From urbanization to aging society
– Lessons from Japan

pwc

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Forward

In 1800, 2% of the world's population lived in cities. Now it's 50%. And according to the Organisation for Economic Co-operation and Development (OECD), by 2050 nearly 70% of the world's population will be living in urban areas.

As urbanization grows on a global scale and at a rapid pace, all the resources and activities are concentrated to cities. Today, cities occupy 0.5% of the world's surface, but consume 75% of its resources. City leaders are facing wide range of issues, such as the lack of infrastructure including water and sewage systems, traffic congestion, environmental pollution, waste disposal, and disaster response. These issues are particularly acute in fast-growing Asian cities, compelling people to quickly find solutions to these problems and to realize sustainable urban development.

Rapid urbanization brings us challenges. However, it also brings us wider opportunities if we are able to handle them wisely. Take Singapore and Israel for example. Both nations suffered from the serious lack of water resources. Today, they are renowned for advanced water technologies, and even exporting them to other countries with water shortages.

Japan, as a nation that has built disaster-resistant, ecofriendly, and inclusive cities that have been rapidly urbanized during a time of fast economic growth, also has a reservoir of knowledge and infrastructure technologies that could contribute to finding solutions for the challenges of urbanization in other countries.

This report is based on the research by Cities Solutions Alliance, partnership of 30+ entities including university professors, central government, local government, international funding agencies, and private companies. The report attempts to illustrate the issues that Japanese cities faced and how these cities developed a variety of unique solutions to overcome their own problems through their urbanization history.

We took a close look at seven cities – Tokyo, Yokohama, Osaka, Kyoto, Sendai, Kitakyushu, and Toyama. All suffered severe challenges, but have transformed themselves into more liveable and sustainable cities. Here, two key lessons can be drawn. Firstly, cities alone cannot solve the problems. They can only be solved through the collaboration among local governments, central governments, private sector, and civil sector. Great solutions are the result of combination of right policies and regulation, private sector knowhow, and citizen participation.

Secondly, solutions must be aligned to the economic, environmental, and social needs. For example, mobility solution of Tokyo differs from that of Toyama. Tokyo has successful transit-oriented development solutions offering convenient and smooth mobility for urban citizens. Toyama, facing a declining and aging population, aims at developing a LRT-based compact city to ensure affordable and safe mobility for elderly citizens.

It would be a great pleasure for us if readers discovered how Japan dealt with urbanization, including some of the lessons learned and challenges for the future, and to use those discoveries as a guide for transforming cities so that they could continue to develop as *cities of opportunity*.

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Introduction

– Why is Japan's urbanization story useful for cities in developing countries?

Rapid population growth is a double-edged sword for cities. A large population stimulates the local economy and attracts businesses. On the other hand, cities need to make huge investments in their infrastructures.

To build a sustainable society, it is important for cities to find effective, efficient ways to use limited urban resources. Otherwise, cities could become nightmarish and face a range of issues: congestion, air and water pollution, unstable energy supplies, etc.

In the past, Japanese cities grew at an unprecedented pace. Chart 1 is a comparison of population growth of New York, London, and Tokyo from 1945 to 2014. In 1945, the population of London and New York was almost the same. The population of Tokyo prefecture was just less than half of the 2 cities (3.5 million).

But 15 years later, the population of Tokyo reached 10 million, overtaking the populations of New York and London, which remained roughly the same. Today, the population of the Tokyo Metropolitan area is the largest metropolitan area in the world.

Tokyo's population growth is actually more similar to Asian mega cities in the developing countries. As you can see from the chart, the steepness of the population growth curve that Tokyo experienced from 1945 to 1970 is identical with two Asian cities: Mumbai

from 1960s, and Jakarta from 1970s. This is the reason why Tokyo's struggle to overcome the urbanization and build a sustainable city can be a good showcase for Asian cities who are struggling with their urbanization.

Chart 1. City population 1940-2014

Source: PwC analysis
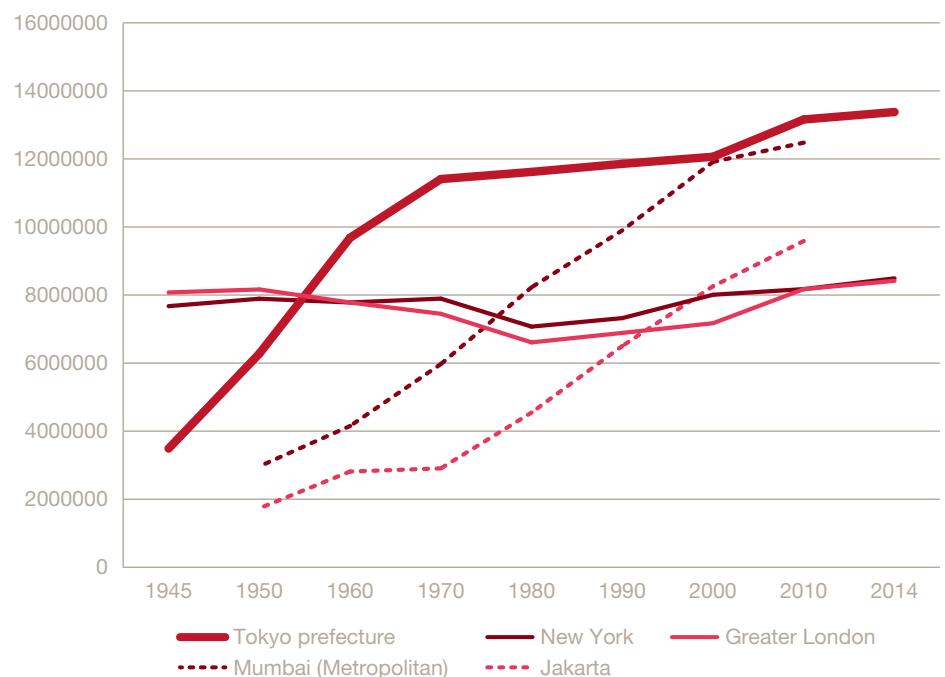
The speed of Tokyo's urbanization was almost the same as Asian megacities in developing countries are now facing (Chart 2). According to the Asian Development Bank (ADB) report "Key Indicators for Asia Pacific 2012," the speed of urbanization in Asia is two to three times faster than that of their American and European counterparts. For example, North America took 105 years to reach, while Europe took 150 years from 1800 to 1950. The average spee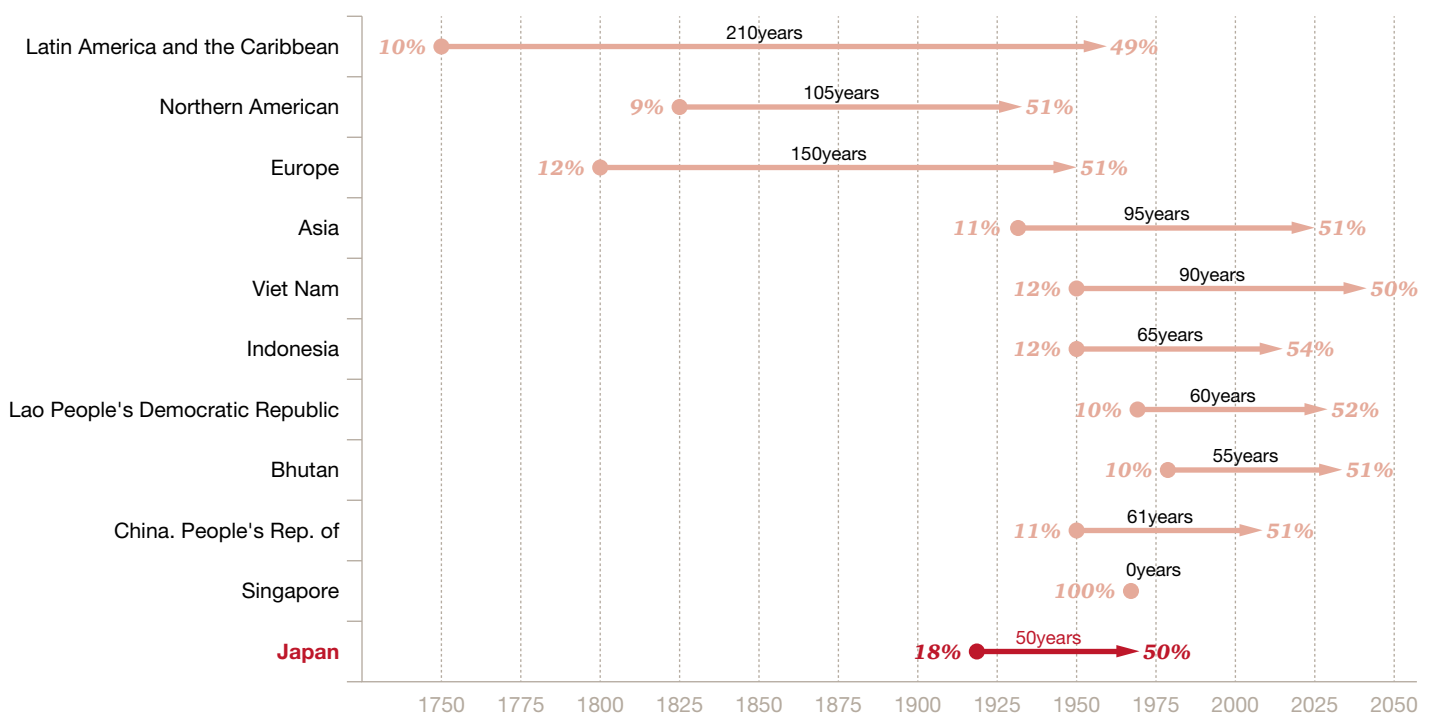d of urbanization in Asia is 95 years, similar to North America. However, the speed is rapidly accelerating in new comers like China (61 years), Lao People's Democratic Republic (60 years), and Bhutan (55 years).

On the other hand, Japan started to urbanize in 1920s, and became over 50% in 1970s, just taking approximately 50 years. And among the developed nations, Japan is the only one that has experienced such rapid urbanization.

Another characteristic of Japan's urbanization is that the country went through three phases of urbanization – emerging, stable, and mature. Therefore, by looking at Japanese cities and their history of urbanization, cities in developing nations can not only understand how to deal with their current urban issues, but also what is awaiting them in the future when rapid urbanization tapers off.

We think that these two characteristics show the reason why Japan's struggle to overcome the urbanization and build a sustainable city can be a good showcase for Asian cities. Even though the political, economic, social, and technological situation may be different from Japan, we can predict what kind of issues will arise and what kind of solutions will be needed in the multiple phase of urbanization. Chart 3 illustrates the whole picture of Japan's urbanization story. From the next chapter, we will explain the details of each phase.

Chart 2. The speed of urbanization in Asia

Source: Key Indicators for Asia Pacific 2012, ADB

Chart 3. History of urbanization in Japan

GDP per Capita (Real, USD)

	1945	1950	1955	1960	1965	1970

17.9 mil

$7079.4

$17949.9

Phase1 Emerging
Responding to rapid urbanization

Urban Issues

-1960 Building cities from the green field	**1960-1973** Rapid economic growth and urbanization

Solutions

Multi-polar urban zoning and PPP-based mass transit systems

Prioritized urban planning Pollution control

Regulations

Basic standards for urban dev.

Urban planning act ('67)
Pollution control act ('70)

Disaster countermeasure
Basic Act ('61)

Disasters

Isewan typhoon ('59)
4,697 victims

Events

Tokyo tower ('58)

Metropolitan expressway ('62)
Tokyo Olympics ('64)
Sinkansen HSR ('64)

Income Doubling Program
(1960)

Oil Crisis
(1973,75)

Population of Tokyo Metropolitan Area

27.0 mil
$24994.7
30.3 mil
31.2 mil
$32294.5
$35781.2
34.5 mil

| 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 |

Phase2 Stable
Systematic dev. for sustainable growth

Phase3 Mature
Rejuvenate toward "the city of the future"

1973-1985
Energy pressure of Oil crisis

1985-1991
High land prices Inefficient CBDs

1991-2005
Achieve high Quality of Living in city centers

2005-
Aging society and decrease in population.

Natural resources management

Land readjustment Integrate tradition & innovation

Rejuvenate core CBD areas Seamless mobility and smart transportation systems

Citizens as a communal force Working with challenging demographics Resilience despite high risk

Energy saving act ('79)

Redevelopment plan act ('88)

Public investment plan ('91)
Master plan act ('92)
CBD revitalization act ('98)

National strategic special purpose areas ('14)

Building standards strickened for buildings ('81)

Building standards strickened for houses ('00)

Acts for large & wide scale disasters ('13)

Miyagiken-oki earthquake ('78)
100,000 buildings collapsed

Hanshin Awaji earthquake ('95)
6,434 victims

Great East Japan earthquake ('11)
over 18,000 victims

Subcenter dev
Shinjuku, Shibuya, etc.

Suburbs dev
Yokohama
Minatomirai,
Saitama, etc.

CBD redevelopment
Marunouchi ('02)
Roppongi hills ('03)

Shibuya station
redevelopment

Plaza Accord
(1985)

**Bubble Burst
(1991)**

Population starting to decrease
(2005)

Emerging phase

– Responding to rapid urbanization

Overview of urbanization history

Emerging phase – Early period (1945–1960)
Building cities from the green field
During World War II, one third of houses and one quarter of buildings and factories in Tokyo were destroyed. The city had to build a new urban areas from the green field. However, Japan's recovery was quick, and the population of the Tokyo Metropolitan area increased by 40% in just five years.

Laws were enacted to provide affordable housing, though minimal civic services were available to support rapid urbanization.

Also, the Japanese government enacted fundamental rules for every part of the urban infrastructure, including building standards (1950), cleaning (1954), water quality (1958), and sewage (1958).

Emerging phase – Late period (1960–1973)
Rapid economic growth and urbanization
In 1960, the population of Tokyo Metropolitan area reached 17.9 million, and the real GDP per capita reached nearly USD 7,000.

In that same year, the Japanese government announced the Income-Doubling Plan, aiming to double GDP per capita in 10 years. The Japanese government surpassed this target (reaching more than USD 15,000 per capita in 1970), by ambitiously investing in Japan's urban infrastructure.

The key elements for accelerating economic growth were legacies of the 1964 Tokyo Olympics: the Shinkansen (bullet train), the Metropolitan (Shuto) Expressway, and the underground metro system. These policies enabled rapid economic growth and urbanization.

Issues and case studies

In Tokyo during the emerging phase, rapid urbanization (as a consequence of successful economic growth) began to cause critical urban issues: traffic congestion, urban sprawl, and pollution. Here, we would like to look at 3 cases from Tokyo, Yokohama, and Kitakyushu, to find out how these cities approached to solve their problems.

Firstly, the case of Tokyo explains how this megalopolis overcame rapid motorization in the 1960s by introducing urban zoning and PPP-based mass transit concept.

Secondly, we will showcase Yokohama's urban planning. Yokohama, which is located approximately 40 km from Tokyo, overcame the urban sprawl through excellent partnership with its citizens and stakeholders, becoming a special mention city of Lee Kuan Yew World City Prize in 2014.

Thirdly, we will explain another prominent example of Kitakyushu. The city grew by the growth of heavy industries, but on the other hand, this growth brought severe environmental problems. We will explain how the city overcame these issue through joint partnerships.

Case 1. Minimizing traffic congestion; multi-polar urban zoning and PPP-based mass transit systems

For mega cities in the world, congestion is one of the most serious problems. Congestion is a loss for economic activities, and causes air pollution. Lack of affordable public transportation system has great influence on education of low revenue people, which is a key to economic growth in a middle-long term. Let's look at how Tokyo managed this issue by unique urban zoning concept and mass transit systems.

Building the Metropolitan (Shuto) Expressway and other major roads for the 1964 Tokyo Olympics brought more cars and trucks than ever before to urban Tokyo. By 1967, there were around three million private cars in Japan. Five years later, this number reached 10 million, causing serious congestion. To cope with this situation, Tokyo introduced a unique zoning concept.

The heart of this concept is to divide the city area in multiple zones, and connect all the zones with spider-web like mass transit transportation system. This enabled the city to avoid over density in certain area such as CBD, but tried to maintain the efficiency and vulnerability of the urban system. There are many cities worldwide that is introducing same kind of strategy. However, Tokyo may be one of the few examples where this system is really working, with the usage ratio of cars and bikes in central Tokyo (23 ward area) is only 12%, and 99% of the area has a railway station within 10 minute walk, and each area – CBD areas, Sub-centers, and Suburbs – is functioning as initially designed. From here on, let's look at how these 3 areas are designed to function.

Chart 4. Transportation usage ratio (23 ward area, Tokyo)

- Cars/Bikes **12%**
- Train **48%**
- Bus **3%**
- Walk **23%**
- Bicycle **14%**
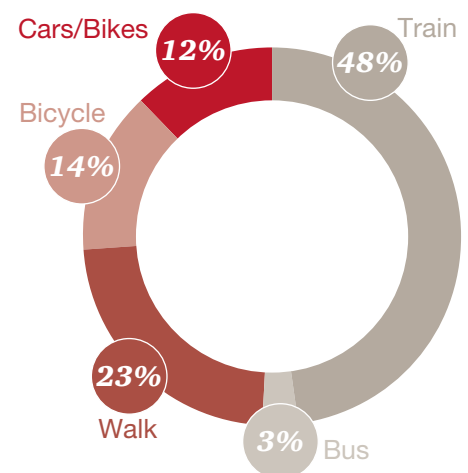
Source: Tokyo Metropolitan Government

CBDs and underground development

CBD (central business district) is an area around major business centers in Tokyo. In CBDs, the railway networks, including subways, were built for easy access to other areas in and around Tokyo. After that buildout, huge underground walkways were developed so that passengers could walk between different stations and railway (subway) lines. For example, Tokyo Station is a railway station in the Marunouchi business district, near the Imperial Palace and the Ginza commercial district. It is also the terminal station for Shinkansen, the high speed rail trains. 400,000 people use more than 4,000 trains every day.

Below is the map of Tokyo station. It is already a very complicated map, but this is only a small part of the underground labyrinth of this area. Actually, the station has 4 km of underground walkways connecting eight subway lines : JR (local and Shinkansen), Marunouchi line, Chiyoda line, Tozai line, Hanzomon line, Yurakucho line, and Mita line.

Chart 5. Tokyo Station map

B1 Floor

1st Floor

http://www.tokyoeki-1bangai.co.jp/pdf/floorMap_foreign.pdf

Sub-centers: Multi-polar development with spider-web transportation networks

Multiple urban sub-centers were developed to support the urban functions of Tokyo.

Shinjuku holds the largest entertainment area in Japan, but also holds the Tokyo Metropolitan Government office. Shibuya is a fashion area for young people, and also many venture companies are located. Ikebukuro is a home of art & pop culture, targeting young females and families.

These sub-centers also function as transfer points between CBD areas and the suburb areas. The CBD areas, sub-center areas, and suburb areas are connected by a spider's web of railway networks for more efficient commuting via sub-centers.

As a result, more than 3.5 million people ride on approximately 10,000 trains every day from Shinjuku Station, 3.1 million people from Shibuya station,

and 2.5 million people from Ikebukuro station, which are also the top3 most used stations in the world. The average time between trains on the Yamanote Loop Line is 2.5 minutes (peak period) to 4 minutes, with the average train delay of less than a minute.

Chart 6. Tokyo railway map

http://www.tokyometro.jp/en/subwaymap/

Suburbs: PPP-based transit-oriented development

Tokyo's suburbs were built to provide affordable and quality housing for people working in the center of Tokyo. The convenience and reliability of public transportation enabled people to use railways in their everyday life. Today, the suburbs have shopping centers, schools, and hospitals, and are connected by railway lines for commuting.

Suburban development in Japan adopted public-private partnership or PPP-based transit oriented-development (TOD) approach. In the suburbs, local

governments supported the private sector by providing the infrastructure and administrative services, while private railway companies became the key property developers, building residential areas with convenient shopping centers and connections to railways, with the average train delay of less than a minute.

For example, in the 1960s, Tokyu Corporation started to build Tokyu Den-en-toshi Line. Along this railway line, high-quality new towns were developed

together with retail shops and bus network for ensuring connectivity as well as creating demand for railways.

Today, approximately 600,000 people live in 50 square kilometers along that line. This area is now one of the most popular places to live in Tokyo, and residents' incomes average is 50% higher. The TOD solution produced not only economic value for the city but also environmental and social value.

Case 2. Challenging urban sprawl; Yokohama's prioritized urban planning

The rapid urbanization of Tokyo caused urban sprawl and fast population growth in nearby areas. Yokohama, now the second largest city just behind Tokyo, was one of those cities that had to confront rapid population growth and build its own characteristics to attract companies and talents to the area. In this section, we will explain the power of urban planning to achieve competitive and sustainable city through the case of Yokohama.

Yokohama was formerly a small fishing village with only about 300 residents just 150 years ago. But the city's role changed dramatically when Japan opened its country to the West in 1859. Yokohama port quickly became the center of foreign trade in Japan. The population of Yokohama was 0.6 million in 1945, but became 1.3 million in 1960. Although most people had jobs in Tokyo, they sprawled out to nearby cities such as Yokohama to find affordable housing.

The explosive population growth and high density created problems in Yokohama. In 1965, to overcome the "five wars" of urbanization – waste disposal, traffic congestion, air pollution, water supply, and scarcity of public spaces – the mayor of Yokohama established six urban planning initiatives.

These six initiatives (Kohoku New Town, the municipal subway, CBD redevelopment (Minatomirai), the Kanazawa waterfront, the highway network, and the Yokohama Bay Bridge) were given high priorities to reinforce the city's core strengths. Also, for maximum impact and synergy with minimal investment, the interrelationships between these initiatives were carefully planned (as shown below).
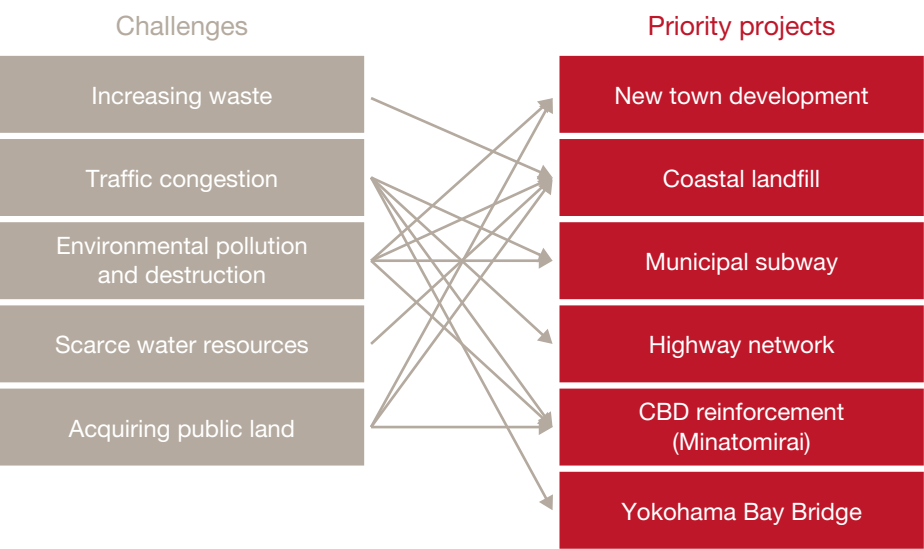

Minatomirai in the past

Reference: An archival document in Yokohama History Library

Present-day Minatomirai

Chart 7. Yokohama's 5 challenges and 6 priority projects

| Challenges	Priority projects
Increasing waste	New town development
Traffic congestion	Coastal landfill
Environmental pollution and destruction	Municipal subway
Scarce water resources	Highway network
Acquiring public land	CBD reinforcement (Minatomirai)
	Yokohama Bay Bridge

Yokohama was successful with all six initiatives. For example, the Minatomirai project (CBD redevelopment) started with an investment of over 170 billion yen and took approximately 30 years. This project was carefully executed with detailed master plans and strict urban design regulations. Skyscrapers and shopping malls were built, along with museums, hotels, and office buildings, but the old buildings — reminders of the port's history — were renovated to make them more attractive. Also, Minatomirai had new smart technologies installed, such as a district heating and cooling system.

The success of these six and other initiatives resulted in one of the most successful mixed-use developments in Japan. Now more than 1,700 companies, including Nissan's Global Headquarters, Accenture, Lenovo Japan, and Hitachi, have relocated to Minatomirai. It is also a popular tourist site, with 76 million visitors every year. For example, Pacifico Yokohama (located in Minatomirai) is one of the most popular MICE (Meeting, Incentive travel, Convention, Exhibition/Event) tradeshow centers in Japan, attracting more than 4 million people every year.

Chart 8. Population growth of Yokohama
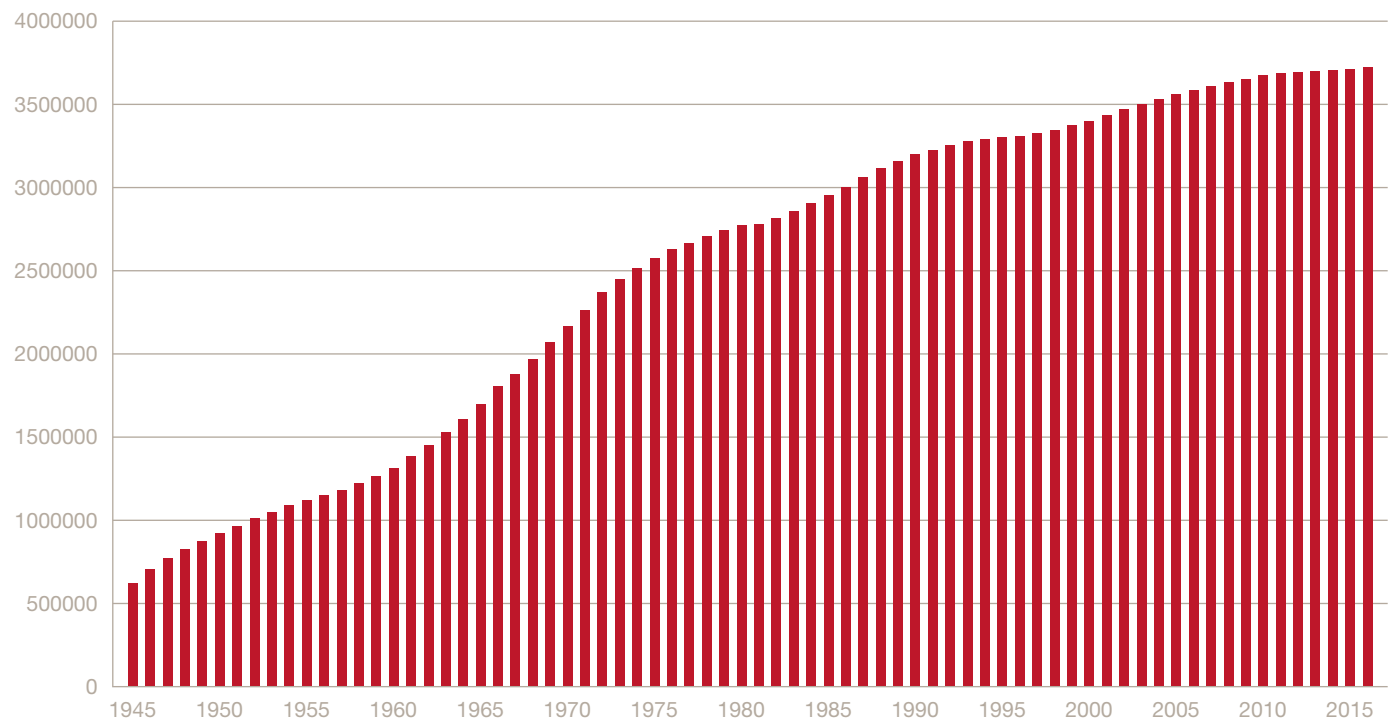
Source: City of Yokohama

Case 3. "We want our blue skies back" Kitakyushu's challenge and response

Pollution from factories and industrial plants became a critical problem in the 1960s. Although standards for air, water, and soil were developed in the 1950s, they were not being followed, since the basic policy of the Japanese government at that time was to prioritize economic development. As a result, pollution related diseases appeared in residential areas near factories. Let's look at how city of Kitakyushu managed to overcome their environmental issues, and brought back their blue skies.

Since the establishment of The Imperial Steel Works in 1901, Kitakyushu region has developed as one of Japan's four major industrial areas.

In the 1960s, Japan experienced rapid economic growth as industry prospered. However, this economic growth and the rise of industry resulted in serious damage to the environment with a level of pollution that had never before been seen.

As shown in the pictures below, in Dokai Bay which was located in the center of the industrial zone, was contaminated by industrial and domestic waste water to such an extent that the bay was called the " Sea of Death" where even E.coli were unable to survive.

Resident areas located near factories endured significant levels of air pollution. Many of the area's residents suffered from asthma.

The first group to truly understand the implication of pollution with regards to the health problems was mothers. They wanted to protect their own family from the environmental pollution. They discussed how to prevent pollution while holding basic study meetings on pollution and conducting field surveys. Based on the result of the survey, a petition was made to a city assembly.

Based on these activities, The Tobata Women's Association in Kitakyushu produced a documentary film called "We want our blue skies back," which drew the public attention.

In 1963, Kitakyushu became a designated zone under the Smoke Control Law with Tokyo, Osaka, Kawasaki, Yokkaichi, etc. To deal with this situation, Kitakyushu established the advisory (Pollution Control Sub-Committee) in Kitakyushu City to study pollution and possible countermeasures. Experts in various fields were commissioned to study the structure, operation, and maintenance of smoke-emitting industrial plants and to come up with countermeasures.

These studies showed that reducing pollution was possible, regulations and countermeasures were enacted based on the research results. For example, the Pollution Prevention Funding System was set up in 1968, which can support small and medium-size companies to reduce the emission by monitoring, installing pollution control equipment.

By implementing some of these antipollution measures, and with each stakeholder such as citizens, companies, and the city government fulfilling each role and cooperating, Kitakyushu achieved "bring back blue skies." Furthermore, as shown in Chart 9, one of the features of Kitakyushu's overcoming pollution is that it was achieved with stable economic growth.

Overcoming Severe Environmental Pollution

In 1960s

Present

"The Dokai Bay, Sea of Death"

In 1985, Kitakyushu was introduced in a white paper by the Organization for Economic Co-operation and Development (OECD) as a city that has transformed itself from a grey city to a green city. In 1987, Kitakyushu was commended as "The Starry sky town" by the Environment Agency of Japan. In 1990, Kitakyushu received the Global 500 award from the United Nations Environment Program (UNEP). In 1992, Kitakyushu received Local Government Honors at the Rio Summit. In 1997, Kitakyushu started the "Eco town" project, which aims to achieve a zero-emission, sustainable society by networking with central government, private companies, and research institutes. In 2011, Kitakyushu was selected as one of the "Future Cities" by the Japanese government, and a model city for the OECD Green Cities Programme with Paris, Chicago, Stockholm.

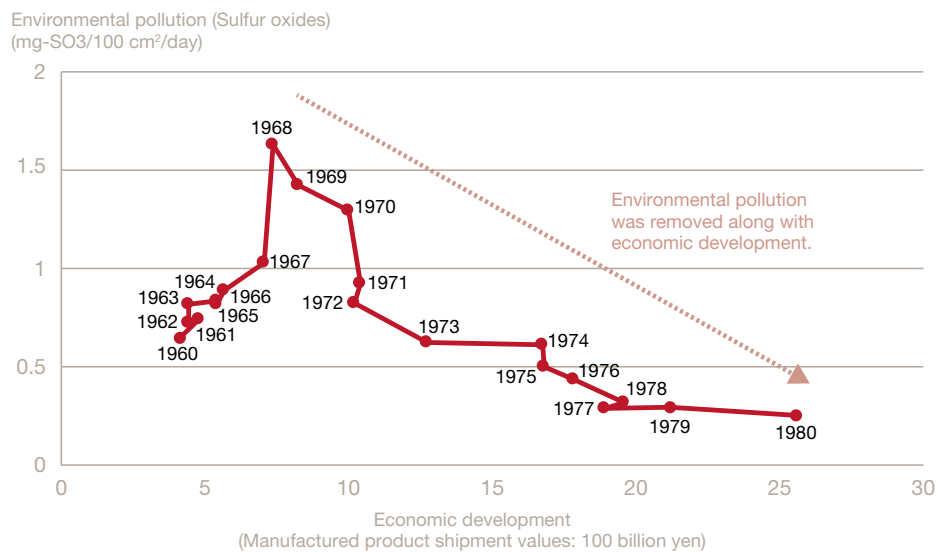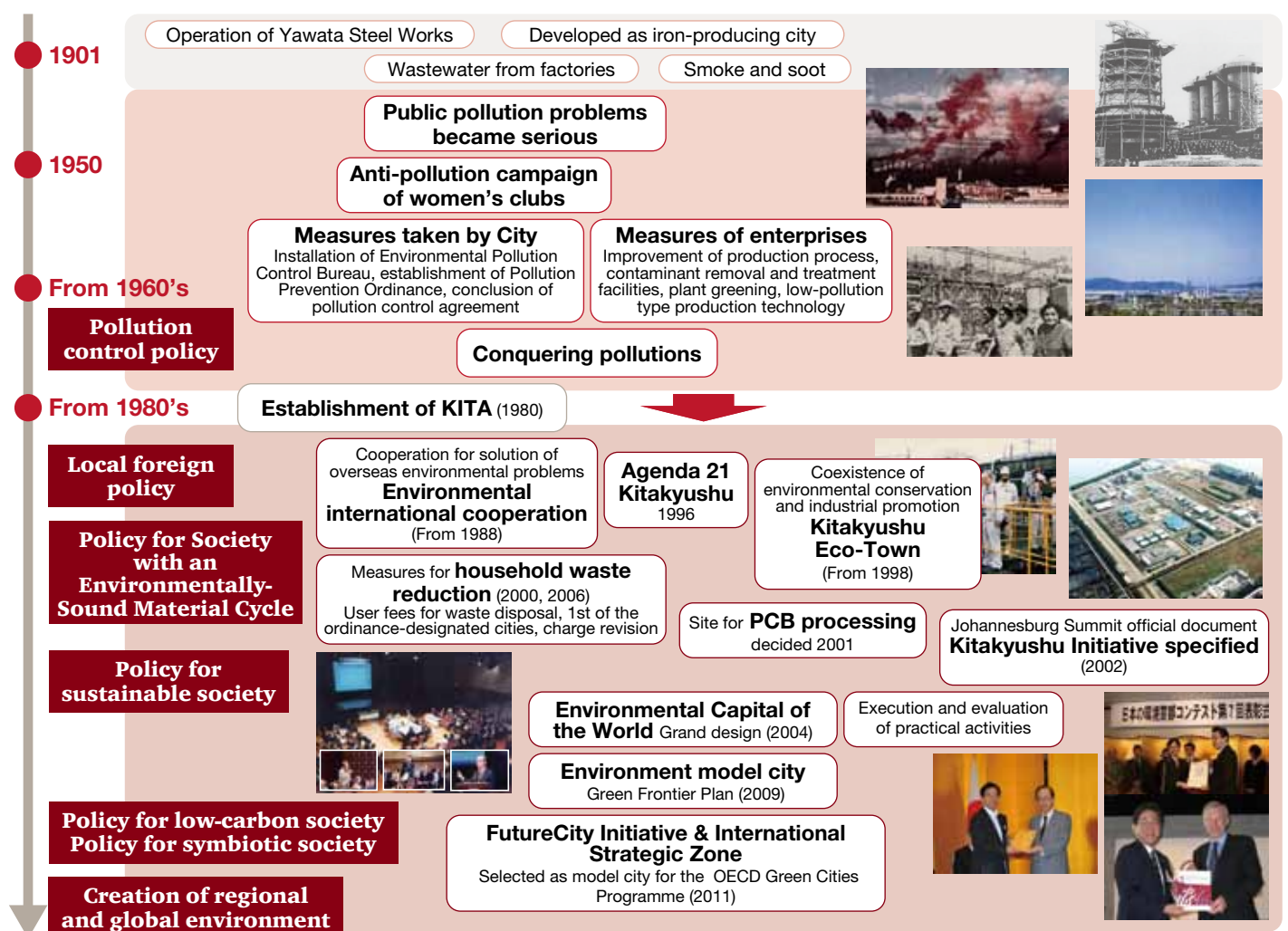**Chart 9. Balance of environmental policies and economic policies in Kitakyushu City**

Environmental pollution (Sulfur oxides)
(mg-SO3/100 cm²/day)

Environmental pollution was removed along with economic development.

Economic development
(Manufactured product shipment values: 100 billion yen)

Source: "Survey on the Japanese Experience" by the World Bank

Chart 10. The history of environmental policies - Kitakyushu

1901
- Operation of Yawata Steel Works
- Developed as iron-producing city
- Wastewater from factories
- Smoke and soot

1950
- Public pollution problems became serious
- Anti-pollution campaign of women's clubs

From 1960's

Pollution control policy

- Measures taken by City
  Installation of Environmental Pollution Control Bureau, establishment of Pollution Prevention Ordinance, conclusion of pollution control agreement
- Measures of enterprises
  Improvement of production process, contaminant removal and treatment facilities, plant greening, low-pollution type production technology
- Conquering pollutions

From 1980's

Establishment of KITA (1980)

Local foreign policy

Policy for Society with an Environmentally-Sound Material Cycle

Policy for sustainable society

Policy for low-carbon society
Policy for symbiotic society

Creation of regional and global environment

- Cooperation for solution of overseas environmental problems
  Environmental international cooperation
  (From 1988)
- **Agenda 21 Kitakyushu** 1996
- Coexistence of environmental conservation and industrial promotion
  Kitakyushu Eco-Town
  (From 1998)
- Measures for **household waste reduction** (2000, 2006)
  User fees for waste disposal, 1st of the ordinance-designated cities, charge revision
- Site for **PCB processing** decided 2001
- Johannesburg Summit official document
  Kitakyushu Initiative specified (2002)
- **Environmental Capital of the World** Grand design (2004)
- Execution and evaluation of practical activities
- **Environment model city**
  Green Frontier Plan (2009)
- **FutureCity Initiative & International Strategic Zone**
  Selected as model city for the OECD Green Cities Programme (2011)

Stable phase

– Systematic development for sustainable growth

Overview

Early period (1973–1985)
Toward a eco-friendly and energy efficient society

Rapid economic growth and urbanization lost momentum due to the oil crises of 1973 and 1975. These crises caused energy pressure, severe inflation, and economic recessions to the Japanese society. In the stable phase, the population inflows from rural areas decreased compared to the emerging phase.

Nonetheless, the population of Tokyo Metropolitan area continued to grow due to high birthrate, so devising a systematic approach for using limited urban resources became an urgent need. Legislation for pollution control gave rise to eco-friendly innovation to Japanese products. Also, office buildings and factories introduced energy saving solutions, which led to the global competitiveness of Japanese companies.

Late period (1985–1991)
Integrated suburban development

In the late 1980s, the Japanese economy was at its peak. Land prices in CBDs rose sharply, and it became too expensive for most people to live. Some MSME (micro, small and medium enterprise) companies also had to relocate. This trend propelled a new type of commuter-oriented development in suburban areas, where business, leisure, education and housing were integrated into a small area that had affordable home prices, and land readjustment programs were implemented to make urban development more efficient.

Issues and case studies

Sustainability of the urban infrastructure became a critical issue due to high population densities in urban areas, the mass consumption of products, and more vehicles travelling on roads. Japanese cities adopted to the situation by utilizing land adjustment scheme for holistic urban development. Also, some cities invested in infrastructures and advanced technologies to cope with scarce natural resources.

Case 4. Land readjustment; Key success factors for sustainable development

Since Japan is a small country, the land available for urban development projects is limited and is almost always owned by multiple landowners. Japan's unique land readjustment program was developed to overcome these issues.

Japan's land area is approximately 378 thousand sq. km. It is about the same size of the State of California, but the population is 3 times larger. Moreover, 70% of the land is covered with forests. As a result, the land available for urban development is limited. In old town areas which were built before the regulation of urban planning act, the land is often divided up into irregular shapes that were owned by local residents, farmers, companies, etc. Also, they usually don't have enough public infrastructures, such as wide roads, parks, community centers, etc.

So, governments and developers have to deal with quite a number of landowners whenever they try to proceed urban development in these old areas.

Land readjustment is a system that is created to achieve holistic and orderly urban development in a democratic way, even when the land is owned by

a number of stakeholders in a complex way.

Under land readjustment scheme, landowners have to agree to contribute a portion of their land, sometimes up to 30% of the area. These contributed areas are used to reshape the land in a more efficient layout and to build out the public infrastructures.

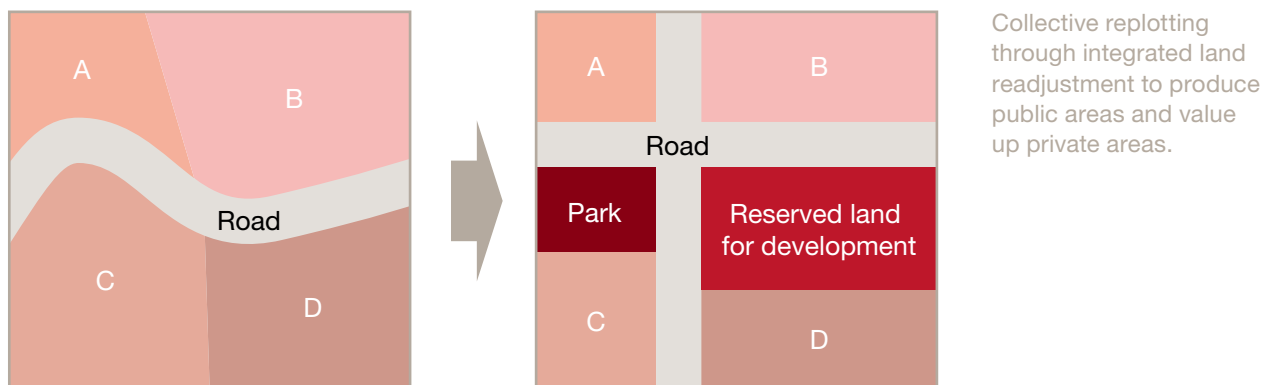Basic process of land readjustment is as written below:

- Advance acquisition of land by municipal councils, the Housing and Urban Development Corporation, railway operators, etc, or agreement of stakeholders for readjustment.

- Collective replotting through integrated land readjustment to produce public areas and value up private areas.

- Redevelopment by building railways and creating public infrastructure.

Land readjustment prevents disordered development and helps spread the risk for railway companies as well as developers.

The attraction of land readjustment for landowners is that it substantially increases land values. For example, in the Yokohama Minatomirai project which was mentioned previously, public space was less than 5% of the total urban area. However, by using land readjustment, the local government was able to acquire more than 30% for public spaces. The City of Yokohama used this additional land for an urban redesign concept, resulting in increased land values for the entire area.

Chart 11. Land readjustment scheme

Collective replotting through integrated land readjustment to produce public areas and value up private areas.

Source: PwC

Case 5. Saving the only water source; Managing Osaka's water supply

Osaka, considered as a merchant city from the Edo period, was nicknamed the "nation's kitchen" as it was the center of the rice trade in that era. Although Osaka has nearly 2.7 million people today, the city relies on just one river system for its water resource: the Yodo River. Osaka also experienced rapid economic growth in the 1960s, which led to severe water pollution from trash and factory runoff. Clearly, to keep the river clean, a comprehensive water management system was needed.

In 1973, Osaka issued the Clean Water Plan. The plan's goal was to develop a wastewater system to clean the river and improve the waterfront. Over time, Osaka developed 12 wastewater plants and laid nearly 4,900 km of pipes within a 225 square kilometer area.

In order to introduce wastewater infrastructure to every households, large investment was required. Osaka was the first city in Japan to introduce sewer usage fee systems.

The fund enabled the city to clean most of the wastewater which were discharged into the river, and the river became clear and fresh again.

Also, Osaka is using their water management system to develop better environment for citizens. For example, by excavating the river and controlling the water flow rate by dams, Osaka transformed the riverbed of Yodo river into a park for citizens. Purified sewage are now used as a new resource for the urban waterfront, such as in the outer moat of Osaka Castle.

Water pollution in Yodo river (1960s)

Reference: Osaka Water & Environment solution Association (OWESA)

Chart 12. Yodo River BOD (Hirakata Ohashi)

BOD mg/L
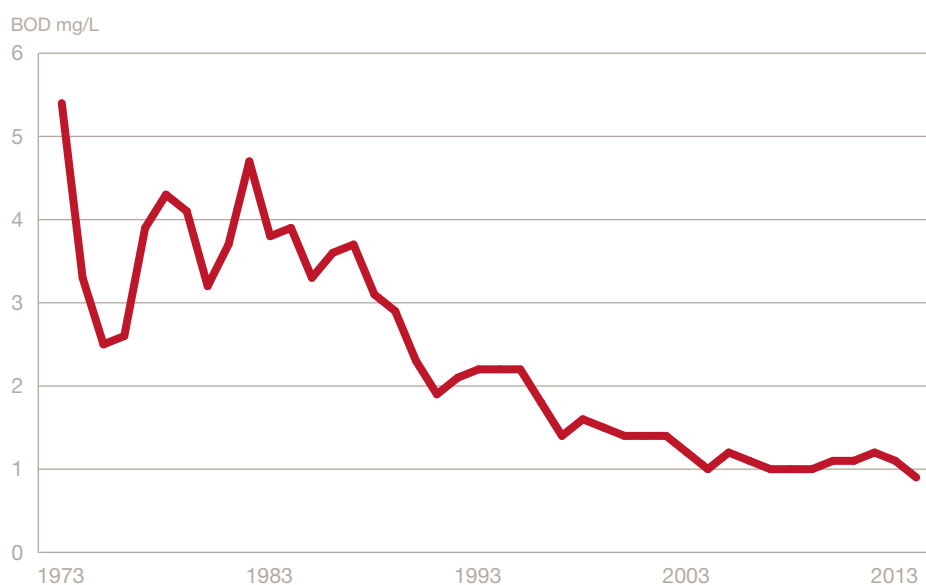
Source: City of Osaka

Osaka castle

Case 6: Integrating tradition and innovation; Kyoto's strategy

Some cities in the world have long histories from the ancient times. The reminiscence of the old times become valuable historical assets to attract tourists worldwide. However, the attractiveness of the historical asset may influence the city to lose incentives for creating new industries, and just keep relying on the tourism industry. Moreover, old prehistoric sites scattered in the city area may behave as an obstacle for an efficient urban development.

Kyoto is an old capital of Japan with a history of over 1200 years. However, Kyoto is also a mother of many innovative global companies. So, let's have a look at how city had accomplished to integrate old & new.

Kyoto is an old capital of Japan with a history of over 1200 years. 20% of Japan's National treasures are located in Kyoto, and 14 properties of the World Heritage by UNESCO are located in the Kyoto prefecture. Kyoto had more than 55 million visitors in 2014. The tourism consumption was 762 billion yen. It was also selected as World's Best City by Travel + Leisure magazine in 2014 and 2015.

However, this was not accomplished so easily. Kyoto went through many discussions to preserve historical landscape and construct new buildings to achieve urban development at the same time.

Leveraging these experiences, Kyoto issued a "New Landscape Policy" in 1997. The objective of the policy is to preserve beautiful and orderly urban design. Under this policy, 27,000 signboards were adjusted, Even the international chain stores, such as McDonald's changed the design of the outer ads. Also, a detailed guideline was made to preserve Kyoto's traditional townhouses ("Machiya") for future preservation. Today many "Machiya" are renovated as restaurants, shops, hotels,

etc., but the external appearance is strictly followed by the guideline, giving an ordered impression of urban design in the area.

Although tourism industry is Kyoto's strong economic basis, the city is also home to unique industries.

Kyoto's economy is small compared to Tokyo or Osaka area, but Kyoto-based companies are noted to have world's top share niche products. Nintendo's video games, Omron's sphygmomanometers, and Murata Manufacturing Co.'s brushless ceramic capacitors are good examples. We must also note that these companies are established in Kyoto, and grew in Kyoto. And what is impressive with these companies is that Kyoto's companies adopted the wisdom and technologies of traditional industries into other areas – mostly high-tech industries. For example, the techniques of Kiyomizu-yaki, traditional porcelain technologies were used to make fine ceramics. Traditional techniques to make nano-level gold plates, which were used to make Buddhist alters from 16th centuries, were transformed to make X-ray apparatus.

Kyoto Research Park

In developing countries, the local government have a tendency to achieve economic growth by attracting global companies to their cities. But Kyoto's city government rather encouraged and supported its local companies to create new innovative industries. Kyoto University is renowned for innovative research in areas such as life science, nanotechnologies, etc. This educational environment helped companies to create new products to support the research, and leverage the innovation achieved by the research.

Kyoto also has a unique research park – Kyoto Research Park – established in 1987. It is managed by a private company, Osaka Gas Co., Ltd, and which is very rare since most of the research parks are publicly owned and operated. Today, about 380 ventures have offices in Kyoto Research Park. Their business areas vary from life science, medical instruments, ICT technologies, etc.

Kyoto's traditional townhouses ("Machiya")
Today, many "Machiya" are renovated as restaurants, shops, hotels

Mature phase

– Rejuvenate toward "the City of the Future"

Overview

Early Period (1991–2005)
Pursuing QOL in core CBD area
In 1991, the bubble economy ended, and the urbanization of Japanese cities entered the mature phase. One characteristics of the mature phase in the early period is "going back to the CBD area." Due to structural changes in industry, land use in CBDs changed. With the sophistication of land readjustment, old buildings and vacant spaces in CBDs were redeveloped. During the 1990s, most buildings were redeveloped in a compact, multi-purpose style, where the places to live, work, learn, and play were integrated into an area within walking distance, to improve the Quality of Life (QOL) for citizens.

At the same time, mass transit became more convenient. Railway lines, stations, and buildings were more closely connected, and new businesses using underground spaces and even station spaces were developed.

Late period (2005–)
Coping with the aging and the declining population
2005 marked an important turning point for Japanese society. It was the first time in Japanese history that the population showed a natural decline. This trend of population decline and aging will continue. In 2011, the population of Japan was 128 million, but the population in 2060 is projected to decline to 86 million. Also, nearly 40% will be over 65.

In 2011, the massive Tohoku Earthquake hit vast sections of eastern Japan. Most of the infrastructure remained intact after the earthquake, showing the resilience of Japanese cities. However, tsunami on an unprecedented scale took many lives and devastated the urban infrastructure near the coast.

The risks of aging society and natural disasters have compelled the Japanese people to re-recognize the role of the urban community. Cities are using the power of their citizens and the community to reduce waste and clean up the environment, to preserve urban areas, and to prepare for disasters.

Chart 13. Demographic change in Asian countries

Period	Period when total fertility rate falls below 2.1	Period when elderly population ratio exceeds 14%	Period when labor force begins to decline	Period when total population begins to decline
1950-1955				
1955-1960				
1960-1965	Japan			
1965-1970				
1970-1975				
1975-1980	Singapore			
1980-1985	Hong Kong			
1985-1990	Korea			
1990-1995	China	Japan		
1995-2000	Thailand			
2000-2005			Japan	
2005-2010	Vietnam			Japan
2010-2015		Hong Kong		
2015-2020	Indonesia	Korea, Singapore	China, Hong Kong	Korea
2020-2025	Malaysia		Korea, Singapore	
2025-2030		China, Thailand		China
2030-2035	India			
2035-2040	Philippines	Vietnam	Thailand, Vietnam	Singapore
2040-2045		Malaysia, Indonesia		Thailand, Vietnam
2045-2050				

Note: Rates of change for the total fertility rate, labor force and total population were measured as five-year averages. The elderly population ratio was viewed by five-year intervals (for 1995, for example, the results are classified as being for 1990-95).

Case 7: Rejuvenating core CBD areas

In 2000s, sophisticated urban redevelopment were done through transit-oriented developments and by deregulating urban planning. Let's look at the cases of Marunouchi and Roppongi of the Tokyo CBD area to find what kind of achievement was done to improve Quality of Life in the mature stage.

Marunouchi, a CBD area which faces the Tokyo Station, was mainly used to tenant company offices before the mature age. It was, and is still one of the most important economic centers in Japan. However, since there were only company offices, the area turned into a ghost town on weekends, lacking vibrant atmosphere.

In the early 2000s, Marunouchi was redeveloped to include multiple urban functions, such as commercial spaces, museums, and hotels. One of the first redevelopments of this type was the Marunouchi Building. Based on the Special District Deregulation program in the Urban Planning Act, this 8 story building — Japan's largest building in the early 1900s — was replaced with a 180 meter tall, 37-story building.

The Marunouchi Building turned out to be a great success, so other buildings were renovated to gain more floor space by taking advantage of deregulation, to attract more people coming to the area. For example, Marunouchi Park Building "bought" the unutilized volume of Tokyo railway station, to gain spaces for office tenants, shops, and restaurants. Tokyo railway station used the revenue to renovate and restore its 100 years old building, which added more attractiveness for people using the station for commute and sightseeing.

Moreover, Town Management Organization (TMO) was developed to think about the vision of the area in a long term, and support multiple activities such as the greening of the area, events, promotions, etc.

Ten years after the opening of the Marunouchi Building, many new buildings were built using the District Deregulation program. Today, the total floor space in the Marunouchi district had increased by 70%, and the number of visitors on Sundays increased from 20,400 to 62,300 people per day.
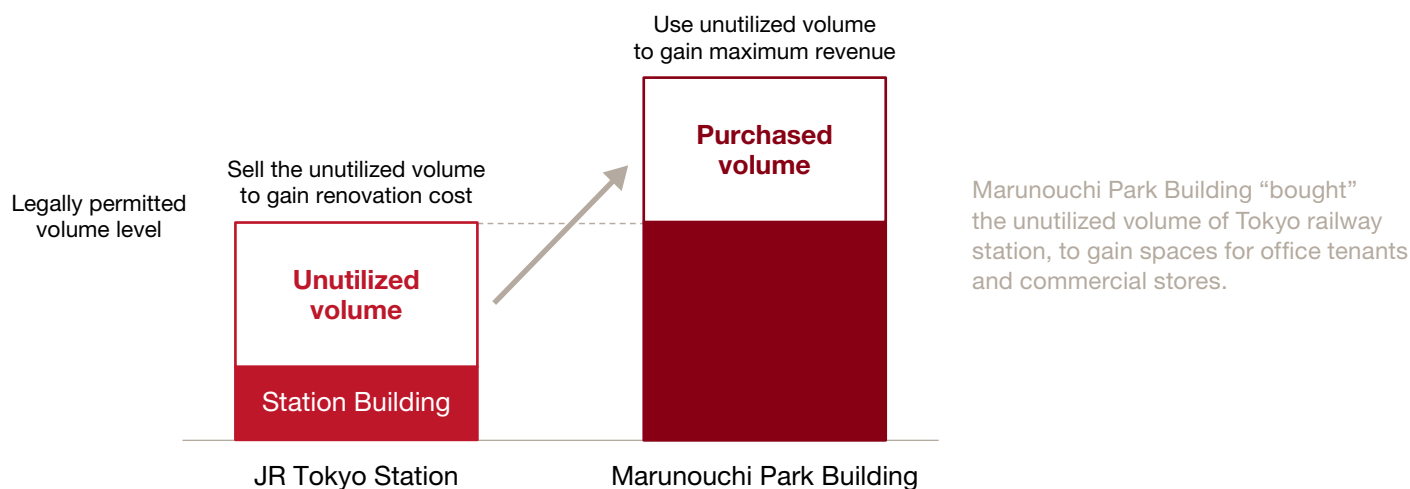
Chart 14. Data of Marunouchi area

		Before the opening of Marunouchi Building	Today
Total floor area of Marunouchi area		1,580,000 m²	2,740,000 m²
Commercial stores		280 stores	820 stores
Number of visitors	Weekdays	60,500 visitors/day	81,000 visitors/day
	Saturday	26,100 visitors/day	67,800 visitors/day
	Sunday	20,400 visitors/day	62,300 visitors/day

Marunouchi Building

Chart 15. Using the deregulation scheme for urban renovation

Use unutilized volume
to gain maximum revenue

Sell the unutilized volume
to gain renovation cost

Legally permitted
volume level

**Purchased
volume**

**Unutilized
volume**

Station Building

JR Tokyo Station

Marunouchi Park Building

Marunouchi Park Building "bought" the unutilized volume of Tokyo railway station, to gain spaces for office tenants and commercial stores.

Roppongi Hills is another good example of CBD Redevelopment. Although located in the CBD area of Tokyo, the area where Roppongi Hills stand now used to be an old residential area with lots of wooden houses and apartments. The area had issues in disaster prevention, since the wooden houses were old and the area only had narrow roads where fire engines cannot go through.

The developer, Mori Building, talked with the TV Asahi Corporation which was also located in the area, and had plans to rebuild their own building. Instead of just rebuilding the TV Asahi Corporation headquarter, they decided to redevelop the entire area with the support of the local government. Initial planning started in 1987, and it took 17 years to persuade 400 landowners and leaseholders to redevelop the area. Land readjustment scheme played an important role to develop the area. Also, planar intersection of 2 main avenues – Roppongi Avenue and the Kanjyo No.3 Ring Road, and the new metro station greatly eased the traffic congestion in the area.

Today, Roppongi Hills not only has offices and commercial stores, but also has high-quality residences, theaters, schools, and museums on approximately 11.6 hectares. Roppongi Hills has now become one of the largest mixed-use complexes in Japan. Top global companies such as Apple, Google, and Goldman Sachs locate their Japan office in the office area.

A range of infrastructure technologies, such as gas energy and thermal (heat and power cogeneration) systems as well as earthquake-resistant construction, were introduced. The cogeneration systems provided a stable electricity supply and hot water even during the blackout brought about by the Tohoku Earthquake in 2011.

Roppongi Hills, Tokyo

Case 8: Seamless mobility; Railway companies' collaboration for building smart transport system

In Japan, most public transportation systems are operated by private companies. In order to improve the efficiency and the profitability of the transportation systems, unique cooperative scheme were introduced in the areas of train operation and fare payment systems.

In the mature phase, the connectivity of modes of transportation were dramatically improved in Tokyo. Most public transportation systems are privately owned, and others are run by public-private partnerships (PPPs) in Japan. They improved connectivity and the seamlessness of the transportation system to improve user experience and gain more revenue. Today, not only the stations are connected via underground paths, but the train itself ride into other lines owned by other railway companies. So now, passengers can go far places using multiple railway companies with just one ride. Let us tell you one example. When taking a train from Machida, which is located in suburban Tokyo, to Otemachi, a business center in CBD area, you need to use two transportation companies: Odakyu and Tokyo Metro. However, you don't have to get off and change trains to reach Otemachi. When you take the train from Machida, it is operated by the Odakyu line, but when the train reaches Yoyogi-Uehara Station, the train operator switches to another company, the Tokyo Metro line, until

Chart 16. Seamless mobility example – from Machida to Otemachi

you reach Otemachi.

This system is made possible by a common IC (integrated circuit) card system. Although each railroad company developed a unique IC system, travelers do not need to have multiple cards even when using different railway companies. The total sum of the transportation fee will be paid from the pre-paid IC card, and the railway company which is the destination of the traveler will pay back to the railway company which is the point of departure.

The IC card can be used not only in Tokyo Metropolitan area, but also almost all over the country. Moreover, it can be used for bus and taxi fares, restaurants, entertainment, etc. This seamlessness was achieved by mutual communications among private companies.

For example, the East Japan Railway Company (JR East) introduced a smart fare card called Suica in 2001. In 14 years, the company has issued 45.7 million Suica cards. As well, there are approximately 3.2 million people using

the Suica smartphone app. With this card or mobile app, you can not only ride trains operated by JR East, but also trains and buses operated by more than 100 other transportation companies just in the Tokyo area. These IC cards can also be used for other major train companies all over Japan, who have approximately 4,600 train stations. You can also use the Suica card as e-money at 245,000 shops, restaurants, hotels, and sports clubs. The number of e-money transactions using Suica is more than 4 million per day.

Maximum usage of station area

Underground paths and station areas are fully used as shopping areas, restaurants, museums, hotels and even fitness gyms. According to JR East, more than 16 million people use these eki naka (inside station facilities) every day, bringing in over 400 billion yen per year in revenues (2015).

Eki naka (inside station facilities)

Case 9: Citizens as a communal force to solve problems; Yokohama's waste reduction challenge

Regulations, infrastructures, and technologies are important elements for improving the environment. But, in order to combine these elements into a holistic approach, partnership with citizens play an important role. Let's look at how Yokohama reduced waste in collaboration with citizens through their G30 plan.

As Yokohama's population showed rapid growth since 1960's, urban environment issues became severe. Especially, the increase of municipal solid waste was pressing, since landfill area are limited within the city area. Also, the operation cost of incineration plants which are owned by the city were high. To tackle with these issues, Yokohama challenged to solve the problem at source; that is, to reduce the amount of waste in spite of growing population.

In 2003, Yokohama announced the G30 plan, laying out a program to reduce waste by 30% in seven years. When the plan was announced, everyone was

surprised at the target. However, the result was more surprising because the city surpassed this target, reaching a 42.2% reduction.

The key success factor for Yokohama's municipal solid waste reduction was the collaboration between the local government and the citizens.

In the G30 plan, Yokohama increased waste separation (sorting) from "5 types, 7 items" to "10 types, 15 items."

Yokohama's G30 plan also supported waste-to-energy technologies to generate energy and, at the same time,

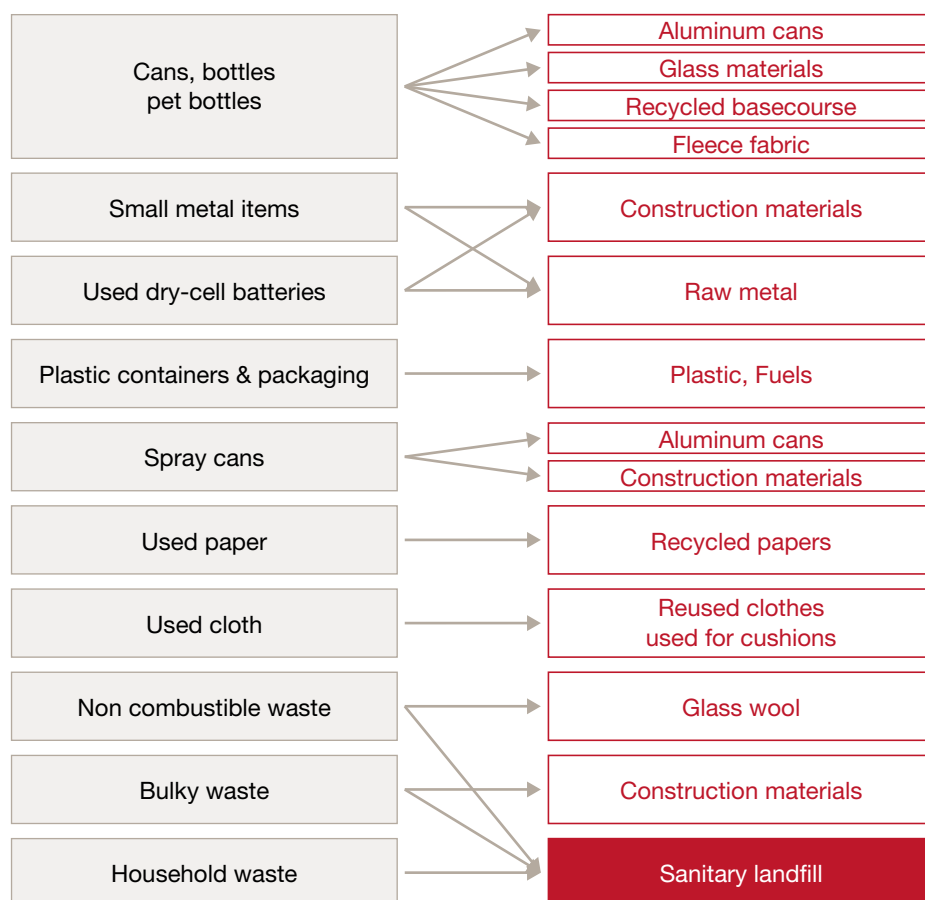to safely reduce the volume of waste by 90%.

To make this complex process a success, communal support, or the full participation of local citizens, was critical. Educating citizens and waste management companies was thorough. Sessions for citizens to learn the new separation policy were held 11,000 times in two years. Almost all the waste brought in by trucks was checked at waste-to-energy plants, and unsorted waste was not accepted. These activities dramatically changed attitudes, and the waste reduction goal was achieved.

Chart 17. Amount of municipal solid waste in Yokohama

(10,000 ton)
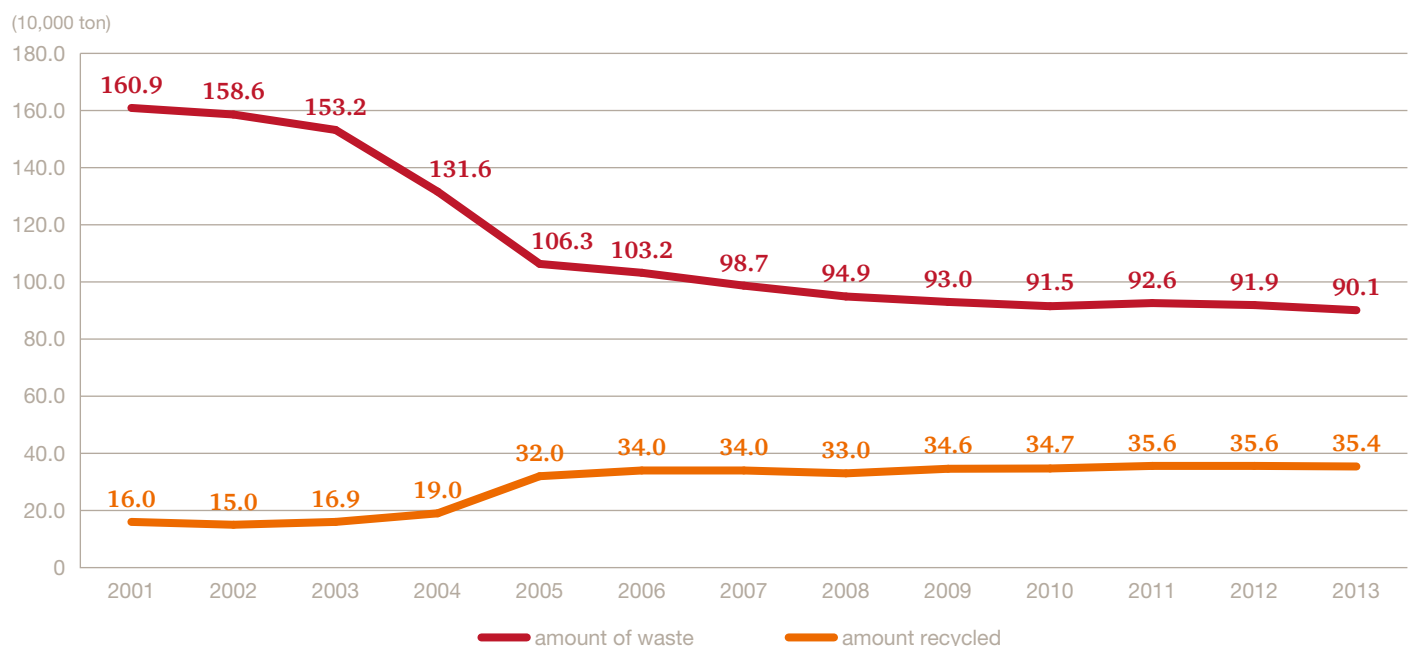
In the chart above, the red color shows the amount of waste in metric tons. Orange shows the amount of recycled waste in metric tons. https://cf.yokohama.localgood.jp/project/kankyodesignproject

Chart 18. Yokohama's segregation process

Input	Output
Cans, bottles pet bottles	Aluminum cans / Glass materials / Recycled basecourse / Fleece fabric
Small metal items	Construction materials
Used dry-cell batteries	Raw metal
Plastic containers & packaging	Plastic, Fuels
Spray cans	Aluminum cans / Construction materials
Used paper	Recycled papers
Used cloth	Reused clothes used for cushions
Non combustible waste	Glass wool
Bulky waste	Construction materials
Household waste	Sanitary landfill

Sorted items are put into an integrated recycling process.

Chart 19. Activities to promote G30 plan

- Separation briefing session: About 11,000 times (FY2004 & 2005)
- Educational campaign in front of train stations: About 600 times (FY2004 & 2005)
- Early morning education at collection point: About 3,300 times (FY2004 & 2005)
- Garbage left behind due to non-separation: About 10,900 times/day (FY2009)

Case 10: Working with challenging demographics; Toyama's "compact city" strategy for an aging society

The issues of aging and declining population triggered a significant turning point in Japanese cities. Aging will make it difficult to have a cohesive society; elderly people with health problems tend to stay in their homes and lose ties to the community. Action is needed to increase the "healthy years," and to keep seniors involved in their communities. Let's look at Toyama's unique "compact city" initiative focusing on the aging and declining society.

The demographic shift toward aging and declining society is forcing Japanese cities to take a new look at the concept of urban planning. From an economic viewpoint, high land price is a positive factor because it shows the fact that companies, investors, and residents value the area. However, to maintain the social cohesion of Japanese cities in the long run, governments must find economic and efficient ways to build public facilities even in areas with high land values. In local areas, this trend is more pressing, and countermeasures to overcome their circumstances are needed.

Toyama is a middle-sized city of approximately 400,000 population in

Hokuriku area. Toyama's population is just about half of San Francisco or Stockholm, but the city area is almost the same size as Rio de Janeiro, which has 6.4 million people. The population density in Toyama is only 337 people/km2, which is lower than Dubai (521 people/km2). Moreover, Toyama's population is aging and the figures are declining. By 2045, the city is expected to have 100,000 fewer people, and the percentage of elderly (over 65) will reach 40%.

To combat this situation, Toyama introduced "compact city" strategy to rebuild the social infrastructure. When defining the "compact city" model, Toyama emphasized the need

to ensure the availability of mobility systems for people without cars, who are mostly the elderly that cannot drive any more. This innovative variation on the "compact city" idea placed focus on public investment to build dense centers and sub centers, and then connect these dense areas with public transportation to shift from a car-oriented society.

The urban redevelopment model they introduced is called the "dumpling and skewer" model. First, Toyama defined the central hub area and local hub areas – called "dumplings" due to their shape. The central hub has functions that enhance the attractiveness of the city: cultural centers, business offices, local administration, etc. Local hub areas have functions essential for everyday life, such as supermarkets, schools, hospitals, etc. These "dumplings" are connected by transportation systems, such as LRT (light rail transit) and buses, which are called "skewers." To enliven cities and at the same time get elderly people out of their homes, Toyama began several programs to attract people to the central hub.

Toyama also introduced unique measures to stimulate the movement of residents, especially the elderly, to urban centers. For example, the city introduced a transportation discount program for senior residents. If they take a bus to the central hub, senior residents pay only 100 yen. However, if they get

Toyama Light Rail CENTRAM

**Chart 20. Toyama's Compact City Model – "Dumpling and Skewer"**
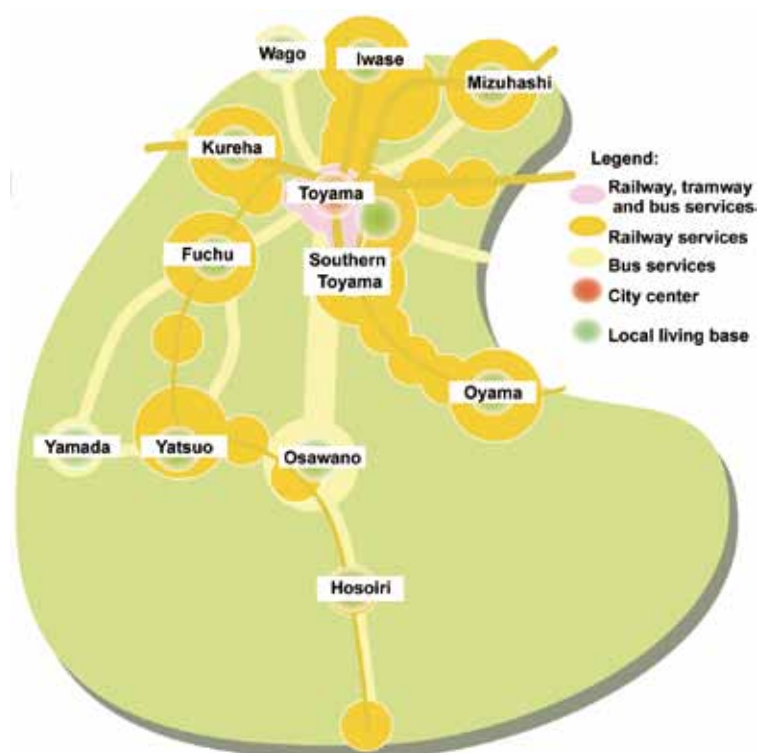
off before the central hub, they have to pay the full price which is 600-800 yen. By introducing this kind of fee systems, the city was able to bring more people into its center. Also, if grandparents and grandchildren travel together to public facilities such as the zoo, planetarium, etc., admission is free.

In Toyama, mixture of these initiatives brought positive impact. For instance, ridership on the LRT increased by 25% from 2006 to 2014. The elderly residents now use the LRT ring line more often: ridership increased by 23% on weekdays and weekends and 51% on holidays in just four years (from 2010 to 2014).

Improving the mobility of elderly people to go to city centers stimulates commercial business in those areas and reduces healthcare costs, since it is medically proven that people are healthier if they walk every day. Confronting the looming aging society is a new urban challenge for Japan.

Chart 21. Public mass transit users per day in Toyama central area
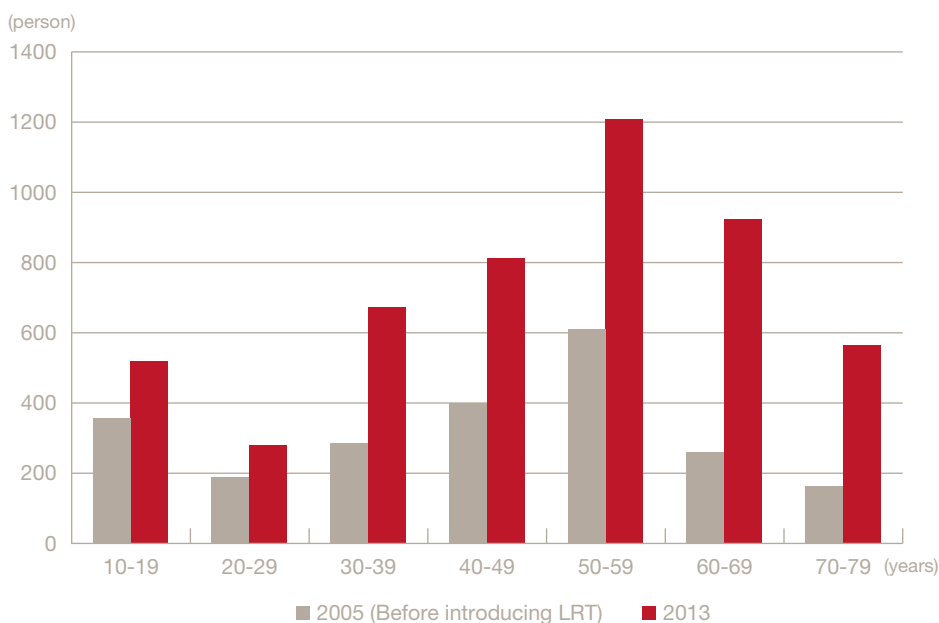
Case 11: Resilience despite high risk; Sendai's lessons from the Great East Japan Earthquake

Japan has lived with natural disasters since ancient times. Mount Fuji, the nations' highest mountain and a famous icon of Japan, is actually a volcano, with the last eruption occurring about 300 years ago.

Japan has lived with natural disasters since ancient times.

In the last 100 years, Japan has experienced 17 natural disasters with over 1,000 casualties. During the Great Kanto Earthquake of 1923, more than 105,000 people died. The Kobe Earthquake of 1995 resulted in 6,402 deaths and caused US$ 100 billion in destruction. And recently, the Great East Japan Earthquake of 2011 had more than 15,000 fatalities with an estimation cost of US$ 122 to 235 billion. The World Bank has called this "the costliest natural disaster in world history."

Every time a catastrophe happened, the national and local governments upgraded the building codes, emergency maps and alert systems, and the urban infrastructure. In 1978, the Miyagi-ken Oki Earthquake (magnitude 7.4) occurred near Sendai, killing 28 victims, injuring 10,000 people, and damaging 7,400 buildings. Collapse of houses and block walls were especially serious. As a result, the Japanese government strengthened the Building Standards Act, to force houses and buildings to become more earthquake resistant. In 1995, more than 6,400 people lost their lives in the Great Hanshin Earthquake in Kobe. After the earthquake, the national government changed its disaster response policies, and allowed Self-Defense Forces to have automatic authority to respond to earthquakes over a certain magnitude. These measures helped to minimize the damage from

the Great East Japan Earthquake. For example, the number of victims in Sendai was less than expected for such a massive quake. In the areas where the tsunami didn't come, the number of victims were 11, while the wards where the unexpected level of tsunami struck had more than 600.

Moreover, although the Great East Japan Earthquake was the fourth largest in history — 360 times more powerful than the Great Hanshin Earthquake — almost all buildings were undamaged. The resilience of the urban infrastructure

was not only demonstrated in the buildings, but also in other parts of the infrastructure and was widespread.

On the other hand, the experience of the Great East Japan Earthquake changed the basic concept of disaster management. Until 2011, the Japanese governments aimed to achieve a "zero-victim, zero-damage infrastructure." However, after the earthquake, the government understood that it would be impossible to completely control the damage from the tremendous power of nature.

Chart 22. Victims of the Great East Japan Earthquake in Sendai

Izumi ward
2 victims

Areas hit by tsunami

Aoba ward
1 victim

Miyagino ward
308 victims

Taihaku ward
8 victims

Wakabayashi ward
339 victims

Arahama Elementary School — center for remembering the Earthquake

WCDRR (UN World Conference on Disaster Risk Reduction) in Sendai

Sendai is now reconfiguring the role of disaster risk management (DRM). This new risk mitigation policy is intended to boost the autonomy of citizens and the community by enabling them to better cope with disasters. The importance of education to prevent or mitigate damage caused by natural disasters was one major focus of the new policies.

"Cities cannot be resilient just through their own actions," argued Emiko Okuyama, the mayor of Sendai. Sendai was one of the areas most affected by the Great East Japan Earthquake. Based on their experience of the disaster, the mayor said that two other factors are important: the autonomy of citizens and mutual support in local communities.

Giving more autonomy to citizens

In the Great Hanshin Earthquake in Kobe, 35% of the people who survived being buried, escaped by themselves; 63% were rescued by their families and neighborhoods; only 1.7% were rescued by a rescue team. It is important to know what to do to save your own life in a sudden disaster.

Sendai has named 12th June as Disaster Prevention Day. On that day in 1978, the Miyagi-ken-oki Earthquake occurred, which caused tremendous damage. Although nearly 40 years have passed,

all the elementary schools in Sendai hold disaster prevention drills on 12th June every year. Drills and practice helped to save many lives during the Great East Japan Earthquake in 2011.

There is one example from the Great East Japan Earthquake that shows the importance of self-reliance. Kamaishi city was one of the areas most damaged from the tsunami that accompanied the Great East Japan Earthquake. When the earthquake struck, the students of Kamaishi East Junior High School ran out of the school to higher ground. Their quick response prompted the children and teachers in the neighboring Unosumai Elementary School to follow their lead, and this drew in many local residents. As they continued to run, the older students helped the younger schoolchildren, and together they reached to a safe area while behind them the tsunami virtually destroyed their schools and the town. Kamaishi City lost more than 1,000 citizens, but only five of them were school-age children, and these victims weren't at school when the quake hit. The story of the evacuation is now known as "the miracle of Kamaishi."

Improving communal cohesion in local communities

After the earthquake, activities of

central/local government were limited since the damage from the earthquake and tsunami was over such a vast swath of eastern Japan. On the other hand, small communities functioned to save people by joining together.

In the Great East Japan Earthquake, it was revealed that only hard measures such as facility maintenance were not enough to prevent the damage caused by the disaster and that routine preparations by citizens and mutual supports in local communities played important roles to limit the damage.

Based on this experience, Sendai decided to promote "disaster mitigation" strategy by the autonomy of citizens and the mutual support of local communities. Currently, Sendai is working on the evacuation guidance for the disadvantaged, preparation of the shelter operation manual, and the training of local disaster prevention leaders. These actions reinforce social cohesion and lower the security risk.

Also, the city government is encouraging private companies to build more resilient infrastructures. For example, Sendai introduced disaster prevention certificate for apartments. The resilient apartments are certified by 3-stars rating, increasing the value of the real estate.

Future of Japan – and how can developing cities utilize its experience

In the "Cities of Opportunity" 2012 version, PwC projected the future of economic growth, population, and employment of the 27 leading cities in the world. The result was that 27 cities that are generating nearly 8% of world GDP with only 2.5% of the population in 2012, will house 19 million more residents, account for 13.7 million more jobs, and churn $3.3 trillion more in GDP if we continue on our current course of modest growth and avert serious economic crises.

On the other hand, the big picture of divided East/West wealth and quality of life is unlikely to change easily in any kind of "what-if" scenarios. Affluence is likely to remain in developed cities—whose long establishment, high productivity, and richer incomes tower over developing cities. The latter have a mountain to climb to catch up

in productivity (and underlying areas like open governance, elimination of corruption, and stronger physical and social infrastructure), even while growing spectacularly population and employment.

In the 2025 projection, Tokyo will be second to London in creating jobs and in growth of GDP. The result is impressive because in spite of the mature stage of Japanese society, Tokyo is still one of the leader cities in the world.

One of the reasons why Japanese cities are so resilient is that the country and the cities had to overcome such a variety of urban issues, as we have explained in this report. Moreover, the cases we introduced in this report are only a few examples of their achievement, and they are still struggling to solve the issues they are confronting at this moment.

We hope that cities in developing countries, especially Asian countries, utilize the experiences of Japanese cities to find clues to solve their problems in their own ways, and develop a critical path to become a "City of the Future".

Chart 23. London leaps ahead in a world where educated, connected cities count, but growth falls in emerging cities
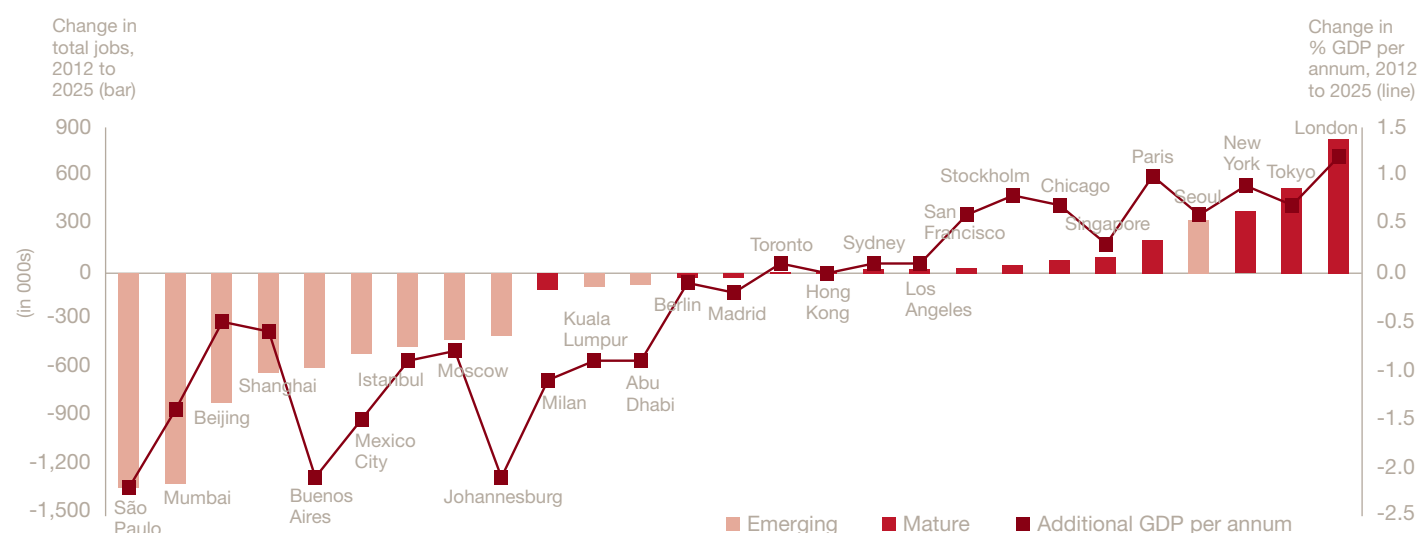
Source: Oxford Economics, Cities of Opportunity

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