Transition Management for Sustainable Cities

- The Dynamism of Local Experiments and Roles of Informal Networks in Japan

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1. Introduction

Transition management is a governance approach to sustainability transition. It is based on an understanding of transition as processes of multi-level and multi-phase changes in complex systems. The framework of transition management can be operationalized into different instruments such as transition arena for informal network among heterogeneous actors (Loorbach, et al. 2016).

In Japan, which is required to respond to rapid aging and global warming, transition management is needed to introduce sustainable industry, transport, and welfare system at city level. In this paper, transition management lens is used for analyzing cases of Eco-Town project in Kitakyushu, Compact City project in Toyama, focusing on the role of informal networks for local experiments.

2. Kitakyushu City

2-1. Overview of Kitakyushu City and policy requirements

Kitakyushu is located at the “entrance” to Kyushu in Japan and is a “designated city” with a population of 1 million people. The city’s development began in the late 19th century. In 1901, the first modern steel plant in Japan, the government-operated Yahata steel works (currently Nippon Steel & Sumitomo Metal Corporation) began operations. This steel works, which became Japan’s top steel supplier, was situated near the site of Japan’s largest coalfield, and railroad lines and port facilities were also established. Taking advantage of these resources, the city developed essential industries such as chemical, metal, and ceramic industries, playing a significant role in Japanese modernization. The smoke from these factories’ chimneys were a symbol of local prosperity.

However, air and water pollution associated with this industrial development soon became prevalent. By the late 1950s, environmental conditions in Kitakyushu were severely threatened. High concentrations of soot and dust caused NOx, particulate matter, and Sox levels to rise beyond World Health Organization (WHO) standards. Water pollution in Dokai Bay, at the heart of the industrial district, became also so bad. Kitakyushu moved to the forefront of the unsustainability problem arising from Japan’s modernization.

Against this backdrop, the City created a new department in charge of pollution control in 1963 and raised it the status of Pollution Control Bureau in 1971. From 1969 to 1972, the City signed “pollution control agreements,” informal voluntary agreements outlining specific pollution-control measures, with each factory. In addition, companies reduced emissions by retrofitting their facilities with newer and higher-efficiency equipment. As a result of having taken these measures enabled

through civic pressure and the City's own administrative efforts, companies made significant progress in developing new technologies and improving production process. Many pollution issues were settled by the late 1970s.

The oil crisis in the late 1970s, appreciation of the yen, and structural economic change in the 1980s had a large influence on Kitakyushu's economy. Impacts on the iron and steel industry were particularly great. Mayor Sueyoshi, who was elected in February 1987, developed Kitakyushu Renaissance Plan based on his pledge to revitalize the regional economy (Shiroyama and Kajiki 2016).

2-2. Formulation of Ideas of Kitakyushu Eco-Town Project - formal and informal processes

The basic concept of Kitakyushu Renaissance Plan was "to become an international and technological city with waterfronts, a green environment, and human connection," which included, as a component, the "promotion of environmental industries" through the utilization of the reclaimed land in Hibikinada, located in the northwestern part of the city. He worked on various projects during his 20 years (until 2007) in office, and "Kitakyushu Eco-Town Project" is a representative example (Shiroyama and Kajiki 2016).

In the 1980s, a very large swath of land (2000ha) was developed in the Hibikinada district located in the northwestern part of the Kitakyushu as a result of the fact that the City and companies had reclaimed the foreshore with sand and slag. However, the original plans for industrial development were thwarted by structural changes in the heavy manufacturing industry, and the City was forced to rethink its plans. In October 1989, the City set up a "Committee for Hibikinada Basic Development Plan", which included representatives from Nippon Steel, Mitsubishi Chemical, Mitsui & Co., Ltd., and Hibikinada Kaihatsu Co., Ltd., to look into the possible uses of the Hibikinada district. In March 1992, the committee agreed on the Hibikinada Basic Development Policy for fostering the waste management and recycling industries utilizing technologies and human resources based on Kitakyushu's long experience in pollution management. In line with this Basic Policy, the City began holding study sessions with relevant bureaus. Finally, in March 1996, the Committee formulated the Hibikinada Basic Development Plan, which consisted of the following four items.

①Attract and support environmental industries
②Establish a R&D base for environment-related fields
③Improve infrastructure for development and supply of energy
④Attract and support industries relating to environmental devices and engineering

Preceding this policy was also organizational change at the City. The Pollution Control Bureau merged with the Environment Operation Bureau in charge of waste management, creating in 1990 a

new Environment Bureau in charge of environmental policy, waste management policy, and industrial policy. This bureau was placed in charge of Hibikinada district development and the Eco-Town Project.

Around the same time, amidst a downturn in iron manufacturing, Nippon Steel (currently Nippon Steel & Sumitomo Metal Corporation), which owned 300ha of unused land in Hibikinada district, started discussions on the creation of new business utilizing this land. In June 1994, Junichi Kawasaki, who belonged to the iron manufacture section of Nippon Steel Yawata, moved to the general affairs department and started working on the creation of new business. He set up a study group in November 1994 with Yoichiro Kamei, who was the president of Kyushu Industry (subsidiary of Mitsui & Co., Ltd.) and knew the recycling business well. They searched for the possibility of some form of waste recycling business. They were incumbent members of companies but were trying to introduce new ideas.

Kawasaki and Kamei expected it would be important to understand the City's policy on waste management administration, and so in March 1995 they set up an advisory committee (first phase) comprised of members of the private sector (Nippon Steel Yawata, Nippon Steel Engineering, Mitsui & Co., Ltd., Hibikinada Kaihatsu) and city officials from various bureaus and departments, including environmental bureau, economic affairs bureau, port and harbor authority, and city planning departments. Based on the extensive experience of its members, the advisory committee concluded that a new environmental industry, unlike the conventional waste disposal treatment business, would need to be created.

In the first phase of the advisory committee, participating city officials were those at the rank of subsection chief. However, since political support from the City was critical to the success of the recycling business, the attendance of officials at the level of section manager or director was expected in the second phase of the advisory committee from February 1996. The advisory committee developed a Comprehensive Environmental Industrial Complex concept that would later become the starting point for the Eco-Town Project (Interview with Junichi Kawasaki on 26th June 2013).

2-3. Realization of Kitakyushu Eco-Town Project - intra-company politics, linkages with national policy and cross-sectoral training of officials

After advisory committee meetings, Kawasaki and Kamei started examining the idea of a PET bottle recycling business based on the Law for Promotion of Sorted Collection and Recycling of Containers and Packaging (Containers and Packaging Recycling Law). This legislation was drafted by the Ministry of International Trade and Industry (MITI) in June 1995, coincidentally around the same time when the idea for PET bottle recycling was put on the agenda in Kitakyushu. The law became the decisive factor in choosing the type of business to create, because the law clarified the

roles of consumers (classification), municipalities (separated collection, storage) and the company (recycling) (Interview with Junichi Kawasaki on 26th June 2013).

However, negotiating with Nippon Steel leaders in headquarters (located in Tokyo), who had the authority to decide, was not easy. Executives at the head office were concerned about the difficulty of bearing factory construction costs of 1.6 billion yen. In addition, they pointed out the contradiction of working in a competing field such as the PET bottle recycling business, because the company had a division that produced and recycled steel cans. After several stages of negotiation between the vice-president of the head office and the Nippon Steel Yawata iron manufacture director, the problem was finally settled as a "land sale item," taking also into account the history of the company's collaborative relationship with the City.

How to frame the issue was an important part of obtaining agreement from the corporate leaders at headquarters. The company was restructuring at the time, and it became the problem to let Nippon Steel Yawata that made an effort for reduction in cost bear a large amount of property tax imposed on the land in the Hibikinada district. One idea that emerged to persuade leaders at headquarters was to sell the land to launch the PET bottle recycling business. Under the devised scheme, the PET bottle recycling company would purchase the land from Nippon Steel headquarters for 300 million yen, thereby decreasing its financial burden. This would also transfer responsibility for the result of the business decision away from the company as a whole to Nippon Steel Yawata. To this headquarters could agree.

Through these processes, West Japan PET Bottle Recycling Co., Ltd. (NPR) was established in April 1997 based on investments from five private enterprises (Nippon Steel, Mitsui & Co., Ltd., Nittetsu Transportation, Nippon Express, and Sankyu) and the City. The new venture became the first in the Eco-Town Project designated by central government (MITI and the Ministry of Health and Welfare) in July, as will be explained later.

Because Kitakyushu City actively seconded personnel to the central government, it was easy to exchange information and opinions with the central government ministries. When the section manager of environmental policy at MITI, visited the City in May 1996 looking for new policy ideas, the City suggested that establishing new business would require differentiating the recycling business from conventional garbage collecting (Interview with Former Official of Kitakyushu City on 26th June 2013). The idea of completely eliminating waste and emissions by utilizing them as resources was attracting attention at the time, and negotiations between MITI and the Ministry of Finance resulted in the creation of the Eco-Town Project, a national program aimed at revitalizing local economies through the promotion of green business (environmental industry) and the creation of an environmentally harmonious system by industry, the public sector, and consumers. Under this new framework, up to 50% of the project cost was borne by the central government.

Multiple ministries and government offices, including MITI and the Ministry of Constructiontion,

had jurisdiction over recycling business. So Mayor Sueyoshi devised a strategy to draw subsidies from the various ministries and government offices in every project. For this he put together a team of subsection chief-level officials from various fields (civil engineering, chemical engineering, mechanical engineering, biotechnology, agriculture, law, and business administration) to deal with the ministries. Furthermore, the City adopted a "catered lecture" program in 1989, requiring officials in executive-level positions to explain city plans or projects beyond their jurisdiction to citizen groups comprised of more than 20 people. This was an opportunity to hear public opinion and also a place where such officials could be tested on their ability to respond to input. It was also an opportunity for officials to develop a capacity to communicate with various stakeholders. In other words, this program was a mechanism for training future transition managers. Such a "catered lecture" was held for the PET bottle recycling business. Residents expressed anxiety over how garbage would be collected, the potential rise in illegal dumping, and the possibility of Hibikinada simply becoming a dump site" (Interview with Former Official of Kitakyushu City on 26th June 2013). To obtain residents' consent, City officials had to explain that "the Environmental Bureau does not take part in environmental pollution" and "a certain local trusted company will take responsibility."

2-4. Implementation and spillover of Kitakyushu Eco-Town Project

The Kitakyushu Eco-Town Project began in July 1997. The newly formed Kitakyushu Environmental Industry Promotion Council comprised of Nippon Steel Yawata, Mitsui & Co., Ltd., Toshiba, Hitachi, academia, the chief of the Kyushu Economic Industrial Bureau, and the deputy-governor of Fukuoka Prefecture formulated three action plans—one each for education and basic research, technology and demonstration studies, and industrialization—as a three-pronged strategy to environmental industrial development.

In the industrialization area, companies began commercializing recycling operations. From PET bottle recycling, six recycling plants for such things as office automation equipment, automobiles, home appliances, fluorescent lamps, and medical equipment went up in the area. The Home Appliance Recycling Law, which was enacted in June 1998, catalyzed the creation of Nishinihon Kaden Recycle Corporation (NKRC) in the same year by financing from manufacturers. In this way, recycling business in the Kitakyushu Eco-Town Project started with PET bottles and expanded to other fields in what became the first stage (1997–2002).

In July 2005, the Kitakyushu Eco-Complex Promotion Council (comprised of 17 private enterprises and four universities, the chief of the Kyushu Economic Industrial Bureau, the deputy-governor of Fukuoka Prefecture, and the City) was also formed, starting the move to optimize resources and energy use between the industrial and residential sectors on a regional level. In addition to expanding the project area to the entire city, the City also started examining the

possibility of developing business overseas. Following this idea, the City set a goal in the second stage of the Kitakyushu Eco-Town Project Plan to promote the 3Rs and establish an environmental industry base city in Asia beyond Japan through systematic accumulation of various industries related to recycling resources and technologies and further expansion of previous actions. It becomes clear at this point that the goal of the Kitakyushu Eco-Town Project grew from the effective utilization of Hibikinada district to include international cooperation in the second stage (Shiroyama and Kajiki 2016).

The City targeted places in China through sister city agreements and the Organization for the Promotion of East Asia Economic Development. In 2007, under a bilateral agreement between Japan and China, three Chinese cities (Qingdao, Tianjin, and Dalian) were selected as the location of Japan-China cooperation projects, in which the City of Kitakyushu has been involved. For example, the following five specific items were adopted in Qingdao.

1. Cooperation on a “recycled resources industry development plan" that Qingdao City devises
2. Examination of the possibility of introducing technologies and facilities for collecting and processing home appliance waste
3. Consideration of the potential for cooperation with existing or planned recycling-related industries in Qingdao
4. Visiting Japan to train city officials and relevant parties from companies in Qingdao
5. Advertising this cooperation project in both Japan and China

The overseas expansion of the “eco-town” concept and the Kitakyushu City business model has included not only technology transfer but also legislation and operational management of waste collection systems. The City aims to integrate these areas, developing everything from start to finish, including the construction of institutional systems and the creation of recycling markets.
In addition, improvements in waste collection methods are indispensable to improving the operation of recycling machinery as well as to introducing technology that allows Eco-Town businesses to secure a profit (Interview with Officials of Kitakyushu City on 26th June 2013). Training of operating staff is therefore necessary. The City has also been matching Kitakyushu companies with companies overseas to support their foreign operations.

In this way, Kitakyushu City has expanded the geographical scope of its Eco-Town to the entire city, and even transferred technologies and operational systems to China through international cooperation networks.

3. Toyama City: A Compact City

3-1 Overview of Toyama City and policy requirements

Toyama City is the capital of Toyama Prefecture and the seat of the prefectural government. In 2005, 42 surrounding villages were absorbed by Toyama City in the context of so-called “Great Heisei Mergers,” making Toyama a key regional metropolis with a population of just under 420,000 people (according to the 2010 National Census) and a total area of 1,200 square km (roughly one-third of the prefecture).

Toyama is a manufacturing city that revolves around the pharmaceutical and metalworking (e.g., aluminum) industries. Many workers are employed in the manufacturing sector, and—owing to traditionally strong aspirations for home ownership—the resulting division of residential and working areas has led to the proliferation of commuter towns in areas surrounding the city. This development has resulted in improvements to the road networks. The effect of this trend has been the creation—since the period of high-speed economic growth until the period of the bubble economy—of a dispersed urban structure that is reliant on the movement of private motor vehicles. Among the various modes of transport available to residents, reliance on private cars for transportation increased almost twofold between 1974 and 1999, making Toyama City the most car-reliant of Japan’s core cities.

Currently, Toyama City is faced with several issues associated with its aging population. For instance, will older residents who are physically unable to drive be able to access urban services? Can its spreading urban infrastructure be maintained financially in the face of a declining population? Such questions have prompted a shift away from continued urban expansion toward the promotion of a more compact and concentrated city structure. The key notion behind the Compact City policy is to direct urban planning away from thinly dispersed suburban growth toward a concentration within the urban center.

3-2. Initiation of LRT Project

The original component of the Compact City policy was the idea to convert a local heavy rail line - the Toyamakō Line - operated by JR West that ran along the northern part of Toyama central station into the LRT (Light Rail Transit) and to connect the LRT to the tram network operated by the Toyama Local Railway Co (Fukayama, Kato and Shiroyama 2007). Toyama City started informal discussions in July 1995 with members of the Ministry of Land, Infrastructure and Transport (MLIT) and the Toyama Prefectural Transport Authority. They examined the feasibility of a town development that connected the northern and southern parts of Toyama central station. The main agenda at that time was whether the JR Hokuriku line could be elevated and Toyamakō Line could be converted into LRT with support from the Limited Rail-highway Grade Crossing (LRGC) Program. The LRGC Program provides financial support to the local authority, to construct elevated rail structures that cross over a single road, and the financial support in this program is limited to the amount of expenditure required either to construct the tunnel for the road crossing under the railroad

or to construct an overpass road that crosses over the railroad. In 2000, the MLIT relaxed the conditions of the LRGC Program. The relaxation of the LRGC Program conditions ultimately enabled Toyama City to realize town development vis-à-vis the LRT in Toyama.

Toyama City developed a new urban plan and announced the Urban Master Plan in March 1999. The plan covered local transport development, including the highway network and the public transit network. In addition to the Urban Master Plan, Toyama City completed the Regeneration Plan for the Toyama Central Business District. The Regeneration Plan outlined the planning visions, including the new town development in the northern part of the central station and the regeneration of the existing commercial district in the southern part. The Regeneration Plan suggested that improvements to the public transport system were badly needed, in order to enhance the accessibility of local people—particularly when society is rapidly aging and there is an impetus to reduce the environmental impact of automobile emissions. Based on these plans, Toyama City prepared in 2000 the Toyama Local Public Transport Plan, which hinted at introducing an LRT in Toyama.

The central government made a political decision in 2001 to start constructing the Hokuriku Shinkansen line ("bullet train") at Toyama. The Hokuriku Shinkansen project is one of the national high-speed rail projects; it runs between Tokyo and Osaka via Nagano, Toyama, and Kanazawa. This prompted Toyama City to reexamine the local transport system and the area development around the station, because it was thought that the Toyama central station would be replaced by a new station that includes the Shinkansen line. The most critical problem was how best to use the Shinkansen platform in the Toyama central station. As the Shinkansen trains were required to run on the elevated rail structure, the elevation of the existing JR Hokuriku line was also expected.

From there, how to deal with the existing Toyamakō Line was inevitably taken up for discussion. One of the option was to convert the Toyamakō Line into the LRT line. Although the LRT plan was regarded as preferable one, preparing the budget for the construction became a critical problem. The central government finally approved the application of the RGC Program to the Toyama LRT project in 2003, after long discussions with the MLIT.

3-3. Proposing the Compact City framework

The LRT project was framed under the boarder framework of the Compact City. The Compact City initiative was pursued initially by Mr. Masashi Mori, first elected as the mayor of Toyama City in February 2002. He was cognizant of the risks associated with the city's urban structure from serving as a member of the prefectural assembly.

A "Compact City Study Group" was established within the city office in early 2003 as an interdisciplinary project team composed of a diversity of employees from the Department of Urban Infrastructure, Department of Construction, and the (then) Environmental Section. It was overseen

by the Department of Planning Management. This team was headed by a section chief in his fifties, but most of the staff members were younger (in their twenties and thirties). Two research teams were formed under the direction of the advisor (deputy mayor) and chair (the chief of the Planning Coordination Section within the Department of Planning Management). The first was a 12-member team that studied the merits of a Compact City policy, whereas the second was an eight-member team that reviewed implementation approaches for such a policy. The Study Group convened approximately once every three months. Over a period of one year and several months, the Study Group investigated compact city structures and developed the Compact City concept. The deputy mayor, Mr. Mochizuki (on temporary transfer from the Ministry of Land, Infrastructure and Transport), provided invaluable support in helping to prioritize various aspects of the concept (Interview with Officials of Toyama City on 9th May 2017).

In March 2004, the Compact City Study Report was released, highlighting various issues detailed below (Study Group on Compact City 2004). The report initially outlined the background issues affecting the city. For example, flat topography and a strong preference toward owning individual homes had resulted in dispersion of the urban area and the lowest population density of the prefectural capitals. Meanwhile, aging of the city's population foreshadowed difficulties for older residents no longer able to drive. Additionally, increases in vehicular traffic were intensifying environmental burdens in the form of carbon dioxide emissions, and a tighter fiscal environment for local government meant that existing levels of service were becoming difficult to maintain. Accordingly, the objectives of the Study Group were, 1) to conduct a quantitative analysis regarding the impacts on municipal management and residents' lifestyles to demonstrate the need for compact urban planning, and 2) to consider and propose a basic policy direction aimed at achieving compact urban planning.

The need for Compact City planning was underscored through a four-part analysis. First, the population concentration in densely inhabited parts of the city in 2000 was just 41 people per hectare, the lowest among the prefectural capitals. Dispersed urban structures were linked to poor investment efficiencies and increased social burdens, creating a crucial need for efficient urban planning that would make effective use of existing urban concentrations. Second, based on projections that the population density in the center of the city would decrease from 46 to 35 people per hectare between 2000 and 2020, living standards were predicted to drop significantly for residents scattered throughout this area. Therefore, financial pressures would make it difficult to maintain existing levels of government services in suburban areas. These findings pointed to the need for urban structures that would allow people to continue to live without concern for such potentialities and move about on foot. Third, the ratio of pedestrians in the centers of Toyama City and Takamatsu City—a city with a similar population and number of retail stores, was 1/1.6. In the age of competition among cities, it was determined that the central city area should be developed as the

“face” of Toyama City and urban planning should focus on developing an appealing and energetic city center. Fourth, Toyama City has an exceedingly high reliance on private vehicles compared to other cities (72% of the transportation share in 1999). Thus, it was determined that urban planning should focus on increasing the load density of public transport and reducing the burden placed on the environment.

With these objectives in mind, the following measures were proposed:

(1) Providing incentives for developing the Compact City

① Expand assistance programs to encourage inner city residence

② Establish measures to attract industry into the central business district

③ Create an integrated city area centered on public transport nodes

(2) Developing social infrastructure systems to support the proposed Compact City

④ Rebuild the inner city by elevating railroads near Toyama Station (to achieve north-south integration) and locate public facilities within the city center

⑤ Reorganize existing transportation systems: improve public transport services (regarding Light Rail Transport [LRT] for the Toyamakō Line, convert existing trams to LRT and connect them to the Toyamakō Line), promote the use of bicycles, etc.

⑥ Build frameworks to assist with relocation

⑦ Build frameworks to promote development in city hubs, such as programs to develop district management organizations.

(3) Building consensus and associations with residents to promote the Compact City

⑧ Create arenas to raise awareness and build consensus (e.g., create Compact City support organizations)

⑨ Create associations linking public and private bodies to promote the Compact City

Findings from this study were regularly reflected in the measures adopted simultaneously and later. For example, the LRT plan for the Toyamakō Line that was submitted by the mayor to the municipal assembly in May 2003 and which was approved for necessary funding, was linked to the drafting of the Toyama City Comprehensive City Transport System Master Plan, completed in March 2005 (Toyama City 2005). The Toyama City Center Residential Encouragement Plan was also finalized in March 2005.

The Compact City policy became a public commitment in the mayoral election held in April 2005, when seven surrounding towns and villages were incorporated into new Toyama City. Promotion of the policy made use of the image of “dumplings on a skewer” to encapsulate the new urban model.

The skewer represented the existing public transport routes covered by trains and buses, and the dumplings represented compact and walkable residential zones with transport hubs (i.e., train stations and bus stops) in their center. Subsequently, measures cited in the Compact City plan would focus on improving the efficiency of services to boost livability in these areas.

For three years following his reelection, Mayor Mori held 109 town hall meetings in various locations within the new city boundaries (Interview with Officials of Toyama City on 9th May 2017). Initially, there were concerns as to whether the Compact City plan would funnel city investments solely into the city center. In these town hall meetings, Mori carefully explained that rather than concentrating investments on the city's center, streamlining would result in more investments in the surrounding areas.

During the development of urban planning for Toyama City following the merger between old Toyama City and surrounding areas, the proposed Compact City was progressively incorporated into these new plans, which included the Basic Revitalization Plan for the Toyama City Downtown, finalized in February 2007, as well as the Toyama City Comprehensive Plan, the Toyama City Public Transport Revitalization Plan, and the Toyama City Plan to Promote Residence along Public Transport Routes—all finalized in March 2007. Additionally, the Toyama City Master Plan was finalized in March 2008. Recommendations were also made within the context of the Environmental Model Cities and Future Cities frameworks developed nationally. The Toyama City Environmental Model City Action Plan and the Toyama City Environmental Future City Plan were put in place in March 2009 and May 2012, respectively.

3-4. Implementing Compact City policies

(1) Light Rail Transit (LRT)

Work commenced on the LRT conversion of the Toyamakō Line and construction of a loop line for existing trams after these projects were highlighted by the study report and included in subsequent plans. Conversion of the Toyamakō Line to LRT was completed in April 2006 (Fukayama, Kato and Shiroyama 2007). The number of users within the LRT section that was formerly the Toyamakō Line increased by 2.1 times during the week and 3.4 times on weekends (as of 2015). The increase in elderly users during the day has been particularly marked.

The creation of a loop line for inner city trams was completed in December 2009. Nine hundred meters of new tracks were installed and managed under a scheme separating infrastructure from operations. Under this arrangement, the city is responsible for infrastructure (maintenance of facilities and carriages), and the Toyama Chihō Railway is the public carrier responsible for operations according to the 2007 Act on Revitalization and Rehabilitation of Local Public Transport Systems. Integrated work on track areas was also carried out to improve both the tram-related infrastructure and urban landscape.

In addition, when the new Hokuriku Shinkansen Line began operating in March 2015, a tram terminal was built beneath the “bullet train” station. Subsequently, a 10% increase in the number of tram users was noted. Future plans include raising existing tram lines and connecting them to the north-south LRT.

(2) Encouraging residency in the inner city and along public transport routes

A range of measures has also been implemented to encourage people to live in residential areas that can be covered on foot (Interview with Officials of Toyama City on 9th May 2017). The first measure was to subsidize the construction of high-quality buildings and homes as well as rent for leased homes in these areas. Under this arrangement, purchases of apartments attract a higher subsidy than that typical for detached homes, with 700,000 yen being made available for the purchase of an apartment within designated areas and 300,000 yen being made available for the purchase of a detached home within designated areas.

Second, many efforts were undertaken to increase the city’s appeal. The construction of the multipurpose Grand Plaza (opened in September 2007) in the center of the city was one such endeavor. More recently, the Toyama Glass Art Museum and Library was built in August 2015.

The construction of the physical infrastructure was also accompanied by the creation of systems and frameworks that would facilitate using it. First, the NPO “Grand Plaza Network” was established to determine how residents and private businesses should make use of this new open space. Because of concerns that downtown Toyama offered little appeal to local students - identified as assets who bring vitality and creativity to the city -, the “Downtown Laboratory” targeted students in Toyama. It was built by repurposing an untenanted site as a gathering place and hub for students. It can also be used as an extension of university research space and a venue for providing information about part-time work opportunities available in the city. A project aimed at encouraging students to offer policy recommendations for the commercial district has also provided an opportunity to enhance social commitments among the student population. In addition, the “Toyama City Civic Pride Study Group” was established at the behest of younger employees within the city government. Its mission is to undertake unique projects within the government sector in cooperation with residents. Formation of the group was inspired by the concept of communication design.

To assess the efficacy of these measures, a benchmark was established to measure the portion of the population living in designated residential encouragement areas in the city center and along public transport routes. The city center is spread across 486 ha, whereas the residential encouragement areas along public transport routes cover spaces within a 500 m radius of each train station and a 300 m radius of bus stops. The objective of strategic planning is to increase the percentage of Toyama’s population living in these areas from 28% (recorded in 2005) to 42% in 2025. As of 2016, the figure was 37%, indicating a sustained increase. Indeed, in terms of overall

numbers, there has been a notable return of the population to both the city center (since 2008) and areas adjoining public transport services (since 2014). One of the upshots of this type of public investment has been the apparent growth in private investments. As a result, land prices in the center of the city have increased for the three years since 2015, which in turn has brought the city increased revenue from the fixed assets tax.

3-5. Developing the Compact City further: Connections with health and welfare policies

The Compact City plan initially focused on urban infrastructure, construction, and transportation. However, as implementation has proceeded, there have been some clear impacts on other policy areas, including health and welfare (Interview with Officials of Toyama City on 9th May 2017).

As already mentioned, introduction of the LRT clearly encouraged more elderly residents to leave their homes. In addition, a commuter pass for elderly users was introduced with the dual objective of attracting consumers to the city center. This pass allows elderly users to travel into the center of the city using any mode of public transportation for just 100 yen (one USD). First introduced in 2003 for travel via buses connecting the city center and surrounding areas, the pass was extended for use on the Toyama Chihō Railway in 2008 and to trams and LRT in 2011. Currently, 24% of the elderly residents in Toyama City have their own passes. In 2015, passes were used by 2,763 people daily.

As part of the Compact City policy of increasing the residential population within the city center, a preventative care center was established in the center of town in 2011 on the site of a former elementary school (Hoshii-cho Elementary School), made available by amalgamation and closing of the school. This is the only preventative care center in which hot springs are used for therapeutic treatments. Though it is a public facility, it is managed by a private business. Construction of the center was financed with public funds and contributions from the private sector.

Additionally, using a GIS (Geographical Information System) program containing transport infrastructure data, trials commenced in 2013 to plot the use of medical and welfare facilities, as well as residential care and healthcare facilities, by elderly residents. These trials highlighted connections between residential encouragement areas in the city center and along public transport routes with medical and welfare facilities. For example, 83.3% of residents within these stated areas were found to live within 500 m of a hospital or clinic. The data indicate that a lower proportion of residents within these residential encouragement zones require primary nursing care.

In this way, the Compact City policy, which originated with public transport initiatives such as the LRT, has gradually spread into policy areas dealing with residency, health, and welfare. For this reason, a multidisciplinary taskforce was created to work within the city government, as per the original model outlined by the 2003 study group, to respond actively to the spillover emanating from these issues.

4. Comparison and discussion

Comparing the experience of Kitakyushu with the example of Toyama, several common threads emerged.

First, in both cities, it was critical to place each individual project within a broader comprehensive framework. In Kitakyushu, Kitakyushu Renaissance Plan in 1987 and the Hibikinada Basic Development Plan in March 1996 was significant for having highlighted leadership and support for the recycling and resource recovery industries. In Toyama, this framework was laid out by the Compact City Study Report prepared in March 2004.

Second, the role of private organizations, such as NPOs and businesses, was important. In Kitakyushu, two key figures from private enterprises have taken the lead in creating basic idea for new environmental businesses. Numerous mechanisms were created to attract residents and students into downtown Toyama City to revitalize this area. In addition, private donations provided support for the construction of the LRT and welfare facilities, which were built with public money and operated privately.

Third, the role of outsiders as a source of new ideas was also critical. In Kitakyushu, ideas for recycling businesses came from employees of private companies in non-management positions. In Toyama, an assistant to the mayor on temporary transfer from the Ministry of Land, Infrastructure and Transport provided significant help in shaping the measures that would be incorporated into the Compact City framework.

Fourth, cross-sectional linkages and cooperation were indispensable. The ability to respond across disciplines (of the environment and industry) was important in Kitakyushu. The mayor organized inter-sectoral group of officials to have links with various ministries in the central government. The mayor also arranged "catered lectures" by officials. They are talks given by officials at the request of residents, which gave employees broader perspectives outside of their own areas of responsibility. In the case of Toyama, a taskforce encompassing various government departments was utilized, as was the case with the 2003 study group. Accordingly, the organization formed could provide cross-sectional responses within a range of policy contexts, from urban planning and transport to environment and welfare. Moreover, working as members of this taskforce gave employees a more cross-sectional perspective.

Fifth, leadership from top levels of local government was critical. In Kitakyushu, support from the mayor allowed the Environmental Department to manage a wider array of policy areas, including industrial policy. Similarly, it was the leadership of the mayor of Toyama, for example, that facilitated cross-sectional cooperation.

Sixth, it was important to link local initiatives with the policies of the central government's ministries and agencies. In Kitakyushu, staff were dispatched from the municipal government to the central government's ministries and agencies. In Toyama, transferred staff from the Ministry of Land,

Infrastructure and Transport were responsible for creating these associations. Moreover, many central government frameworks were utilized, including special zones, the 2008 Environmental Model Cities Scheme, and the 2012 Environmental Future Cities Scheme.

Finally, the role of incremental process management was critical in tackling subsequent issues after concrete results were produced and visualized.

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