model of green development for export				
** The number of the international business projects: 5 projects				
** International water business and technology transfer to other cities is contracted.				
** The number of international trainee on environmental cooperation: 900 persons (JICA and KITA)				
Source: ** 2012 data: [45], otherwise specified	Ec	S	En	G
score	43	38	42	41
%	26	23	26	25

Ec: Economic development and eradication of poverty; S: Social inclusion; En: Environmental sustainability; G: Governance, including peace and security

This evaluation indicates several insights. Broadly speaking, the City of Kitakyushu has provided comprehensive approaches, and many indicators are available in measurable data. The four sustainability aspects are also even, although the social aspect is slightly weaker. This finding is similar to that of sustainability assessment by the national government, although the government assessment does not focus on the SDGs but social, environmental and economic aspects based on the measurable data provided by the City of Kitakyushu [45].

The author's study used most of this provided measurable data and other sustainability related reports of the City, but they were not enough to meet all the SDGs. Actions for poverty reduction, gender equality and rural development came from the City's other reports.

In general it can be said that Kitakyushu's actions highly satisfy the SDGs already. One suggestion is to include more detailed data on the training for 'vulnerable country' through the JICA and the KITA, as well as gender equality and rural development, if the City wished to prepare an SDGs report in the future.

In regard to the training in Kitakyushu, many descriptions relate to environmentally friendly pollution control technologies [37] (pp.7-8). Kitakyushu can emphasize the training and the peace building role of the City, as JICA's approach to poverty reduction aims to achieve peacekeeping through socioeconomic assistance [23] (pp.69-70). JICA focuses on the reconstruction of social capital, economic growth, governance systems and enhancing security [23] (p.69), and Kitakyushu can contribute to such socioeconomic development. For example, the organic waste composting project being conducted at Surabaya [37] indicates the improvement of the basic infrastructure in the vulnerable community. Kitakyushu is likely to have some experiences suitable for the most vulnerable countries and poverty reduction as well as the difficult environmental challenges that face everyone.

Perhaps another way forward is in regards to the tenth SDG on governance and in particular citizens' participation and inclusiveness. The gender specific indicator was not particularly used in Japanese government's sustainability assessment for Kitakyushu [45], despite Japan's unfavorable gender inequality in the HDIs [18] (p.156). Also, a progress report of the City points out the lack of recognition on sustainability by the citizens [43] (p.192). Since Kitakyushu has been highly innovative and brave, the citizen participation can be also enhanced with participatory budgeting. According to

Matsubara [49] [50] (p.15), the city of Ichikawa in Tokyo's neighboring area has a system to allocate one percent of residential tax to some NGO activities which the citizens choose by vote. When gender focused NGOs in Kitakyushu are partly funded through a participatory budgeting process, Kitakyushu can enhance its transparency and accountability further, because the participatory budgeting is considered as one of the robust methods for inclusive participation [50] (pp.1, 14).

In addition, Kitakushu's development experience and Japan's post-war development are similar, because the current prosperity of Japan and Kitakyushu started from the destruction. The national government shares the post-war development experience with other countries through JICA, and Kitakyushu shares the pollution alleviation experience with other local governments across national borders. Since Japan is geographically located in a fragile land, efforts to overcome the hardship may be deep rooted in the Japanese way of thinking in general. The hardship can be positively understood as something necessary to bring prosperity. The efforts made by the City, the citizens, businesses, research institutions are remarkable. Unfortunately, not all local governments have enough resources as the City of Kitakyushu has, and the next case study attempts to explore the possibility of a smaller city that seeks to explore its own way of achieving sustainability.

4.2 Kagoshima City

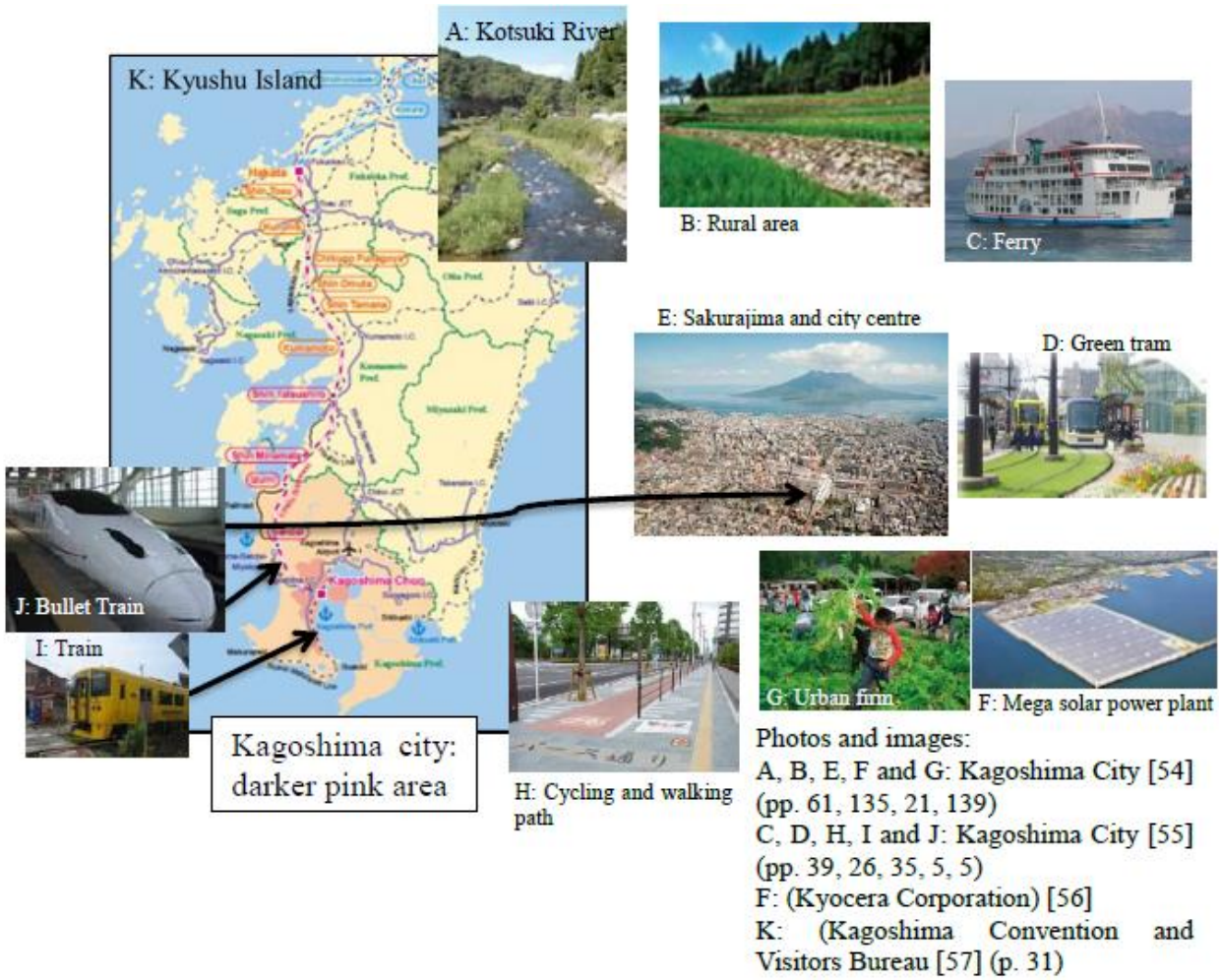
4.2.1 City profile

Kagoshima City is located at the southern part of Kyushu Island (Figure 8), and an active volcano, Sakurajima, is the symbol of the City (Photo E below).

Geographically, the bay area was formed by a historic volcanic eruption some 29,000 years ago affecting the southern part of Kyushu Island, that led to opportunities to develop on the fragile land of deposited pyroclastic flow from the eruption locally called Shirasu [51] (p.4). Shirasu composition has weak solidification and higher water percolation, so that sometimes the heavy rain can cause landslides [52] (p.70). Shirasu is not suitable for rice growing, but highly suitable for sweet potato, and the City is famous for Syouchu, spirit made from the sweet potato [52] (p.70). Sakurajima was first formed around 26,000 years ago but has affected the surrounding ecology and the life of people through repetitive volcanic activities [52] (p.4). The City's east-west length is 33km, and the north-south length is 51 km; the height of Sakurajima is 1,117 metres and only four kilometres away from the city centre [53] (p.3). The volcanic activities in 2012 were 1,107 times bringing 4,579 g/m^2 of ashes to the City which was influenced by the wind direction [53] (p.3).

Historically, trade with the continent and Europe through a far southern island called Ryukyu or Okinawa made the southern Kyushu region politically and economically stable until the Meiji Revolution, Japan's industrialisation period in the1870s [53] (p.1). The City was famous for a place where the first Christian missionary landed in the 16th century and the Meiji Revolution ensued [53] (p.1). The current City prospers on the post-war recovery that started from scratch, because 90% of the City was destroyed [53] (pp.1-2). Also, the City was expanded by several amalgamations with the neighbouring towns [53] (p.4).

Figure 8: Kagoshima City and Sustainability Actions



The City's economy is predominantly tertiary industry [58], and tourism in the focused area [54] (pp.64-65), as well as to link with the further development of agriculture, forestry and fishery [54] (pp.72-73). Especially green tourism is promoted from economic, health and educational aspects to achieve quality well-being [54] (pp.136-137). Table 4 compares the basic statistics of Kagoshima and the City of Kitakyushu's data that comes from Figure 5. Kagoshima City's economic scale is much smaller than that of Kitakyushu.

Table 4: Kagoshima City Basic Statistics

Statistic Data	**Kagoshima City** (2012)	**Kitakyushu**
Land area (km^2)	547	487 (2006)
Annual average temperature (℃)	18.2	17.7 (2005)
Annual average precipitation (mm)	2,895	2,022 (2005)
Population	607, 604	990,000 (2006)
Density (person/km^2)	1,110	2032 (2006)
Gross City Product (Trillion Yen)	1.9	3.5 (2004)

Source: [56, Figure 5, 36]

However, Kagoshima City's economic scale does not necessarily mean it is unable to achieve sustainability goals. According to email communications with Mrs. Hara [59], an older age person who lives in Kagoshima City, she enjoys her healthy and convenient city life by walking and using public transportation. Her home is located within walking distance from the central station and the neighbouring two different sub-urban centres where various services and entertainment are available [59]. Sometimes she goes for a half day trip to the rural areas to participate in a walking event by train [59]. The rural area which hosts the event can gain economic benefits from the visitors [59]. The reason she repetitively joins the walking event is that she can enjoy rural nature, meet other people while walking and enjoy shopping locally produced items after the walk [59]. Also, the hosting rural community members are highly hospitable and well prepared [59]. Mrs. Hara points out that the change of her mindset toward health consciousness mostly comes from walking, and comfortable walking paths motivate her for walking [59]. Kagoshima City promotes green tourism as part of the City's strategy for engaging economic and environmental aspects [54] (pp.64-65), and it seems that the walking events are a part of green tourism.

4.2.2 Kagoshima City and sustainability

The new efforts are made to develop the volcano and the bay into Sakurajima-Kinkouwan Geopark to demonstrate how a city can coexist with the active volcano [51]. The idea of Geopark started from how to conserve many geologically significant areas which do not satisfy the World Heritage criteria [60] (p.2), and yet the scientific and educational values, rarity and aesthetics of Geoparks are outstanding in terms of the Earth's geographic history [60] (p.3). Fukami [61] (p.64) points out that the Geopark initiative is in progress since the Rio Summit in 1992, and the United Nations Educational, Scientific and Cultural Organization (UNESCO) supports Geopark initiatives. The Global Geoparks Network [60] (p.6) explains that "Geopark aims to bring sustainability and real economic benefit to the local populations, usually through the development of sustainable tourism and other economic and cultural activities." The hosting organisation of the Geopark needs to satisfy requirements such as securing accessibility and safety, enhancing the strong bottom-up community commitment and multi-stakeholder cooperation, developing sound financial resources, and learning with other geoparks' experiences [60] (pp.3-4). Especially, the Sakurajima-Kinkouwan Geopark links the disaster mitigation activities and inclusiveness [51] (pp.2-3). As research and observation of the volcano and comprehensive emergency evacuation training are the norms for the City's resilience to the natural disasters for a long period [51] (p.4), this uniqueness can raise awareness for the natural disaster to visitors.

The Geopark has some must-see geo-sites which are geologically, ecologically and culturally important [62][61] (p.68). Also, the local communities, volunteers and guides need to explain the theoretical understanding in plain words for the general public, and Geopark management requires consensus building with all stakeholders, especially with citizens [61] (p.69). In addition, the approval for the Geopark requires education for students and communities [61] (p.69). Another challenge is how to enrich geological education in Japan, as science in general and geology are losing popularity among students [61] (pp.69-70). Even though, the Geopark initiatives are in the early stage of development, the world now has 63 Geoparks including three from Japan as of July 2010, and Japan has another eight domestically approved Geoparks, six candidate sites and twelve proposed candidate sites as of July 2010 [61] (p.65). Sakurajima-Kinkouwan Geopark was domestically approved in September 2013 [63] (p.10). Geo-tourism is a good way to approach sustainable Kagoshima, and the next section tries to examine how the City utilises the Geopark project to pursue sustainability.

Even though, Kagoshima City does not emphasise the word, sustainability, in its reports, the Geopark project already contains some important sustainability principles similar to those in the SDGs. The further progress of the Sakurajima-Kinkouwan Geopark will be the key to achieving a more sustainable Kagoshima. Firstly, the committee members for the Geopark seem to indicate the City's holistic approach to strengthening economic linkage with environmental benefit. The members include the mayor, city offices, relevant national government ministries and prefecture departments, the tourism industry, local business organisation, volunteer groups and academia [63] (pp.6-7). This approach indicates the growing partnership and socioeconomic aspects in the SDGs.

Secondly, awareness raising campaigns for the citizens were broadly held in the form of seminars, study meetings, workshops and a geo-tour [63] (pp.12-14), and as a result, a survey for the citizens showed that 61% of respondents recognized the Sakurajima-Kinkouwan Geopark in 2014 [63] (p.15). The awareness raising campaign seems to expand the sense of place, to recognize biodiversity associated with the significant geography, and to affect empowering of citizens. Also, a series of meeting minutes and references are available through Kagoshima City's website [64], enhancing the better governance for transparency. Most importantly, the vision of the Sakurajima-Kinkouwan Geopark emphasis on developing a sense of place through geo-tourism, partnership and ecosystem awareness [63] (p.4). The link between the Geopark and efficient resource use can be more emphasized if Kagoshima City wishes to meet the purposes of Geopark.

One way to link Kagoshima to the SDGs is to emphasise the industrial side of Shirasu use. Shirasu is innovatively utilised to make the City more sustainable. Greening the City's tram line with the Shirasu green blocks (Photo D in Figure 8) is one of the examples. The Shirasu blocks are sufficient to reduce noise and temperature, and the citizens and tourists favour the green tram line [52] (p.75). Sakurajima-Kinkouwan Geopark adopts the green tram line for one of the must-see geo-sites [51] (p.7). However, other Shirasu products can be connected with the Geopark. Shirasu roofing tiles are light weight and more heat resistant compared to typical roof tiles [52] (p.74), and Shirasu interior panel absorbs humidity, odour and volatile organic compounds which are harmful substances for human health [52] (pp.71-72). The healthy and heat resistant characteristics of the Shirasu products are encouraged to be widely shared among the citizens through the Geopark projects for further economic opportunity for Shirasu industry, as well as the way to demonstrate the City's unique way of efficient resource use.

Linking the economic and environment aspects is one of the difficult things, and Kagoshima City is doing well despite its small economic size. The Geopark project implies one of the mayor's leadership for sustainable Kagoshima, and wisely enough, the City appoints an environment advisor [65] (p.27) – perhaps in future they will appoint a sustainability advisor.

Another unique action takes place in primary and junior high school education. The City's schools adopt a simplified and adjusted version of the international environmental management ISO 14001 system, namely the PDCA cycle, for environmental education and behavioural change: P for plan, D for do, C for check and A for action [66] (pp.9-10). As long as the four processes take place, and the teachers and students participate in the activities, the implementation plan can be decided by each school's conditions [66] (p.13). Typical activities are reducing water and electricity use, recycling, taking care of the school garden and participating in environmental community projects [66] (pp.17-18). The records are assessed according to the continuity of activities for each process every three years and the certification is issued by the City [66] (p.12). Familiarising with the practical resource use from a young age, such as switching off the lights when the class is not in use, is important at the individual level [66] (p.1).

4.2.3 The SDGs and Kagoshima City

The same method was taken with the City of Kitakyushu's case to examine how Kagoshima can contribute to the SDGs. Unfortunately, Kagoshima is much quieter than Kitakyushu, so that fewer data are available. Most data come from the City's report on the environment, comprehensive city planning and low-carbon city planning. The GHG emissions increased 17% from the base year of 1990 to 2010, due to an increase from computer uses, household electric products, harsh weather conditions and increased car use, despite the considerable efforts of 33% reduction from the base year by the industry sector [67] (p.1). The transportation sector accounted for 44.2% of total GHG emission [67] (p.1), and the congestion negatively affected the customer satisfaction of public transport [55] (pp.68-69). Currently, the City's public transportation sectors are undergoing projects for better services to encourage modal shift from passenger cars to efficient public transportation, walking and cycling [55].

In regard to sustainability and Kagoshima City the analysis covers the four areas of the economy, social inclusion, environment and governance in a balanced way (Graph 2 and Table 5).

Graph 2: Kagoshima and the SDGs

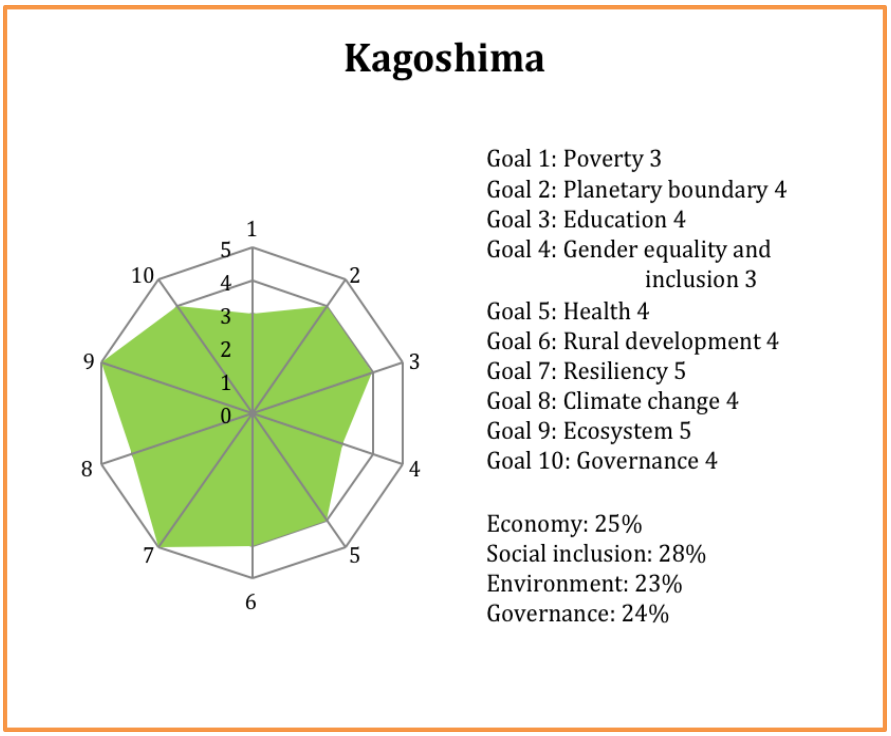


Table5: Kagoshima's SDGs based on four dimensions (SDSN suggestion)

Kagoshima's SDGs	Ec	S	En	G
1. End extreme poverty including hunger	2	2	2	1
Japan is a high income country [47] (p.113)				
ODA participation through JICA's training by Kagoshima University: 3 training, 2 experts dispatch, 2 field research in 2012 [68]				
2. Achieve development within planetary boundaries	5	5	5	4
* Recycling bicycle event: participants 701, recycled bicycle sold: 364				
* Environmentally friendly rice farming training: 75 participants				

* Planning for biogas facility				
*** Household wastes recycling rates: 19.2%				
* Electricity generation from the wasted heat at incineration plants: 70,053,430 kW (partly used on site otherwise sold to the local electricity supplier)				
3. Ensure Effective Learning for All Children and Youth for Life and Livelihood	3	3	3	3
* 116 environmental study books for adults and children were purchased for the City's library				
* Environmental field studies and lectures at local community halls: 12 occasions				
* Environmental study opportunity at the City's facility: 95 sessions Delivering environment lectures to schools, communities and groups: 4 sessions				
4. Achieve Gender Equality, Social Inclusion, and Human Rights for All	6	7	4	7
*** women's participation ratio at the City's meetings: 32.1%				
*** Gender preference for work (men) and house works (women): 44.9%				
*** Human rights in the City is satisfactory (a survey for the citizens): 20.9%				
*** Satisfaction for the community support for raising children: 28.2%				
*** Volunteer opportunities and community activities for the aged persons: 57.5%				
*** Satisfaction for the aged persons' quality of life: 35.6%				
** Awareness raising projects for gender equality in five areas: campaigns, information sharing, supporting networking, empowerment and research				
5. Achieve Health and Wellbeing at All Ages	4	5	2	5
*** Overall satisfaction for the wellbeing: 22.3%				
*** Satisfaction for the overall safety in the City: 43.2%				
*** Crime prevention patrols: 3,673 times				
*** Participation rate of public cancer periodical checks: 8.5-24.4%				
*** Overall satisfaction for medical and public health services: 35.4%				
6. Improve Agriculture Systems and Raise Rural Prosperity	4	4	4	4
* Five study meetings for the new industry development focusing on the food, health and environmental fields				
*** Preference for purchasing locally grown foods: 71.4%				
* Public housing made of local lumbers were built at two rural areas: Hirakawa and Inuzako areas				
* Provided community bus/taxi services at 14 isolated areas from public transportation				
7. Empower Inclusive, Productive, and Resilient Cities	6	7	5	7
* Community cycle feasibility study: 2,328 participants and 5,524 uses				
* Built cycling parking by four tram stations: total 410 parking capacity				
*** Voluntary community disaster prevention group availability: 70.2% of total households				
*** Comprehensive disaster prevention training				
*** A working group for Kagoshima City's fifth master plan is consist of 37 members from private, academic and the city officials including five citizens .				
* Walking path development: 7 roads				
* Barrier free walking paths: 480 sites				
8. Curb Human-Induced Climate Change and Ensure Clean Energy for All	7	5	7	3

* All the lightings were changed to LED at the City's hospitals and public health offices	■		■	
* Free car park for EV cars at the Zoo and the City's cultural hall: 374 cars	■	■	■	
* Solar PV panels for the City's facilities: 40kW for agricultural park, 30kW for 8 schools	■		■	■
* Solar PV subsidies for households: 1,522 applications approved	■	■	■	
* Energy efficiency improvement buildings owned by the City through renovation: office building, schools and apartments	■	■	■	■
* Energy efficiency analysis and technical advice for local businesses: 4	■	■	■	
* Loans to small and medium local businesses for energy efficiency facilities and ISO application: 7 applications approved	■	■	■	■
9. Secure Ecosystem Services and Biodiversity, Ensure Good Management of Water and Other Natural Resources	1	4	4	2
* School ISO projects at all the public primary and junior high schools		■	■	
*** Satisfaction for the City's natural environment: 52.2%		■	■	■
* Greening at 14 schools: 1roof top greening, 2 green curtain, 5 green shading, 6 lawn playground	■	■	■	
Sea turtles landed for laying eggs at the City's Iso beach since last saw 25 years ago: 14 sea turtles, 1,794 eggs and hatched 795 [65]		■	■	■
10. Transform Governance for Sustainable Development	3	4	2	4
Minutes of opinion exchange meetings participated by the city officers and concerned citizens are available at the city's website [69]		■		■
*** Kagoshima City the fifth master plan report contains detailed data and process, and the report is available at the City's website.	■	■	■	■
*** Kagoshima City fifth master plan emphasis on easy to understand expression for citizens with clear quantitative goals, in addition to empowering the citizens and partnership between the city and the citizens	■	■		■
** Community visioning feasibility projects are undertaken by utilizing current community organization	■	■	■	■
Source:	Ec	S	En	G
* [67]: 2012 data **[53]: 2012 data **score**	41	46	38	40
*** [54]: 2012data **%**	25	28	23	24

Otherwise specified

Ec: Economic development and eradication of poverty; S: Social inclusion; En: Environmental sustainability; G: Governance, including peace and security

The City's master plan published in 2012 and the summary of the City issued by the Kagoshima City Council in 2013 contain broad information to view how Kagoshima is shifting towards sustainability. Kagoshima City can choose appropriate indicators under each goal from already available data in the City's reports for the expected SDGs in the near future. Also, one office can be responsible for combining all the data to present in a single paper.

The weaker goal is poverty and gender equality and inclusiveness, goal one and four respectively. Assisting the poverty eradication of vulnerable countries through the ODA is a significant contribution in Japan, as chapter two has explained. The choice for local government to support vulnerable countries to use JICA's various programs would be of considerable value to Kagoshima and they could partner very well with similar small cities. Kagoshima City can also offer specific skills in disaster emergency training to other countries, as the City hosts the comprehensive training against Sakurajima's unprecedented eruption [54] (pp.90-91). Taking a partnership with the local university might be another way for poverty eradication assistance to be developed, as the university works with JICA for international cooperation [68]. Also, the indicators in the gender equality and inclusiveness tend to show lower scores, despite actions taken by the City. The City's actions are not much focusing on providing opportunities for empowering women [53] (pp.94-95). The Sakurajima-Kinkouwan Geopark project can be an excellent opportunity to encourage women's participation and empowerment as could a growing role in international cooperation.

4.3 Toyama City

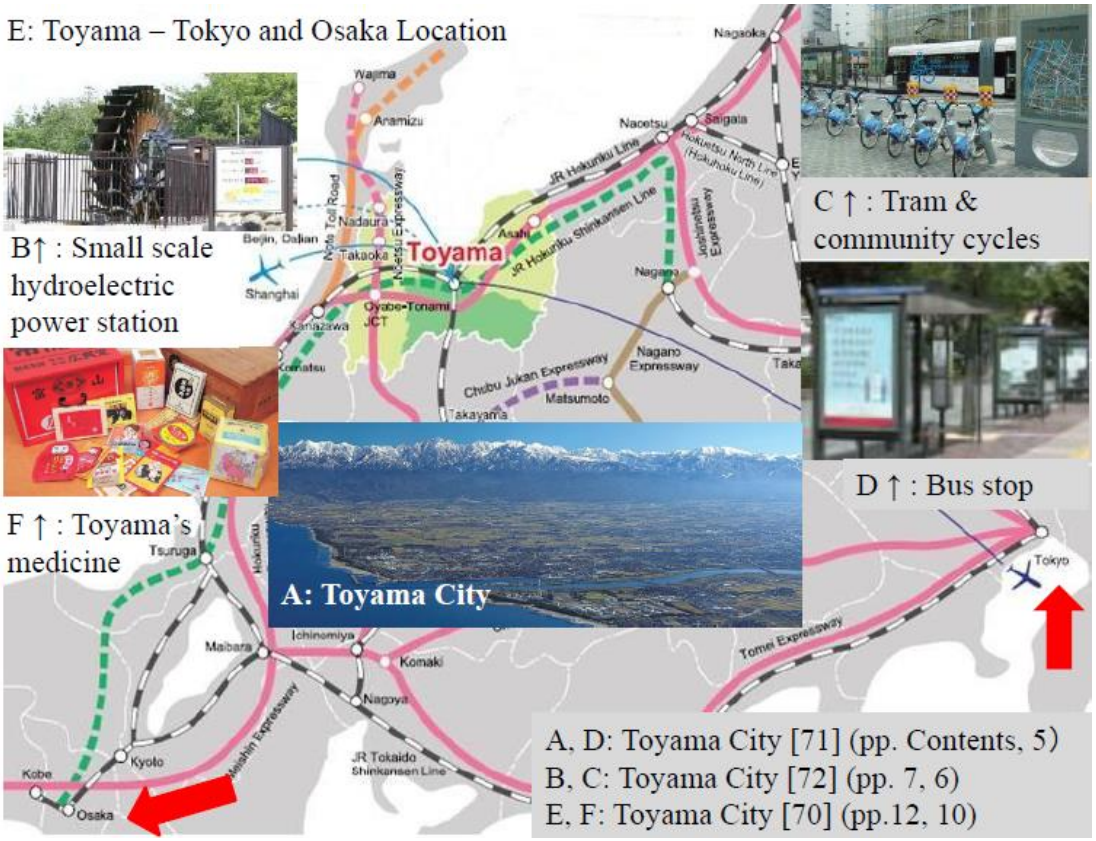
4.3.1 City profile

Toyama city has developed as one of the regional hub centres to Japan's major mountain ranges, the Northern Japan Alps, and the scenic Tateyama Kurobe Alpine Route attracts many tourists [70] (p.1). Abundant natural resources including hydroelectric energy are the important base for the City's fishery, agriculture, pharmaceutical, glass crafts and other industries [70] (pp.1-2). The current Toyama city started from the amalgamation of seven local governments in 1996 [71] (p.2). Figure 9 shows the well-developed highways and rail lines between Toyama and Japan's two mega cities, and a little over three hour's rail travel from Toyama can reach Tokyo or Osaka [70] (p.12).

Traditionally, Toyama's medicine industry originated in 1690, and its unique business style is widely known in Japan, as common household medicines (Photo F in Figure 9) are delivered to households by the medicine sellers [70] (p.10). On the other hand, Toyama is now achieving attention as a compact city in recent years, as the photos in Figure 9 indicate. Toyama City built Japan's first modern light rail transit in 2006, and a series of innovative policies were developed to be recognised as an eco-compact city, receiving 19 sustainability related awards since 2006 by various organisations [71] (pp.16-17).

Also, the City was introduced in the Compact City Policies report issued by the OECD in 2012, as a model city for declining population and smaller population size of the world [73][71] (p.17). The City accepted 130 study tours and 1,052 people in 2013, and predominantly the study tours focused on the tram and community cycle system [74]. Some participants came from developing countries through the JICA in 2012 [75].

Figure 9: Compact Toyama City



Toyama City officers explain that the compact city idea is suitable for the City's characteristics of sprawled city development and the lowest city centre density out of the capital cities in Japan [76] (pp.5-6). The flat geography except in the mountain area, well developed road connections, cheap land prices in the suburban area, preferences for a house over an apartment, have together enhanced sprawl [76] (p.5). Census data in 2000 shows that car use for commuting is much higher for Toyama: Toyama showed 65.1% for the car use, while Kagoshima's car use was 47.1 % [55] (p.62). Table 6 shows the basic city statistics of Toyama and Kagoshima for comparison, as both cities belong to the same city size category [36] (p.6). Toyama City belongs to the second largest category (*chukaku toshi*) among the prefectural capital cities in Japan [71] (p.3), and the forest area accounts for 859.83 km^2 [77]. The density in Table 6 used the land area containing the forest area. However, the density becomes 1,100 persons per km^2 if the forest area is excluded, and this density is almost the same as Kagoshima's density. Despite the similarity, each city has different conditions, and the next section explores the Toyama way of sustainability.

Table 6: Toyama City Basic Statistics

Statistic Data	Toyama City (2012)	Kagoshima City (2012)
Land area (km^2)	1,241.85	547.21
Annual average temperature (℃)	14.2	18.2
Annual average precipitation (mm)	2,323	2,895

Population	420,496	607, 604
Density (person/km^2)	339	1,110
Gross City Product (Trillion Yen)	1.97 (2010 data)	1.9

Source: [73, 68, 56]

4.3.2 Toyama City and sustainability

Toyama's city information booklet [71] (p.17) clearly expresses that the City's vision is to create a sustainable socioeconomic system that focuses on environmental protection and the super-ageing society, and the City actively shares its experience with other cities. This booklet contains not only statistical data, but also how Toyama is a good place to live with lots of pictures and explanatory notes [71]. In contrast, Kagoshima's city information booklet contains a page of the mayor's message discussing their Geopark and more data [78]. Both booklets are easy to understand, but Toyama seems to be strategic about marketing Toyama's attractiveness.

Interestingly, the Toyama City Mayor Mori explains in an interview that the motive behind the Toyama tram and compact city originates in the ageing population and declining tax income as follows [79]. The mayor was first elected two years after the implementation of *Kaigo Hoken*, Japan's old age care insurance system that was half funded by the national government and the other half imposed on citizens aged 40 years old and above. The local government provides the old age care service, and the insurance cost varies depending on the local needs of the care in quality and quantity. The local government with higher insurance cost and another social service cost can discourage inflow migration from the other local governments. This system is another financial burden for the local governments and the younger generation, and Mayor Mori thinks that the way to reduce the cost is to make the old age citizens healthy as much as possible, and he interrelated the tram, healthy ageing life and livability for policy implementation [79].

The mayor also aims at least to maintain the land value in the central area of the city, because if the land price increases, the land based fixed asset tax will increase, and so will the City's income [79]. Even though the City's central area accounts for only 0.4% of total land area of the City, the central area contributed 22.2% of the total tax revenue for Toyama [79]. The impact of land price and the importance of investment at the urban area are obvious.

In addition, the mayor intends to see only gradual population decrease, as he believes that a more livable Toyama can attract the younger generation for living and healthy old age people can live longer [79]. He used the City's data to convince the citizens, and the initiative for the tram development and the compact Toyama was never smooth [79]. He held 120 town meetings allocating two hours for each meeting to patiently convince and explain the tram project based on the data [79]. Most importantly, he uses the word *Settoku Sekinin* which means the responsibility for convincing the citizens, and he emphasised the benefit to future citizens, not to deny the populism to prioritize the current citizen's benefit as well [79]. It seems that the mayor has strong leadership as he won his case. Based on the above vision of the mayor the next section attempts to analyse the innovative challenges of the City.

Toyama's policy tends to have more than two primary purposes, and the message is clear. For example, *Oishii Toyama Tabekiri Undou* is an awareness-raising project which promotes people to eat all the food on their plate at home and at restaurants, and linking this to thinking about food hunger in

the world [71] (p.19). The project may not have huge impacts, but reducing food waste, the ethics of global awareness, and the GHG emissions reductions associated with less food waste, can be easily connected with the project. Another example is the efforts to reduce the overall human resource cost of the City while enhancing the morale for the officers. The mayor points out the traditional ineffective working culture of the public servant in the interview, and he demands to work efficiently to reduce overtime work and to spend more time with the family [79]. These are the minor examples but they can have multi effects, together with Toyama's latest tram system and compact city development that demonstrate an alternative and sustainable approach for the aging and declining society.

Toyama's tram has the common features for a modern light rail, such as the IC ticket card, low-floor tram, overall design consistency, good time schedule for connection with the feeder bus, park and ride system and cycling parking [71] (p.21). To encourage tram use, the fourth ride of the day by the IC card holders becomes free [71] (p.21), and for those who purchase flowers at the qualified flower shops in the central area can ride the tram for free [71] (p.29). Also, the mayor mentions that overseas visitors are free, and visitors from other local governments are half price for the trip [79]. In addition, community rent-a-cycle system has been developed in the downtown area [71] (p.5), and flowers in hanging baskets and the glass crafts make the streets into art museum [71] (pp.5, 23). A glass roof public space called Grand Plaza increases the livability of the central area [71] (p.24).

Subsidies are available for the purchasing and the building of houses and apartments to encourage living in the inner city and along the public transit lines, and this policy leveraged population increase in those areas [72] (p.5). An intern named Kawasaki in a council member's office in Hirakata City, Japan, posted a comment about their study visit to Toyama City on *Hirakata City council member Ryouta Kimura's blog* on March 24, 2014 [80]. The intern commented about the part of the tram lines which circulate the downtown area within some 20 minutes as 'highly irresistible and easily accessible'. Little over 5,000 tram passengers use the tram every day on average since the first service in 2006, and 11.5% of the passengers indicate a shift from car use [72] (p.4).

At the same time as making the city more attractive to young people, the City tries to attract old age citizens to visit the livable downtown area and maintain their well-being simultaneously. A public transport concession pass for those aged 65 years and above is cheaply available [71] (p.24). Some city facilities, such as a zoo and museum are entrance free for grandparents and grandchildren to promote intergenerational communication and learning, as well as outside activities for the aged citizens [71] (p.27). Especially, a preventive care centre with broad services from spa to rehabilitative exercise is located in the city centre [81] (p.8). If the aged person who owns a house in the suburb wishes to move to living in the downtown area a subsidy is available for the rent fee or administrative fee [81] (p.5). Also, parks in the urban area have community gardens for aged citizens [81] (p.28). In addition, the City supports the promotional downtown walking tour guided by female university students for aged persons to demonstrate a 4-wheeled walker which is newly developed by a local university [79]. Private businesses have developed some unique welfare support services for the aged, children and disabled persons altogether in a single family-like facility [81] (p.7). All these actions aim to empower elderly citizens to live without using cars and increasing well-being simultaneously [81] (p.15).

These planning issues that are encouraging people of all ages to live a more walkable lifestyle will clearly be of relevance to the SDGs. On the other hand, the City also supports environmentally

friendly business and agriculture. A large solar power plant, a biomass plant and eco-town industrial recycling facility are already in operation [71] (p.19). Toyama's rice fields receive the abundant hydro flow from the mountain ranges through well-developed irrigation canals, and several small scale hydroelectric power plants are developing to stimulate a new phase of the agricultural industry and to meet the low carbon electricity needs [82] (p.13). According to Toyama City [82] (p.14), one of their newly started projects is a medicinal plant factory, and the energy source is solar PV and thermal energy from the neighbouring hot spring facility [82] (p.14). The projects cover from the production to the development of value-added processed foods and supplements, and distribution [82] (p.14). The factory offer local employment opportunity for aged citizens and the City's medicinal industry is projected to expand, in addition to contributing to healthy eating habits [82] (p.14). The City plans to use abandoned crop fields to meet the increasing demand of the plant in the future [82] (p.14).

Thus Toyama has social and environmental initiatives that are quite innovative and integrated; they will obviously be of value in delivering SDGs.

With all the efforts for sustainability, Toyama's CO_2 emissions shows a gradual decline trend from 3,928,000 tons in the peak year of 2007 to 3,489,000 tons in 2010 mainly due to the economic downturn; the transport sector shows a slightly declining trend since the opening of the tram lines [72] (p.8). Considering that Toyama's CO_2 emissions were 3,487,000 tons in 1990 [76] (p.49), Toyama' efforts are remarkable in turning the growth pattern into a peak and decline. This will be a significant part of the future SDG delivery.

4.3.3 The SDGs and Toyama City

Toyama City's actions well cover the four aspects: economy, social inclusion, environment and governance (Graph 3 and Table 7). However, economy is slightly weaker, as the City's strategic emphasis is just on the compact city. According to the intern [80] who visited Toyama described in the previous section, the intern was surprised at the number of closed local shops despite ten years of innovative activities. The City focuses on the health and well-being of old age citizens, but what the elderly citizens actually want and need is not much mentioned. A survey identifies the disadvantages of Japan's urban life for aged persons as follows, "pressures of living in high-rise apartments; limited resting areas in open areas in cities; lack of public toilets; accidents in the streets with cars and bicycles; and the decline of small businesses such as local shops" [83] (pp.8-9). Also, old age single households are increasing in Japan, and there is a likelihood of social isolation [83] (pp.7-8). The policies of the compact city are likely to address most of these issues mentioned but it would have been good governance if the City had actually surveyed their population to see that what was they needed. The positive thing is that the major tram users in the day time are citizens aged between 50s and 70s in Toyama [82] (p.4), thus they are responding to what has been provided. This also means that good marketing for these older generations is likely to be causing some benefit to local businesses. Interestingly, research in the UK indicates that the negative public attitude toward ageing ruins the efforts for a happy ageing society [83] (pp.9-10). Toyama does not seem to be doing that. The small businesses in the City centre can enhance friendly communication with customers, and the City can encourage and support them, probably to link with the gender equality, the weakest SDG of the City.

Graph 3: Toyama and the SDGs

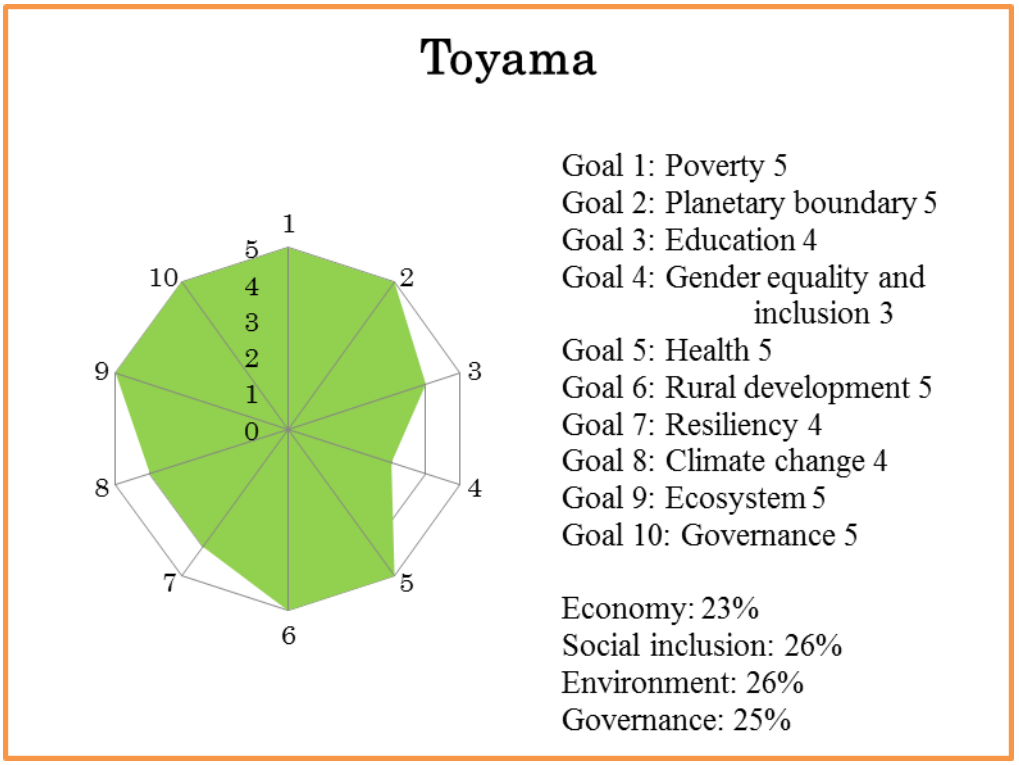


Table 7: Toyama's SDGs based on four dimensions (SDSN suggestion)

Toyama's SDGs	Ec	S	En	G
1. End extreme poverty including hunger	2	2	2	2
Japan is a high income country [47] (p.113)	■	■	■	■
ODA participation through JICA's training and sending experts of waste management to the City's sister city, Mogi das Cruzes, Brazil [84]	■	■	■	■
2. Achieve development within planetary boundaries	4	1	4	1
* Biomass use (wood pellet): 1,000 GJ	■		■	
** Eco Town (7 recycling facilities for biogas, woods, cooking oil, plastic and cars)	■		■	
*** Household waste recycling rate: 24.6%	■	■	■	■
* Reusing the waste heat from hot spring for plant factories	■		■	
3. Ensure Effective Learning for All Children and Youth for Life and Livelihood	3	2	4	3
** 3R education at schools: 15 primary schools and 2 kindergarten		■	■	■
** Environmental study on the environmentally friendly boat since 2009	■		■	
** Promotional education about the City's well developed public transportation system for primary schools, university and local communities since 2010	■	■	■	■
*** Eco Town study tour participants: 8,921 persons	■		■	■
4. Achieve Gender Equality, Social Inclusion, and Human Rights for All	2	5	2	5
** subsidies for increasing accessibility to the public transportation for vulnerable people (subsidies for community bus)	■	■	■	■
*** women's participation ratio at the City's meetings: 24.6%		■		■

** Team Toyama-shi (self-organised groups of individuals and companies to actively support climate change actions and projects)		■	■	■
*** Number of mental health support network: 30		■		■
*** Ratio of business entities where 1% of employee is disabled persons: 51.7%	■	■		■
5. Achieve Health and Wellbeing at All Ages	4	5	1	3
*** 120 subsidies for building houses for old persons in urban area	■	■	■	■
*** Ratio of persons who feel positive for own health : 81.4%		■		
Free entrance to the City's museum and zoo applicable for a group of grandparents and grandchildren [71]	■	■		
Toyama Kodomo Plaza: combined service of kids library and parents supports [71]	■	■		■
*** 21 specialized childcare service for sick children	■	■		■
6. Improve Agriculture Systems and Raise Rural Prosperity	4	3	4	3
** 2 small scale hydro electricity generation from agricultural fields	■		■	
** Building more small scale hydroelectricity power plants for crop growing areas, and branding the produced foods as environmentally friendly agricultural products	■	■	■	■
Petit Marche: farmers market in the city, five times a year [71]	■	■	■	■
*** Subsidies for local timber use for house building: 71 applications approved	■	■	■	■
7. Empower Inclusive, Productive, and Resilient Cities	3	5	4	4
** Subsidy for house and apartment building in the central area and along the public transportation lines: 2046 application received by 2013	■	■	■	
** Community cycle system in the city centre since 2009	■	■	■	■
** Subsidy for utilising empty spaces in urban area to provide services favoured by the citizens	■	■		■
Exchanging driver's license and public transportation tickets (20,000 yen) for old persons [71]		■	■	■
Snow plough from roads in winter [71]		■	■	■
8. Curb Human-Induced Climate Change and Ensure Clean Energy for All	6	4	7	4
** Newly developed tram and the line expansion since 2006	■	■	■	■
* Shifting land use from empty space to community garden		■	■	■
** Modal shift from cars & bus to tram: 28% of total tram passengers	■	■	■	■
** Raising insulation criteria for apartments in the city and areas along the public transportation routes	■		■	
** LED light for the roadside lights: 2,799 places between 2010-2011	■		■	
** Energy Park: small scale hydro, solar, biomass energy generation and education	■		■	■
*** Subsidies for solar power PV for households: 356 applications received	■	■	■	
9. Secure Ecosystem Services and Biodiversity, Ensure Good Management of Water and Other Natural Resources	1	4	4	4
*** Forest management with 47 organizations from private sector, community and the NGOs linking with environmental education		■	■	■
** Limiting the development of large shopping centre at suburb	■	■	■	■
City clean-up campaign: 72,000 participants in 2012 [71]		■	■	■

** Toyama Slow Life Field: large scale community garden at the hilly area of the City				
10. Transform Governance for Sustainable Development	1	3	1	3
*** Detailed decision making process for the City's Master Plan is available at the City's website				
*** Detailed report of workshop participated by the citizens for raising issues to be reflected in the Master Plan is available				
*** Projects with NGOs: 30				
	Ec	S	En	G
score	30	34	33	32
%	23	26	26	25

Source: * [77]: 2012 data

** [72]: 2013 data

*** [85]: 2013 data

Otherwise specified

Ec: Economic development and eradication of poverty; S: Social inclusion; En: Environmental sustainability; G: Governance, including peace and security

The SDGs of the City are well balanced except for gender equality, an issue that faces all of Japan. Toyama's experience in general encourages taking further action toward the sustainable city (Table 7) and suggests they could play a role in international cooperation.

One difficulty for Japanese local governments is how to assist poverty alleviation in other countries. Toyama's contribution has come from a sister city relation. According to JICA [84] (pp.20-21), *Mogi das Cruzes* city in Brazil has a waste management system separately to collect food wastes and other recyclable wastes from households, but the recycling rate is too low due to the lack of cooperation by the citizens. Also, some poor people individually collect the recyclable wastes for income without using any protection. Then, Toyama City was requested to help the sister city, *Mogi das Cruzes*. The Recycle Mogi project started to increase the recycling rates in one precinct, to improve the income for the poor and their social status by establishing a cooperative group for the waste collection and by distributing a pamphlet about recycling rules at every household. *Mogi das Cruzes* city assisted in hygiene and safety education and provided protective wear for the cooperative group. The recycling increased by 60% [84] (pp.20-21).

Another way is to link Toyama's traditional medicine delivery to households and international cooperation on health. Already Thailand, Myanmar, Vietnam and Mongolia have adopted this system, because the system could support areas where the health care system was not well developed and traditional medicines still play a role [81] (p.7). Also, this method involves face-to-face communication at households, and aged persons who live alone and who cannot go out can thus benefit from this system [81] (p.6). Toyama's pharmaceutical industry is encouraged to focus in these areas, in addition to environmentally friendly medicine production. Frumkin, Hess and Vindigni [86] (p.16) suggest the pharmaceutical industry should develop much more non-petroleum source medicine in response to peak oil, as many medicines come from a petroleum feedstock [87] [86] (p.10). Toyama's pharmaceutical industry began to focus on non-petroleum source medicine building on its traditional medicines [81] (pp.55-56). If Toyama's pharmaceutical industry can develop an

environmentally friendly model from the medicinal plant production to the processing, marketing and distribution, the City can share its experience with other areas directly or through the JICA.

This local example of innovation can be seen to relate to many of the SDGs. It illustrates that local government in Japan should look eagerly at the potential for SDGs to be a major part of their future work and demonstrates a clear potential for Japan to contribute to the global delivery of SDGs.

CONCLUSION

This paper aimed to explore what are the SDGs and how Japanese national and local government can help deliver the SDGs in theory and practice.

From the findings outlined above the SDGs and the possible Japanese national and local governments approach to the SDGs are answered in four ways.

1. Firstly, the SDGs can be understood as what every municipality would be expected to pursue in Japan and every other country after 2015. Applying the SDGs enables Japanese municipalities to evaluate how sustainable they are. No studies other than involving JICA have yet been found on how Japan will be approaching the SDGs. Considering the role of JICA and their current focus on the MDGs, JICA's early attention to the SDGs is reasonable. Further research may be able to find out other Japanese initiatives for the SDGs, and since the SDGs are expected to be decided next year more studies about the SDGs and Japan will be released from now on. Hence, this study is one of early studies on SDGs and Japan.

Also, to explore sustainability and Japan in general, broad ranges of reports, websites and journals had to be explored to view from social, economic and environment aspects. A positive point is that the many detailed information and actions which enable the analysis of the extent of sustainability by Local Municipality, are already available. This data availability will provide for the smoother application of the SDGs after 2015.

The requirement of delivering the SDGs is to deliver many actions to make society better; Japan is contributing to sustainability directly and indirectly and can therefore contribute best in these areas for a global contribution to SDGs. The difficulty is the holistic approach which combines the scattered information to understand the Japanese approach to sustainability, and this problem can be improved by introducing the SDGs. The SDGs cover the broad issues with clear and easy to understand indicators, as in the MDGs, so that where we are now and where we need to go will be easily shared with the wider public, probably increasing the legitimacy for promoting sustainable actions and preventing political distortions. Thus, the SDGs have a tremendous potential, if a holistic approach is taken.

2. Secondly, Japanese national government can help the SDGs in three ways through initiating the holistic SDG approach among various ministries, good policy implementation and the ODA. Since the Japanese government system is top-down, the demand for a holistic approach can be quickly implemented at the local level, if the national government takes the holistic approach itself. This will be a challenge for the Japanese government, but it is worth doing so, because the holistic approach can effectively stimulate the economy, protect the environment and increase livability. Considering the financial debts at national and local governments, economic stagnation, the fragile geological location of Japan and the ageing population, sustainable development is an excellent choice for Japan. The three case studies already show the great possibilities for Japan. In addition, actively assisting developing countries through the ODA is ethically appropriate and economically beneficial for both Japan and the recipient countries. Since, JICA's approach started emphasising on the environmental protection and human security, it is even better prepared than most aid agencies at delivering the

SDGs. The tax used for the ODA will have a double meaning for aid and investment, and this can convince many Japanese taxpayers to allocate even more to the ODA.

3. Thirdly, local governments can play a significant role as their broad public services directly engage with their citizens. Especially, there is a big need for the Japanese low-carbon compact city based on public transportation and livable urban areas. This is expected to accelerate in Japan, because of the national policy imposed on local governments. However, how each municipality implement the policy is a matter of wisdom and networking. To develop locally suitable models, learning from the experience of other cities will help, and the increasing autonomy of Japanese local governments enables this to happen.

Also, the extended partnership with NGOs can provide better public services and alternative services to meet broader needs. It might be ideal to reflect women's voices in providing those services, because the gender equality is lower compared to other goals in Japan. Alternatively, any vulnerable people can be empowered in this opportunity by applying JICA's human security policy which is applicable to all human beings. This means women are also included in the human security policy. Human security in Japan is supposed to be at a high level and since Japan's ODA is supposed to share Japan's good experience with the developing countries this an ideal way for the SDGs to be opened up across Asia. Considering the high suicide ratio in Japan, local governments are encouraged to take the human security issue seriously to convince others that their development model is beneficial for them. The national government can emphasise human security policy not only in the ODA, but also in Japan's domestic policies.

In addition, increasing efforts to combine environment and economic activities by the private sectors can enhance more efficient resource use and reduce GHG emissions. The local governments can implement incentive policies to promote this type of business, especially locally available resource use is encouraged to revitalise the local economy. When good examples emerge from every effort for sustainability, utilising JICA's training and various programmes can be an alternative for the municipal level to assist poverty eradication and technology transfer, aiming to benefit both developing countries and Japan.

4. Fourthly, three case studies show the possibility of the fundamental shift to sustainability. Even though, the GHG emissions do not dramatically decrease at this stage, the three cities demonstrate how each city with different conditions can develop differently to sustainability. Kitakyushu stands out among the three in terms of international partnership, research, technology, the size of the economy, and the history for improving the environment. Also, Kagoshima and Toyama studies show how similar sized cities can develop differently based on locally unique conditions. Toyama's policy with multiple effects is easily understood, while the other cities gave weaker images about livability, even though each city is livable.

However, what are blocking for the further shift to sustainability in common among the three cities are their scattered data and too much confusing information. This applies to the national government too. Simplicity, clarity, consistency and easy to understand are necessary for quicker and will be demanded for the SDGs. The ICT technology for gathering scientific data on SDGs for developing countries might be important; however, concise data are critical for developed countries if they are to be leading in SDG delivery.

The SDGs are hence very good goals and necessary for all, and this dissertation shows how Japan can help in their delivery.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. UNWCED (UN the World Commission on Environment and Development). Report of the World Commission on Environment and Development: Our Common Future, 1987. United Nations Web site. http://www.un-documents.net/our-common-future.pdf (accessed on 2 April 2014).
2. UN (United Nations). We Can End Poverty: Millennium Development Goals and Beyond 2015, 2014. UN Web site: Beyond 2015: Overview. http://www.un.org/millenniumgoals/beyond2015-overview.shtml (accessed on 21March 2014).
3. SDSN (Sustainable Development Solutions Network). *Action Agenda for Sustainable Development: Report for the UN Secretary General*; October 2013; http://unsdsn.org/wp-content/uploads/2014/02/An-Action-Agenda-for-Sustainable-Development.pdf (accessed 10 May 2014).
4. UNGA (UN General Assembly). A/RES/65/1: Keeping the Promise: United to Achieve the Millennium Development Goals, 2010. UN Web site. http://www.un.org/en/mdg/summit2010/pdf/outcome_documentN1051260.pdf (accessed on 21 March 2014).
5. UNGA. A/RES/66/288: The Future We Want, 2012. UN Web site. http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/66/288 (accessed on 21 March 2014).
6. UNGA. A/RES/68/6: Outcome Document of the Special Event to Follow Up Efforts Made Towards Achieving the Millennium Development Goals, 2014. UN Web site. http://www.un.org/en/ga/search/view_doc.asp?symbol=A/RES/68/6 (accessed on 25 March 2014).
7. HLP (High-Level Panel of Eminent Persons on the post-2015). *A New Global Partnership: Eradicating Poverty and Transform Economies through Sustainable Development*; United Nations Publication: New York, NY, USA, 2013; http://www.un.org/sg/management/pdf/HLP_P2015_Report.pdf (accessed on 14 February 2014).
8. MOE (Ministry of the Environment). Japan's National Greenhouse Gas Emissions in Fiscal Year 2012 (Final Figures), 2014. MOE of Japan Web site. http://www.env.go.jp/en/headline/headline.php?serial=2077 (accessed 26 April 2014).
9. Government of Japan. *Japan's Fifth National Communication Under the United Nations Framework Convention on Climate Change*; Tokyo, Japan, 2010; http://unfccc.int/resource/docs/natc/jpn_nc5.pdf (accessed on 16 January 2014).
10. SBJ (Statistics Bureau of Japan). *Statistical Handbook of Japan 2013*; MIC of Japan: Tokyo, Japan, 2013. http://www.stat.go.jp/english/data/handbook/pdf/2013all.pdf#page=5 (accessed 8 April 2014).
11. MOE of Japan. Details on the Carbon Tax (Tax for Climate Change Mitigation), 2012. MOE of Japan Web site: Environmental Taxation (Carbon Tax and Other Environmentally Related Taxation): Carbon Tax. https://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf (accessed 26 April 2014).
12. METI (Ministry of Economy, Trade and Industry) of Japan. J-Credit Scheme, 2013. METI of

Japan Web site. http://japancredit.go.jp/pdf/english/credit_english_001_2.pdf. (accessed 26 April 2014).

13. MOFA (Ministry of Foreign Affairs) of Japan. *Japan's Official Development Assistance White Paper 2012: Japan's International Cooperation*; Tokyo, Japan, 2013; http://www.mofa.go.jp/policy/oda/white/2012/pdfs/all.pdf (accessed 12 April 2014).
14. Kawai, M.; Takagi, S. Japan's Official Development Assistance: Recent Issues and Future Directions. *Journal of International Development* **2004**, 16: 255-280, DOI: 10.1002/jid.1074. (accessed 12 April 2014).
15. JICA (Japan International Cooperation Agency) . JICA's Cooperation on Climate Change, 2013. JICA Web site. http://www.jica.go.jp/english/our_work/climate_change/c8h0vm000001378k-att/cooperation08.pdf (accessed on 21 April 2014).
16. Sato, I. JICA, Tokyo, Japan, Personal communication, 24 April 2014.
17. Kurusu, K.; Kersten, R. Japan as an Active Agent for Global Norms: The Political Dynamism Behind the Acceptance and Promotion of 'Human Security'. *Asia Pacific Review* **2011**, 18(2): 115-137, DOI: 10.1080/13439006.2011.630854. (accessed 20 March 2014).
18. UNDP (UN Development Programme). *Human Development Report 2013-The Rise of the South: Human Progress in a Diverse World*. New York, NY, USA, 2013; http://hdr.undp.org/sites/default/files/reports/14/hdr2013_en_complete.pdf (accessed on 5 March 2014).
19. JICA. Direction of Low Carbon and Resilient Development Cooperation by JICA, 2012. JICA Web site: Climate Change: Conceptual Diagram. http://www.jica.go.jp/english/our_work/climate_change/pdf/conceptual_diagram.pdf (accessed on 21 April 2014).
20. JICA. Direction of Low Carbon and Resilient Development Cooperation by JICA, 2012. JICA Web site. http://www.jica.go.jp/english/our_work/climate_change/pdf/direction.pdf (accessed on 21 April 2014).
21. JICA. Building Disaster Resilient Societies: JICA's Cooperation on Disaster Management, 2008. JICA Web site. http://www.jica.go.jp/english/our_work/thematic_issues/water/pdf/cooperation_01.pdf (accessed on 21 April 2014).
22. JICA. JICA's Approach to the Millennium Development Goals: for Inclusive and Dynamic Development, 2012. JICA Web site. http://www.jica.go.jp/englis/publications/brochures/c8h0vm000000k9k0att/millennium_01.pdf (accessed on 16 April 2014).
23. JICA. *JICA 2013 Annual Report*. Tokyo, Japan, 2013; http://www.jica.go.jp/english/publications/reports/annual/2013/c8h0vm00008m8edo-att/all.pdf (accessed on 17 April 2014).
24. JICA. Nihon mo Genki ni suru Kokusai Kyoryoku Jigyou: JICA Kokunai Kyoten no Torikumi, 2012. JICA Web site. http://www.jica.go.jp/publication/pamph/ku57pq00000najg5-att/genki.pdf (accessed on 16 April 2014).
25. Newman, P.; Kenworthy, J. *Sustainability and Cities: Overcoming Automobile Dependence*; Island Press: Washington, DC, USA, 1999.

26. UN Environment Program. GEO (Global Environmental Outlook) 5: Summary for Policy Makers, 2012. UN Environment Program Web site. http://www.unep.org/geo/pdfs/GEO5_SPM_English.pdf (accessed on 22 February 2013).
27. Giardet, H. *The Gaia Atlas of Cities: New Directions for Sustainable Urban Living*; Gaia Books: London, UK, 1992.
28. MIC (Ministry of Internal Affairs and Communications) of Japan. *Chihou Zaisei no Jyoukyou*; Tokyo, Japan, 2014; http://www.soumu.go.jp/menu_seisaku/hakusyo/chihou/pdf/h26.pdf (accessed 23 April 2014).
29. ECCJ (Energy Conservation Center, Japan). *The Energy Conservation*; Vol. 64, No. 12; Tokyo, Japan, 2012.
30. MLIT (Ministry of Land, Infrastructure, Transport and Tourism) of Japan. *Teitanso Machidukuri Jissen Handbook*. Tokyo, Japan, 2013; https://www.mlit.go.jp/common/001023244.pdf (accessed 5 May 2014).
31. TMG (Tokyo Metropolitan Government). *Tokyo Cap-and-Trade Program: Japan's First Mandatory Emissions Trading Scheme*; Tokyo, Japan, 2010; https://www.kankyo.metro.tokyo.jp/en/attachement/Tokyocap_and_trade_programmarch_2010_TMG.pdf (accessed 25 April 2014).
32. Takao, Y. *National Integration and Local Power in Japan*; Ashgate: Aldershot, UK. 1999.
33. Takao, Y. The transformation of Japan's environmental policy. *Environmental Politics* **2012**, 21(5): 772-790, DOI:10.1080/09644016.2012.686224 (accessed 25 February 2014).
34. Yamagishi, T. Trust and Social Intelligence in Japan. In *The State of Civil Society in Japan*. Schwartz , F. J., Pharr, S. J., Eds.; Cambridge University Press: Cambridge, UK, 2003; pp. 281-297.
35. Takao, Y. Aging and Political Participation in Japan: The Dankai Generation in a Political Swing. *Asian Survey* **2009**, 49(5): 852-872. http://www.jstor.org/stable/10.1525/as.2009.49.5.852 (accessed February 17, 2014).
36. MOE. Chihou Koukyou Dantai ni okeru Jikkou Keikaku: Todoufuken Senter Tou no Jisshi Jyoukyou, 2014. MOE of Japan Web site. http://www.env.go.jp/earth/dantai/index.html (accessed 28 April 2014).
37. City of Kitakyushu. Eco, Thereby Enhancing Global Partnership, 2007. City of Kitakyushu Web site. http://www.city.kitakyushu.lg.jp/files/000071565.pdf (accessed on 2 May 2014).
38. Hotai, S.; Oohashi , K. *Chihou Daitoshi no Toshi Mondai: 10 Nenngo ni miru Kitakyushu-shi no Henyou to Jyoukenn*; Taga Syuppan: Tokyo, Japan, 1991; pp. 9-34.
39. Chikazawa, K.; Ohashi, K. *Toshi Byouri Kenkyu: Fukugou Toshi Kitakyushu-shi wo Cyushin ni*; Kawashima Syoten: Tokyo, Japan, 1978; pp. 260-278.
40. Nomura, M. *Kitakyushu-shi ga Torikunde Kita Kankyou Seisaku* [*Historical Survey of Environmental Policy in Kitakyushu City up to This Day*]; Kyusyu International University Keiei Keizai Ronsyu 17(3); Kyusyu International University: Kitakyushu, Japan, 2011; 13-21. http://www.kiu.ac.jp/organization/library/memoir/img/pdf/keizai17-3-003nomura.pdf (accessed 2 May 2014).
41. Takasugi, S. *Kitakyushu Eco-Town wo Mini Iku*; Diamond: Tokyo, Japan, 1999; pp. 92-149.
42. City of Kitakyushu. *Kitakyushu-shi Teitanso Machizukuri Keikaku*; March 2014; Kitakyushu,

Japan, 2014; http://www.city.kitakyushu.lg.jp/files/000166027.pdf (accessed on 1 May 2014).
43. City of Kitakyushu. *Kitakyushu-shi Kihon Kousou・Kihon Keikaku: GenkiHasshin Kitakyushu Plan*; Henkou Ban; Kitakyushu, Japan, 2014; http://www.city.kitakyushu.lg.jp/soumu/file_0238.html (accessed on 2 May 2014).
44. City of Kitakyushu. *Kankyou Model Toshi Koudou Keikaku: Kitakyushu Green Frontier Plan*; March 2014 Kaitei Ban; Kitakyushu, Japan, 2014; http://www.city.kitakyushu.lg.jp/files/000166626.pdf (accessed on 8 May 2014).
45. Cabinet Secretariat of Japan. Hyuka Kekka Soukatu Hyou (2013 Zantei Ban), 2014. Cabinet Secretariat of Japan Web site: Kankyo Mirai Toshi Torikumi Kekka: Heisei 24-nendo no Torikumi Hyouka Kekka: Kitakyushu-shi. http://www.kantei.go.jp/jp/singi/tiiki/kankyo/pdf/torikumi_h24_result/05kitakyusyu.pdf (accessed on 1 May 2014).
46. City of Kitakyushu. 2010-nenndo ni okeru Kitakyushu-shi no Onshitukouka Gas Haisyutsuryou, 2014. City of Kitakyushu Web site. http://www.city.kitakyushu.lg.jp/kankyou/file_0366.html (accessed on 9 May 2014).
47. World Bank. *The Little Data Book 2013*. Washington, D.C., USA, 2013; DOI: 10.1596/978-0-8213-9812-8; License: Creative Commons Attribution CC BY 3.0. (accessed on 4 April 2014).
48. City of Kitakyushu. *Kankyou Syuto Report: Kankyou Model Toshi Koudou Keikaku*; March 2013; Kitakyushu, Japan, 2013; http://www.city.kitakyushu.lg.jp/files/000157715.pdf (accessed on 1 May 2014).
49. Matsubara, A. Participatory Budgeting in the City of Ichikawa. In *Participatory Budgeting in Asia and Europe: Key Challenges of Participation*. Sintomer Y.;Traub-Merz, R.; Zhang, J.; Herzberg, C. Eds.; Palgrave Macmillan: Houndmills, UK, 2013, pp.27-35.
50. Sintomer, Y.; Herzberg, C.; Röcke, A.; Allegretti, G. Transnational Models of Citizen Participation: The Case of Participatory Budgeting. *Journal of Public Deliberation* **2012**, 8 (2): Article 9: 1-9:34. http://www.publicdeliberation.net/jpd/vol8/iss2/art9 (accessed 11 May 2014).
51. Kagoshima Convention and Visitors Bureau. Sakurajima・Kinkouwan Geo Park Kousou, 2013. Kagoshima City Web site: Kyougikai. http://www.kagoshimayokanavi.jp/shizen/geopark/documents/201371162349.pdf (accessed on 15 May 2014).
52. Sodeyama, K. *Shirasu Riyo no Atarashi Tenkai*; Kagoshima Shirasu Sangyou Okoshi Kigyou Guidebook: Challenge Kagoshima; Kagoshima Prefectural Institute of Industrial Technology: Kagoshima, Japan, 2011. 70-76. http://www.kagoshima-it.go.jp/pdf/shirasu/pdf/shirasu70.pdf (accessed 22 May 2014).
53. Kagoshima City Council. Shisei Gaiyou, 2013. Kagoshima City Web site. http://www.city.kagoshima.lg.jp/gikai/kouhou/_43852/_45729.html (accessed on 15 May 2014).
54. Kagoshima City. *Hito・Machi・Midori・Minna de Tsukuru "Yutakasa" Jikkann Toshi・Kagoshima:Dai 5-ji Kagoshima-shi Sougou Keikaku*. Kagoshima, Japan, 2012; http://www.city.kagoshima.lg.jp/var/rev0/0047/9110/201251819413.pdf (accessed on 12 May 2013).
55. Kagoshima City. *Kagoshima-shi Koukyou Koutsu Vision: Koukyou Koutsu wo Ikashita Aruite Tanoshimu Midori no Machi Kagoshima*. Kagoshima, Japan, 2010; http://www.city.kagoshima.lg.jp/var/rev0/0023/2811/20104612758.pdf (accessed on 12 May 2014).

56. Kyocera Corporation. Kagoshima Nanatsujima Solar Science Museum Pamphlet, 2014. Kyocera Corporation Web site: Shinraisei no Akashi. http://www.kyocera.co.jp/energy/reliability/pdf/pamphlet.pdf (accessed 15 May 2014).
57. Kagoshima Convention and Visitors Bureau. Tourist Guide, 2013. Kagoshima City Web site: Official Tourism Website of Kagoshima City. http://www.kagoshimayokanavi.jp/english/index.html (accessed on 16 May 2014).
58. Kagoshima City. Heisei 25-nenndo Kagoshima-shi Toukeisyo, 2013. Kagoshima City Web site: Toukei Data: Takarabako. http://www.city.kagoshima.lg.jp/_1010/shimin/7siseijouhou/7-15tokei.html (accessed on 15 May 2014).
59. Hara, A local resident, H. Kagoshima, Japan, Personal communication, 2014.
60. Global Geoparks Network. Guidelines and Criteria for National Geoparks Seeking UNESCO's Assistance to Join the Global Geoparks Network (GGN), 2010. GGN Web site: Documents: GGN Guidelines. http://www.globalgeopark.org/UploadFiles/2012_9_6/GGN2010.pdf (accessed on 17 May 2014).
61. Fukami, S. *Geopark to Geo-tourism no Seiritu ni kansuru Ichi Kousatu*; Chiiki Kenkyu 38 (1); Nagasaki University: Nagasaki, Japan, 2010; 63-72. http://www.iuk.ac.jp/chiken/pdf/regional_studies38/fukami.pdf (accessed on 8 May 2014).
62. Fukami, S. Chiiki Community Saisei to Eco-Musium: Kyoudou Syakai no Machi Zukuri Ron, 1st ed.; Seizansya, Kanagawa, Japan, 2007.
63. Kagoshima Convention and Visitors Bureau. Sakurajima-Kinkowwan Geopark Suishinn Kyougikai Gijikankei Shiryou, 2014. Kagoshima City Web site: Sakurajima-Kinkowwan Geopark Suishinn Kyougikai wo Kaisai shimashita. http://www.kagoshima-yokanavi.jp/shizen/geopark/documents/02.pdf (accessed on 19 May 2014).
64. Kagoshima City. Sakurajima Geopark Kentou Jigyou ni tsuite, 2014. Kagoshima City Web site. http://www.city.kagoshima.lg.jp/_1010/shimin/3machidukuri/3-6toshiseisaku/_42927.html (accessed on 19 May 2014).
65. Kagoshima City. *Kagoshima-shi no Kankyou*. Kagoshima, Japan, 2013; http://www.city.kagoshima.lg.jp/var/rev0/0068/5911/20131122111832.pdf (accessed on 5 May 2014).
66. Kagoshima City. Kagoshima-shi Gakkou-ban Kankyou ISO Nintei Seido: Unyou Syutoku Mannual, 2006. Kagoshima City Web site. http://www.city.kagoshima.lg.jp/var/rev0/0049/1670/2012622111357.pdf (accessed on 22 May 2014).
67. Kagoshima City. *Kagoshima-shi Chikyuu Onndannka Taisaku Action Plan Jisshi Jyoukyou Houkoku*; March 2012; Kagoshima, Japan, 2014; http://www.city.kagoshima.lg.jp/var/rev0/0072/1238/2014313172153.pdf (accessed on 6 May 2014).
68. Kagoshima University. Kokusai Kouryu: Kokusaikouken Katsudou (JICA Kensyu nado), 2014.Kagoshima University Web site. http://www.kagoshima-u.ac.jp/international/kokusaikouken.html (accessed 21 May 2014).
69. Kagoshima City. Iken Koukan Kai, 2014. Kagoshima City Web site. http://www.city.kagoshima.lg.jp/_1010/shimin/3machidukuri/3-12shiminsankaku/3-12-1mado/_39571/_39574/_30926/_32702.html (accessed on 21 May 2014).

70. Toyama City. Toyama Information, 2014. Visit Toyama Web site. http://visit-toyama.com/en/image_ftp/400/info_en.pdf (accessed on 23 May 2014).
71. Toyama City. Toyama Shisei Youran, 2013. Toyama City Web site. http://www.city.toyama.toyama.jp/data/open/cnt/3/9072/1/youran-all.pdf (accessed on 23 May 2014).
72. Toyama City. *Toyama-shi Kankyou Model Toshi Koudou Keikaku: Compact City Senryaku niyoru CO_2 Sakugen Keikaku*; Toyama, Japan, 2014; http://www.city.toyama.toyama.jp/data/open/cnt/3/2503/1/2zentai.pdf (accessed on 23 May 2014).
73. OECD (Organisation for Economic Co-operation and Development) Web site: Greening cities, regions and communities Compact City Policies: A Comprehensive Assessment, http://www.oecd.org/greengrowth/greening-cities-regions/compact-city.htm#table (accessed on 23 May 2014).
74. Toyama City. 9. Gyousei Shisatsu no Annai, 2014. Toyama City Web site: Shisei no Jyouhou. https://www.city.toyama.toyama.jp/data/open/cnt/3/11038/1/25-koumokubetsukensu.pdf (accessed on 27 May 2014).
75. Toyama City. Torikumi Hyouka: Heisei 24-nenndo, 2014. Toyama City Web site: Shisei no Jyouhou: Kankyou Model Toshi: Kankyou Model Toshi Follow-up Kekka ni Tsuite. http://www.city.toyama.toyama.jp/kankyobu/kankyoseisakuka/ondankataisakukikaku/kankyomoderutoshi.html#semina (accessed on 27 May 2014).
76. MLIT. Toyama-shi ha naze Compact City wo Mezashita noka?: Koukyou Koutsu wo Jiku to shita Compact na Machi Zukuri, 2009. MLIT of Japan Web site: Compact City: Dai 3-kai Compact City Suishinn Kenkyukai: Kaisai Report. http://www.thr.mlit.go.jp/compact-city/contents/suishinkenkyuukai/index.html (accessed 25 May 2014).
77. Cabinet Secretariat of Japan. Hyuka Kekka Soukatu Hyou (2013 Zantei Ban), 2014. Cabinet Secretariat of Japan Web site: Kankyo Mirai Toshi Torikumi Kekka: Heisei 24-nendo no Torikumi Hyouka Kekka: Toyama-shi. http://www.kantei.go.jp/jp/singi/tiiki/kankyo/pdf/torikumi_h24_result/04toyama.pdf (accessed on 22 May 2014).
78. Kagoshima City. 2014 Kagoshima Shisei Youran, 2014. Kagoshima City Web site. http://www.city.kagoshima.lg.jp/var/rev0/0073/8860/201441114748.pdf (accessed on 15 May 2014).
79. Institute for Studies in Happiness, Economy and Society. Interview 2013: Toyama Shicyou, Mori Masashi. http://ishes.org/interview/itv07_01.html (accessed on 29 May 2014).
80. Kawasaki. Hirakata City council member Ryouta Kimura's blog: Toyama-shi no Compact City wo mini itta Ohanashi by Intern-sei. http://ameblo.jp/kimura-ryota/entry-11790402333.html (accessed on 29 May 2014),
81. Toyama City. *Tyama-shi Kankyou Miraitoshi Keikaku Compact City Senryaku ni yoru Toyama-gata Toshi Keiei no Kouchiku*; Toyama, Japan, 2013; http://www.city.toyama.toyama.jp/data/open/cnt/3/9951/1/keikaku.pdf (accessed on 1June 2014).
82. Toyama City. Dai 1-kai Platinum Taisyou ni oite Yusyuu Syou wo Jyusyou shimashita, 2013. Toyama City Web site: Kurashi no Jyouhou: Kankyou Miraitoshi ni tsuite: Fukyuu Tenkai Keihatu Katsudou ni tuite. http://www.city.toyama.toyama.jp/data/open/cnt/3/11466/1/platinum.pdf

(accessed on 1June 2014).
83. Philipson, C. *Growing Older in Urban Environments: Perspectives from Japan and the UK*, A Report on a Symposium Held in Church House Conference Centre, Westminster, UK, March 29-30, 2011, International Longevity Centre-UK: London, UK, 2011. http://www.ilcuk.org.uk/index.php/publications/publication_details/growing_older_in_urban_environments_perspectives_from_japan_and_the_uk (accessed on 1 June 2014).
84. JICA. *JICA's World*; January 2013, No. 52; Tokyo, Japan, 2013; http://www.jica.go.jp/publication/j-world/1301/ku57pq000010c0ct-att/all.pdf (accessed on 2 May 2014).
85. Toyama City. Toyama-shi Sougou Keikakuk Kouki Kihon Keikaku, 2014. Toyama City Web site: Shisei no Jouhou: Kouki Kihon Keikaku. http://www.city.toyama.toyama.jp/kikakukanribu/kikakuchoseika/sogokeikaku/kousouzennki.html (accessed on 25 May 2014).
86. Frumkin, H.; Hess, J.; Vindigni, S. Energy and Public Health: the Challenge of Peak Petroleum. *Public Health Reports* **2009**, January-February 124 (1): 5-19, http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2602925/pdf/phr124000005.pdf (accessed on 3 June 2014).
87. Glenn DH. The hidden energy crisis: oil and gas raw materials in medicine. Tex Med 1976; 72(12): pp.66-67.