

14. Taipei Metropolitan Area, Chinese Taipei

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14.1 INTRODUCTION

This chapter explores the development of the Taipei Metropolitan Area or Greater Taipei Region of Chinese Taipei, which includes Old Taipei and New Taipei City (Figure 14.1). The chapter profiles the region's economic, urban development, social, environmental and governance environments. It discusses the development challenges facing the metropolitan region, and describes best practices in partnerships for sustainable city development.

Photo 14.1 Taipei: A Metropolitan River City



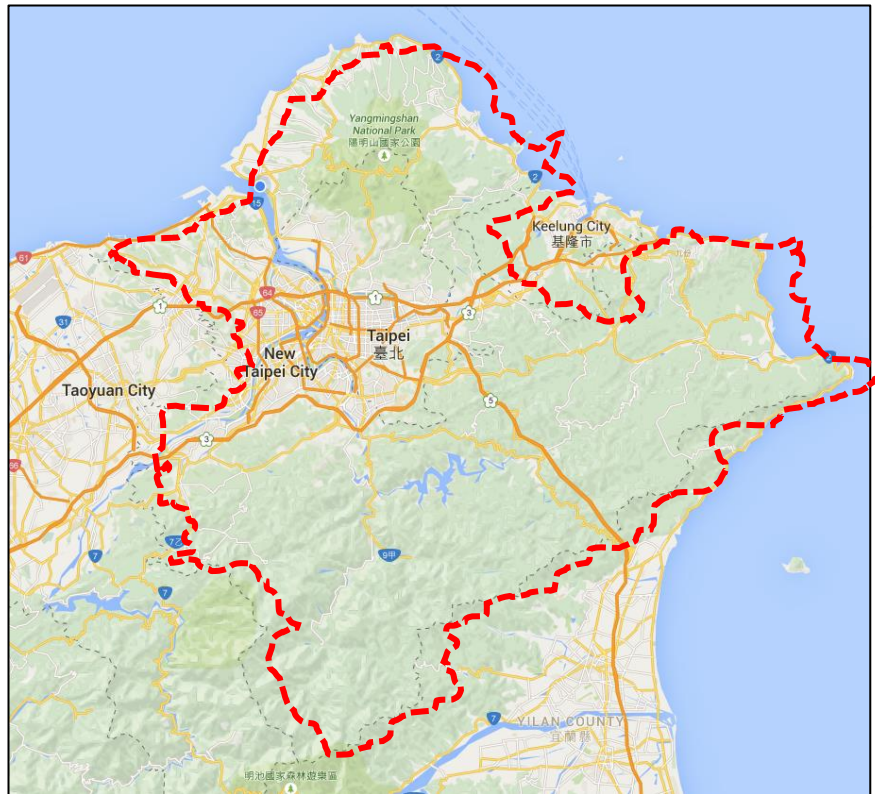
Credit: Min-Ming Chen.

The Taipei Metropolitan Area, has been shaped strongly by the topography of the Taipei Basin formed by the Xindian River to the south and the Tamsui River in the west (Photo 14.1). Taoyuan to the west is separated by hills and river valleys from Keelung to the east. These are separate geographic regions, but their economies and transport systems are linked closely with that of the Taipei Metropolitan Area. Keelung City, a major port, is connected by road and rail through a narrow valley to the two cities. Taoyuan is becoming an emerging industrial centre with a growing urban spillover population from New Taipei.

Taipei serves as the core city of the metropolitan area; it is the location of the central government and major commercial districts. Metropolitan Taipei has become one of Asia's fastest-growing cities, with a dynamic economy and vibrant urban life. It has one

of the tallest buildings in Asia, the Taipei 101 tower. It also has the second highest GDP per capita in Asia after Japan.

Figure 14.1 Taipei Metropolitan Region



Source: Modified from Google Map.

Like most cities in the APEC region, the Taipei Metropolitan Area is experiencing significant urban development pressures. Land for development is at a premium, with the natural topography placing constraints on urban development. Urban population density is over 15,200 persons per square kilometre, making it one of the most densely populated cities in the region. New Taipei developed as an extension to the old city, but as mentioned previously, it has begun to spill over into Taoyuan. The metropolitan area faces the challenge of protecting agriculture and environmentally sensitive areas from development and establishing a governance system for improved metropolitan management.

14.1.1 Classification of Cities in Chinese Taipei

The government has developed a system for classifying urban settlements.⁶⁷³ Metropolitan areas are defined as economically and socially integrated areas comprising one or more core cities with a population of over 300,000.⁶⁷⁴ A core city in a metropolitan area must have: (i) a population of more than 200,000; (ii) more than 70 percent of its residents living in the urbanized area; and (iii) more than 70 percent of the employed

residents working within the city. There are seven metropolitan areas in total: Taipei, Kaohsiung, Taichung, Taoyuan, Tainan, Hsinchu and Chiayi.

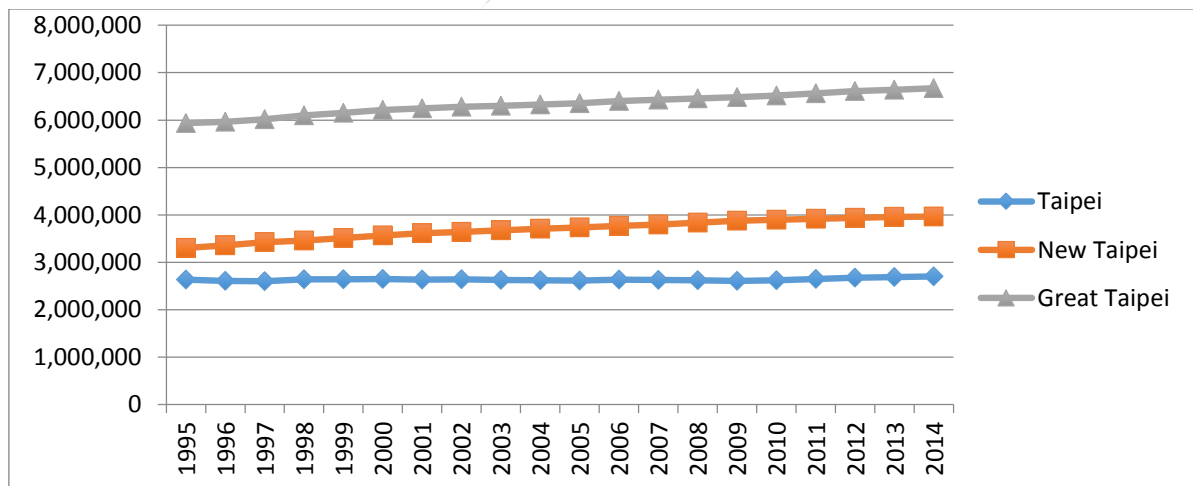
A satellite city is defined as a smaller city within the same region of the core city. Satellite cities must have more than 10 percent of the employed residents commuting to the core city and more than 40 percent of the residents living within the same urbanized area as the core city. The Taipei Metropolitan Area comprises the core city of Taipei and several satellite cities, including New Taipei.

14.1.2 Population

The population of the Taipei Metropolitan Area grew 12.3 percent between 1995 and 2014, from 5.9 million to 6.7 million (Figure 14.2). Over the period, average population growth rate in Taipei City was 2.6 percent (2.6 million to 2.7 million) and in New Taipei City 20 percent (3.3 million to 4 million).⁶⁷⁵ These population statistics excluded students, military persons, and new immigrants who lived in the city but were not registered as residents.

The daytime population in Taipei City is more than 4 million, with more than 1.3 million commuters travelling from surrounding cities such as New Taipei City, Taoyuan City and Keelung City. Since the mass rapid transit (MRT) system opened its first line in 1996, many people have chosen to live in New Taipei City, where housing is more affordable, rather than Taipei City.

Figure 14.2 Population Trends, Taipei Metropolitan Area, 1995–2014



Sources: Department of Budget, Accounting and Statistics, Taipei City Government Online Statistics Abstract.

14.1.3 Challenges of Regional Urbanization

The effect of rapid urbanization and development since the 1960s has led to Old Taipei – once a compact, densely populated city – spilling over into Taipei County. In 2010, the

county's population overtook that of Taipei, and it was decided that the county should be upgraded to city status. As the Taipei Metropolitan Area has spread, urban densities have fallen; and the need to extend public transport, infrastructure, housing and urban services has become more pressing. Central and local governments have found it a challenge to plan, develop and finance these demands. Urban development in Taipei has been prolific, but it has come at a cost to the region's environment and now its social systems.

14.2 THE ECONOMY

Taipei City and New Taipei City are the two largest cities for business and industry. Table 14.1 shows key facts on the two cities and the metropolitan area. The two cities form Chinese Taipei's principal gateways for the economy's trade and development. Over 32 percent of domestic economic activity occurs in these two cities. The headquarters of more than 41 percent of the top 1,000 local businesses, by value, in Chinese Taipei are located in Taipei City and New Taipei City.⁶⁷⁶ Nearly 31 percent of small- and medium-sized industries also are located in these two cities.⁶⁷⁷

The impact of the 1997 Asian financial crisis on the economy was much less severe compared to economies in Southeast Asia. Its economy has expanded by around 5 percent annually over the past decade, with low unemployment and inflation rates. The estimated 2007 nominal GDP of Taipei City was USD 160 billion while that of the metropolitan region was around USD 260 billion. It is 26th among the world's strongest city economies by GDP in 2007.

The GDP per capita of Taipei Metropolitan Area in 2011 was USD 48,400, the third highest in Asia, behind Tokyo and Seoul.⁶⁷⁸ The Brookings Institution estimated GDP in 2014 at USD 327,295 million at PPP, making it the 29th largest urban economy in the world. GDP per capita (PPP) was estimated at USD 46,102.⁶⁷⁹

Table 14.1 Key Economic Facts – Taipei Metropolitan Area

	Taipei City	New Taipei City	Taipei Metropolitan Area
Value of the economy (2012), million USD	83,170	84,010	167,180
Residential population (2014/12)	2,702,315	3,966,818	6,669,133
Employment (2014/12)	1,262,000	1,927,000	3,189,000
Unemployment rate (2014/12)	4.00%	3.90%	3.94%
Number of businesses (2014)	215,882	206,626	422,508
Key export sectors	Wholesale and retail trade, transportation and storage, information and communication, finance and insurance activities, scientific and technical, support services activities	Manufacturing, construction, transportation and storage, information and communication, professional, scientific and technical	

Source: Ministry of Interior, Department of Statistics, *Statistical Yearbook 2013*; ADB (Asian Development Bank), Asia Regional Integration Centre online database 2015.

14.2.1 Economic Output

Table 14.2 shows a breakdown of the Taipei Metropolitan Area’s economic output for 2014. Business and finance is the largest industry sector. The sector has been growing very rapidly, as the economy has transformed from manufacturing to services over the past two decades. Taipei’s main industries include urban light industries, urban services, high-tech industries and technology-intensive industries.

From the perspective of enterprise capitalization, most are small- and medium-sized. Taipei City’s economy is reliant on small- and medium-sized industries and is commerce, finance and service industry-based. In response to a world shaped by fast-paced globalization and competition among the regional economies, city governments in the Taipei Metropolitan Area have worked hard to improve the business environment, and to enhance the region’s competitiveness.

Table 14.2 Output by Industry, Taipei Metropolitan Area, 2014

Industry sector	Percentage
Business/finance	31.3
Trade and tourism	21
Manufacturing	20
Local/non-market	19.3
Transportation	3.6
Utilities	2.5
Construction	2.2
Commodities	0.1
Total	100.0

Source: Brookings Education, *Global Metro Monitor, Taipei* (2015).

14.2.2 City Competitiveness

The Economist Intelligence Unit's Hot Spots index ranks Taipei at equal 37th among 120 of the world's largest cities in 2012 (Table 14.3). Its 'economic strength' category are comparable to Shanghai and Beijing, but below that of Seoul. Taipei City's scores in 'economic strength', 'physical capital', 'institutional effectiveness' and 'human capital' are above the global and regional mean. However, on 'social and cultural character' and 'environmental and natural hazards', it scores below the global mean and around the regional mean. The Hot Spots index is a relatively good indicator of the city's competitiveness and identifies factors that the city needs to concentrate on to enhance its competitiveness position.

Table 14.3 Economic Competitiveness of Taipei

	Economic strength	Physical capital	Financial maturity	Institutional effectiveness	Social and cultural character	Human capital	Environmental and natural hazards	Global appeal	Overall	
New York	54	92	100	85.8	95	76.5	66.7	35.7	71.4	1
Singapore	46	100	100	87.8	77.5	69.8	87.5	43.2	70	3
Taipei	41.9	90.2	50	77.5	61.7	66.1	58.3	24.8	56.6	37
Global	35.9	77.3	50	63.3	63.8	63.7	66.7	9	49.1	
Category weight	30.00%	10.00%	10.00%	15.00%	5.00%	15.00%	5.00%	10.00%	100%	

Source: Based on data from Economist Intelligence Unit, *Hot Spots – Benchmarking Global City Competitiveness* (London: Economist, 2012).

New Taipei City is a major city for business services and manufacturing activities, second only to Taipei City. It has over 250,000 privately owned companies and 20,000 factories, with a total capitalization of NTD 1.8 trillion (USD 56 billion). The high technology industry alone generates an annual revenue of NTD 4 trillion (USD 124 billion). High technology, services and tourism are some of the major industries in New Taipei City, attracting a large volume of workers with their abundant employment opportunities. As a result, 70 percent of the population of New Taipei City are from places outside the city.

Photo 14.2 Taipei 101 Tower



Credit: Min-Ming Chen.

14.2.3 Unemployment

Unemployment occurs when people are without work and actively seeking work and it is an indicator of a city's economic condition. In Taipei City and New Taipei City from 1995 to 2014, unemployment rates have been under 6 percent. In 1995, the unemployment rate stood at 2 percent. It grew to a peak of 5.2 percent in 2010, but has declined to below 4 percent since (Table 14.4).

Table 14.4 Unemployment Rate in the Taipei Metropolitan Area, 1995–2014

Year	Taipei City (%)	New Taipei City (%)	Taipei Metropolitan Area (%)
1995	2.1	1.9	1.99
2000	2.7	3	2.87
2005	3.9	4.1	4.02
2010	5.2	5.2	5.20
2014	4	3.9	3.94

Source: Taipei City Online Statistics Abstract; New Taipei City Online Statistics Abstract.

14.2.4 Household Income

Given the intermittence of official GDP data for local cities, household income is a good indicator of economic conditions in the Taipei Metropolitan Area. Average annual household income in Taipei City in 2013 was USD 49,852; in New Taipei, it was USD 38,390. The higher household income in Taipei City reflects the greater competitiveness of its industries.

However, neither city showed significant growth in household income in the past decade or so. Household income of Taipei City changed only 2.65 percent between 2001 and 2013; while in New Taipei City, it increased just 4.2 percent (Table 14.5). Household income for the Taipei Metropolitan Area increased 2.73 percent over the period. The slow growth seen in household income over the last decade is an issue for Chinese Taipei generally.

Table 14.5 Trends in Average Annual Household Income for the Taipei Metropolitan Area, 2001–2013

	Taipei City (USD)	New Taipei City (USD)	Taipei Metropolitan Area (USD)
2001	48,565	36,842	41,929
2005	48,841	38,628	42,947
2010	50,461	36,564	42,253
2013	49,852	38,390	43,074

Source: Taipei City Online Statistics Abstract; New Taipei City Online Statistics Abstract.

14.2.5 Key Industry Growth Sectors

The Taipei Metropolitan Area is a magnet for resources and capital domestically and internationally. It is the primary population centre and employment hub, as indicated by the employment location quotient (LQ) data for industry sectors shown in Table 14.6. (LQ is a measure of industry, employment or economic activity concentration in a region compared to a larger geographic area such as the state or nation.)

Table 14.6 Employment Location Quotient (LQ) for Industry Sectors, Taipei Metropolitan Area

Sector	New Taipei	Taipei City
Manufacturing	1.496	0.326
Construction	1.25	0.605
Wholesale and retail trade	0.952	1.071
Transportation and storage	1.331	1.093
Information and communications	1.07	2.708
Finance and insurance activities	0.813	2.537
Real estate	0.982	1.466
Professional, scientific and technical activities	1.035	2.097
Support services	0.879	1.077
Public administration and defence	0.85	1.626
Education	0.754	1.817
Human health and social work activities	0.597	1.391

Source: Taipei City Online Statistics Abstract; New Taipei City Online Statistics Abstract.

Taipei City is the key business centre of Chinese Taipei. It has high employment LQs for finance and insurance activities, information and communications, and professional, scientific and technical activities. Professional services, real estate, education, support services, public administration and defence, compulsory social security, and human health and social work activities are also significant. The low LQ figures for manufacturing and construction reflect the shift of investment in housing and new industries into New Taipei. Taipei City is experiencing some level of de-industrialization

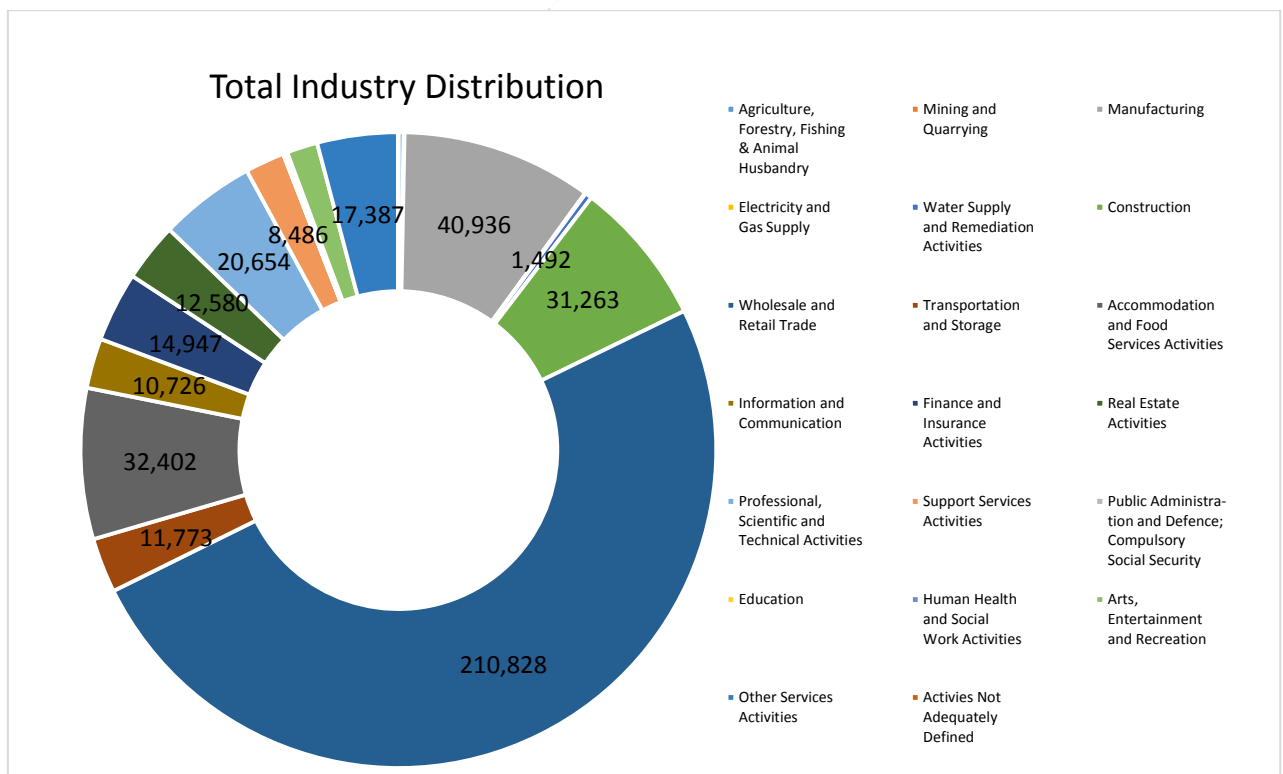
as the city's economy becomes more service-industry orientated, while New Taipei has seen significant industrial expansion as a result of increasing connectivity to Taipei city.

New Taipei has become the manufacturing centre of the Taipei Metropolitan Area. The relatively higher LQs for transportation and storage and for construction reflect the development of new housing and industries in the city. In the rural areas surrounding New Taipei City, the residential construction sector is important. Some small- and medium-sized technology and R&D-based industries are emerging; but by and large, these are commuter areas.

Figure 14.3 shows the number of businesses by industry sector for the Taipei Metropolitan Area. The largest sector is wholesale and retail trade, with more than 200,000 registered businesses. However, the LQ for this sector is around the national average. This is partly because there tends to be a more equitable distribution of employment and investment in the cities of Chinese Taipei, compared to economies such as the Philippines and Indonesia.

There are also more than 40,000 manufacturing companies in the region, most of which are in New Taipei City, in several important industrial parks. Accommodation and food services are also important, with more than 32,000 companies. Some of these are very important in supporting international business.

Figure 14.3 Distribution of Industries, Taipei Metropolitan Area



Sources: Taipei City Online Statistics Abstract; New Taipei City Online Statistics Abstract.

14.2.6 Labour Market

Table 14.7 shows employment in the primary, secondary and tertiary sectors in the Taipei Metropolitan Area. The tertiary sector is the major labour market, contributing to 71 percent of total employment in the Taipei Metropolitan Area. In New Taipei City, the tertiary sector workforce is 64 percent, while in Taipei City it is 81 percent. Only 0.4 percent of the workforce in the Taipei Metropolitan Area is engaged in the primary sector (agriculture, fishing, forestry).

Table 14.7 Employment by Sector, Taipei Metropolitan Area

Sector ¹	New Taipei City	Taipei City	Taipei Metropolitan Area
Primary industries	12,000 (0.6%)	2,000 (0.2%)	14,000 (0.4%)
Secondary industries	684,000 (35%)	238,000 (19%)	922,000 (29%)
Tertiary industries	1,232,000 (64%)	1,023,000 (81%)	2,255,000 (71%)
Total	1,928,000	1,263,000	3,191,000

Note 1: Based on the international Standard Industrial Classification (SIC) system.

Source: Taipei City Online Statistics Abstract; New Taipei City Online Statistics Abstract.

14.2.7 Innovation, Creativity and Entrepreneurship

Chinese Taipei is facing the challenge of sustaining its competitive advantage: localized transaction cost of production is rising due to ageing technologies; logistical issues are slowing down the efficiency of supply chains; construction costs are rising; and large-scale manufacturing operations can no longer rely on cheap wages. To regain their competitive position, companies must become more innovative, and place greater focus on knowledge-based industries.⁶⁸⁰ They would have to develop new areas of production where innovative design is the core element, whether in reducing costs or creating new markets. To achieve this, international collaborations would be key, and the R&D culture in Chinese Taipei would have to adapt accordingly.

The implications for the Taipei Metropolitan Area are clear. The future of its manufacturing industry would hinge on developing a culture of collaborative relationships between business and research institutions from different cities and economies. Such collaborations would be vital to strengthening creativity and design capabilities, and to promoting the adoption of effective business management methods. Better English language skills would be needed, since that is the primary language for commerce, publishing, and the sharing research and development ideas, data and information, especially over the Internet.

Greater emphasis would also need to be given to the cultural and creative industries, which encompass the development and inclusion of greater local and international culture, art, philosophies and traditions into the creation of a 'smart region'. These are priorities for the central and city governments, but it takes time and broad consensus to make changes. Nevertheless, the region must continue to look at ways to support endogenous growth through its creative industries if it is to build competitive service industry sectors and create a more sustainable basis for employment growth.

Given the ageing population, the region will also need to promote the development of robotics as a way of filling the skills and technology gaps it will need to ensure continued prosperity and rising wages and boost domestic consumption.

14.2.7.1 Developing Social and Cultural Capital

Some important initiatives have been implemented in the Taipei Metropolitan Area to enhance social and cultural capital and a more creative society. Two cultural and creative parks have been developed in Taipei City by the city government and private foundations: the Songshan Cultural and Creative Park, and the Huashan 1914 Creative Park. Both were originally industrial factories.

The Songshan Cultural and Creative Park was once the Songshan Tobacco Plant; it was designated a historic site by the Taipei City government in 2001. In 2011, the park was refurbished as a venue for diversified cultural and creative exhibitions and to restore its usefulness to the public. The park is now a premier site for the cultural and creative industries in Taipei City to display their achievements.

The Huashan 1914 Creative Park had its origins in 1914, and housed one of the island's largest wine producers throughout the 1920s. The site was abandoned many years ago, but in 2007 the Taiwan Cultural-Creative Development Co. Ltd assumed responsibility for the renovation and operation of the park⁶⁸¹. It now serves as Taipei's primary creative arts centre and hosts the most significant cultural activities.

New Taipei City has also been exploring and supporting ways to establish creative businesses. One example is Liuli Gongfang, a glassware workshop established in 1987.⁶⁸² The company started in small workshop located in Tamsui, New Taipei City with seven employees. They had to develop their production technology from scratch. Liuli Gongfang gradually introduced new production systems based on methods developed by its employees. It currently has more than 800 employees. The company has exhibited its products in Japan, the USA, the UK, Italy, Germany and South Africa. Several arts pieces have been acquired by leading international museums. The company has succeeded in building its own distinctive brand and continues to play a leading role in the development of modern Chinese glassware-making.

The three initiatives described above are examples of successful partnerships to advance industry innovation and cultural development. All three are directly or indirectly supported by city governments, but the facilities are operated privately with minimal government support. However, there is a need for more efforts to reach out to international partnerships to foster cultural exchange, innovation and creativity.

14.3 STRATEGIC INFRASTRUCTURE AND ASSETS

14.3.1 Transport Infrastructure

Transport is the key strategic infrastructure for the sustainability and prosperity of the Taipei Metropolitan Area. Two important transport infrastructure projects in the region which have been essential to maintaining the efficiency of the transport system and bolstering the economy and wellbeing are the MRT system and the Port of Taipei. The region's highways, rail and public bike systems have also been vital to inner city transportation and connecting the core city with surrounding satellite cities.

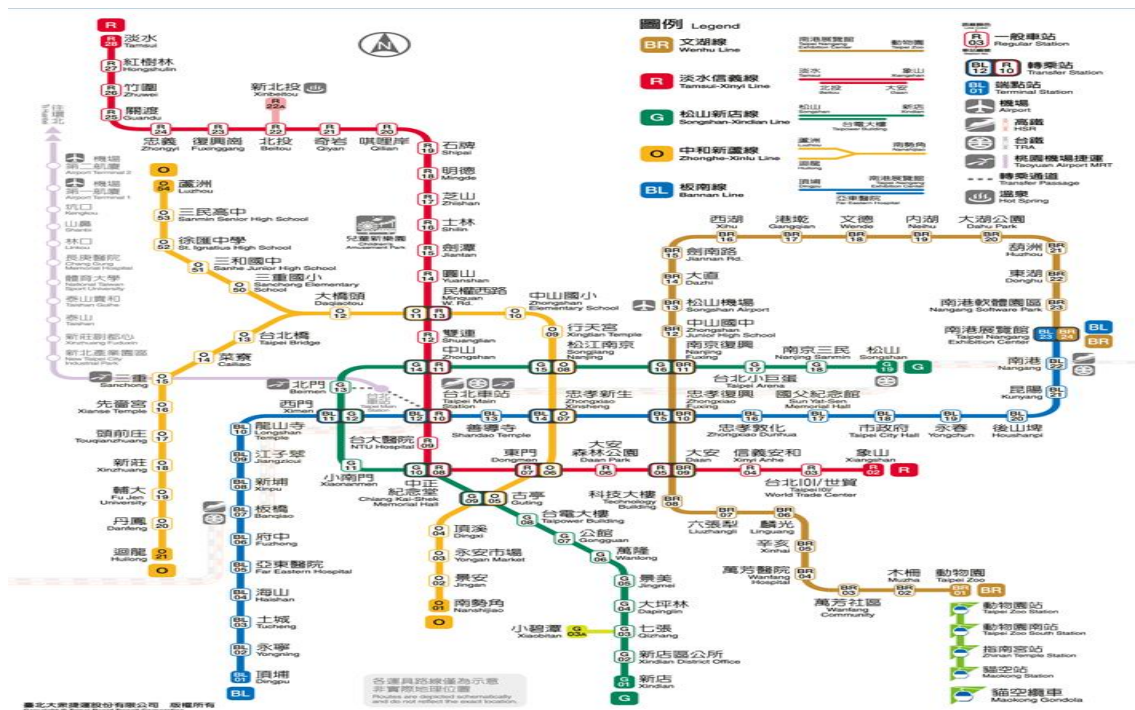
14.3.1.1 Mass Rapid Transit (MRT)

The Taipei Metropolitan Area is served by an MRT system, Chinese Taipei's first. The system was planned in the early 1990s, and began operations in 1996. The respective Departments of Rapid Transit Systems of the Taipei City government and the New Taipei City government are responsible for building it; while the Taipei Rapid Transit Corporation is responsible for operating it.

It covers 131.1km, and has 117 stations and 5 main routes. In 2015, the system carried an average of over 2 million passengers per day.⁶⁸³ Conversions have been made to existing railway lines to integrate them into the system, and more than 12 lines are still under construction and planning, including the Xinzhuang Line extension and the Circular Line. The Taoyuan Airport MRT has become operational as of March 2017, which further integrates the transport network of the Taipei Metropolitan Area.

The Taipei MRT system not only connects the cities of Taipei and New Taipei, it also serves the important function of providing improved connectivity to the international airport. By increasing the transportation options available to those commuting into and out of the city, it has helped ease traffic congestion. The greater ease of travel afforded by the system has also provided the impetus for urban renewal. Tourist traffic to outlying towns such as Tamsui has also increased.

Figure 14.4 Taipei Mass Rapid Transit (MRT) System, 2017



Source: Metro Taipei Mass Rapid Transit, Taipei Rapid Transit Corporation, Taipei City (2017)

14.3.1.2 Port of Taipei

The Port of Taipei, or Taipei Harbour, is Chinese Taipei's largest international port. Located in New Taipei City, it covers an area of 3,102 hectares. Work on the port began in 1993, and two terminals were completed in 2009. In 2011, a third terminal became operational. The port handled 1.26 million TEUs in 2014 and focuses on trans-oceanic shipping and international logistics services for the north of the island.

Besides the port extension project, the Taipei Harbour Special District Project⁶⁸⁴ is also underway to make the Port of Taipei an international commercial harbour. The plan is to develop the surrounding area into a recreational, transportation and entertainment complex.

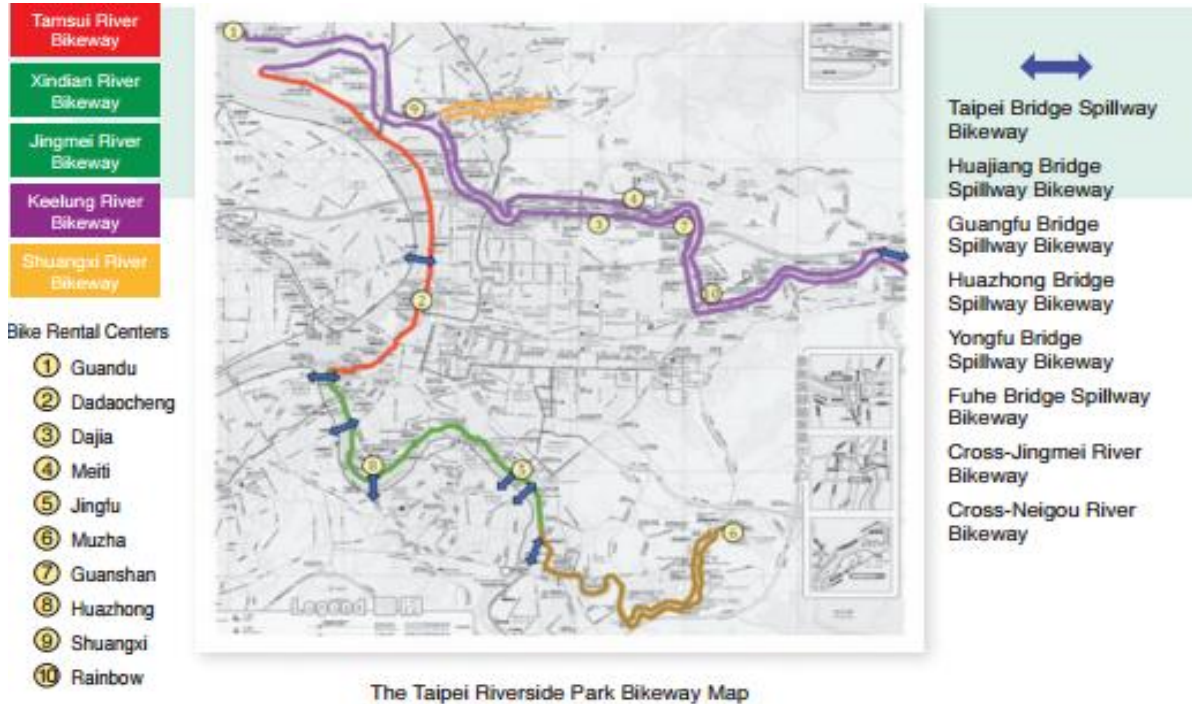
14.3.1.3 Public Bicycle Sharing System

YouBike⁶⁸⁵ is a public bicycle sharing service offered by the Taipei City Department of Transportation. It was implemented through a build-operate-transfer collaboration with local manufacturer, Giant Bicycles. YouBike changes the behaviour of commuters in the metropolitan area, as it brings the green transportation concept into their lives.

In 2009, 500 bicycles were available at 11 rental stations. The system now offers over 190 stations throughout Taipei City, New Taipei City, Taichung City and Changhua County, with over 6,000 bikes available for rent. The system is increasingly well received by the populace. Over 1.9 million people use it. In 2014, the system saw 22 million

rentals, twice that of the previous year. Figure 14.5 shows the extent of the Bikeway Parkway, which is undergoing further development.

Figure 14.5 Taipei Riverside Bike Parkway Map



Source: Taipei City Government, 'Activation of the Tamsui River', *Taipei Yearbook 2012* (Taipei: Taipei City Government, 2012).

14.3.1.4 Highways

Three major highways cross the Taipei Metropolitan Area: Freeway Nos. 1, 3 and 5. Freeway No. 1, also known as Sun Yat-sen, is the first highway in Chinese Taipei. This 372.9km highway begins in Keelung and ends in Kaohsiung. Freeway No. 3, also known as the Formosa Freeway, connects Keelung City to Linbian, Pingtung. It is 430.5km long, with 55 interchanges, 13 junctions, 11 toll stations and 7 service areas. Freeway No. 5 begins in Taipei City and ends in Su-ao, Yilan.

14.3.1.5 Railway System

There are two railway systems in the metropolitan area: a conventional railway system and a high-speed one. Most of the main lines in the conventional system are fully electrified and service is generally efficient and reliable. In 2011, it carried 563,915 passengers per day.

The other system, the Taiwan High-Speed Rail, runs approximately 339km along the west coast, from Taipei to the southern city of Kaohsiung. The line, which opened for service

on 5 January 2007, reaches almost 90 percent of Chinese Taipei's population. With trains running at a top speed of 300km/h, the journey from Taipei to Zuoying could be completed in as little as 96 minutes. Ridership has fallen short of forecasts but over 129,000 passengers per day were using the system in 2013. While the system has experienced significant financial difficulties, it is an essential piece of infrastructure that enables the whole island to be travelled in one day. It also expands the influence of the Taipei Metropolitan Area to other regions of the island.

14.3.7 Universities

The Taipei Metropolitan Area has the highest density of universities in Chinese Taipei. There are 46 universities in all. Taipei City has 25 universities, comprising 13 public universities and 12 private ones, including the National Taiwan University. New Taipei City has 3 public universities and 18 private ones. These universities play an important role in the city's human capital development and creativity. Local public universities receive substantial funding from the central government and usually provide better quality education than private universities.

14.3.8 Public Utilities

Public utilities take several different forms in the Taipei Metropolitan Area. Responsibility for construction management and maintenance ranges from local community-based groups to government monopolies. Taipei City and New Taipei City have cooperated to build most of the public utilities in the region, the first partnership between the two cities. This cooperation has been important in providing for the long-term planning and maintenance of the utility services.

14.3.8.1 Water Supply and Wastewater Treatment Facilities

There are two well-developed partnerships for water supply and wastewater treatment. Both facilities are physically located in New Taipei City, but administered by the Taipei City government:

- **Feitsui Reservoir⁶⁸⁶**. This concrete dam sited on the Beishi River in Shiding District in northern part of the island provides around 50 percent of the metropolitan regions water. The dam and catchment is managed by the Taipei Feitsui Reservoir Administration, under the Taipei City government. The Reservoir has a water storage capacity of 460 million cubic metres and an active capacity of 335.5 million cubic metres. The principal purpose of the reservoir is for water supply, with flood control and hydropower generation as secondary purposes. The main purchasers of water are the Taipei Water Department and the Taiwan Water Corporation.
- **The Bali Wastewater Treatment Plant⁶⁸⁷**. The plant was built in 1984, and is located in Bali District, New Taipei City. It is the biggest wastewater treatment plant and is managed by the Taipei City government. The capacity of the wastewater treatment plant is 3.3 million cubic metres. It services Taipei City, New Taipei City, and Keelung City.

14.3.8.2 Power Plants

Some may argue that nuclear is not a sustainable development option, but for an economy heavily reliant on energy imports, the two nuclear power plants in New Taipei City help to significantly reduce emissions levels. New Taipei City also has a hydropower plant.

The Jinshan Nuclear Power Plant is located in Shimen District, with a capacity of 1,208 MW. The Kuosheng Nuclear Power Plant is located in Wanli District and generates 1,896 MW. The Gueishan Hydro Power Plant is located in Wulai, with a capacity of 111 MW. These three power plants provide stable electricity service.

Since Taipei City has little rural land available for the development of utilities, it is highly reliant on New Taipei City for many of its utility services. It has therefore been important that the partnerships between the two cities and private service providers and managers have worked well. Without good levels of cooperation, there would have been risks to the quality of services provided to Taipei City, which would have had direct impacts on the performance and competitiveness of the Taipei Metropolitan Area as a whole.

14.4 PLANNING, ENVIRONMENTAL AND URBAN GOVERNANCE SYSTEMS

The early planning and governance systems of Chinese Taipei were shaped by the Japanese imperial system of government. After 1949, the island adopted a more western system of planning and governance to support the modernization of the economy. By the early 1990s, the Taipei Metropolitan Area was one of the most heavily built-up industrial cities in East Asia.⁶⁸⁸ However, this period of development was one in which an enormous gap developed between planning and implementation.

The issues related to urban planning, development and governance of Chinese Taipei and the cities of the Taipei Metropolitan Area over the past half century have been extensively documented.^{689,690} Environmental and economic structural changes from a manufacturing to a more service driven economy have also proved challenging. The speed of industrialization and urbanization left central and local governments ill-equipped to regulate and control much of the growth.⁶⁹¹ The city developed severe shortages of infrastructure; there was unplanned urban sprawl; open spaces and parkland were taken over by new industries; and serious environmental and congestion problems began to arise.⁶⁹²

Community disquiet in the late 1980s over the state of the environment, the loss of amenities and the need for democratic reforms led to significant changes and the modernization of the urban planning, governance and development systems. A more engaging and inclusive planning system was progressively introduced, one focused on what was required to promote sustainable economic growth, and a more liveable city.⁶⁹³ During the late 1990s, urban neighbourhoods underwent spectacular modernization and transformation,⁶⁹⁴ and programmes to improve the state of the urban environment and transportation systems began.

Intergovernmental relationships are important, as the central government controls most of the resources; and since 2000, centralization of control over resources has increased, which has affected the levels of autonomy and control cities and regions have over development.^{695, 696}

Such governance problems gain greater importance when weighed against the new demands on cities. Post-industrial cities face qualitative issues centred on urban restructuring and competition, democracy in urban governance, and the new urbanism of community empowerment, environmental sustainability and cultural conservation. In response to these new institutional requirements, it has been suggested by Bristow that Chinese Taipei's administrators 'need to take a more holistic planning approach that emphasizes the necessity of strategic planning and urban restructuring and development and integrates the process towards new goals of environmental sustainability, economic competitiveness and social equity'.⁶⁹⁷

Building a partnership network for future metropolitan governance is important to the sustainability of Taipei's development. There is need for improved integration among the governments that make up the Taipei Metropolitan Area. Better vertical integration is needed in passing policy from the central government to the local government, especially when there are party political differences. Also, within Taipei City alone, there are 33 bureaus which need to be streamlined to facilitate communication and sharing of responsibilities. Improving horizontal integration, and collaborative governance, between these many agencies and the city government would be essential. Regulations relating to climate change or sustainable development policies also need to be updated.

14.5 SUSTAINABLE DEVELOPMENT INITIATIVES

In response to growing concern by residents and business on the need for better planning, governance, environmental management and economic initiatives to foster the development of the region, the central and Taipei Metropolitan Area governments have promoted initiatives involving different types of partnership. Some of these are described briefly as follows.

14.5.1 Northern Taiwan Development Commission

Driven by globalization and an awareness of the need to reduce business and government transaction costs to attract business and enhance the performance of the domestic economy as a whole, Taipei City and New Taipei City have joined with other six counties and cities in the north to promote regional cooperation, regional resource integration, inter-regional spatial function improvement and the effective use of resources.

The growing level of regional cooperation includes the Taipei International Co-workshops by Universities/NGOs Grant Programme to foster international exchange and cooperation on urban planning and urban design. The purpose is to introduce multidimensional and innovative ideas and encourage creative teams to utilize unoccupied property.

The Northern Taiwan Development Commission is the first inter-regional cooperation platform. Since its inception in 2004, the commission has reached a consensus to promote general regional development. Each of the eight counties and cities in the north serves as host county/city in turn. The members of commission are Taipei City, New Taipei City, Taoyuan City, Hsinchu City, Hsin Chu County, Maolin County, Yilan County and Keelung City.

The commission seeks to address eight important development issues: recreation, transportation, industrial development, environmental resources, disaster prevention and safety, culture and education, health and welfare, and aboriginal and new immigrants. Each city or county will take responsibility for one of these issues (Figure 14.6). The commission is currently focusing on the industrial development, health and welfare sectors.

Cross-Boundary Cooperation

The commission was created to break barriers created by administrative boundaries, and emphasize strategic and cross-boundary collaboration among members. It aims to promote effective utilization of diverse resources to increase overall international competitiveness and synergies built on joint regional development. The commission is similar to the Core Cities Network developed in New Zealand (see chapter 2) and the United Kingdom, which collaborate on sharing resources to reduce the cost of providing services to business. Taipei and New Taipei, as the largest cities, play an important role in fostering greater collaboration between cities.

Cross-boundary cooperation under the commission includes horizontal and vertical integration of activities. Horizontal cooperation involves improving the working relationship between central and local governments, with communication platforms to address issues using bottom-up and top-down approaches. Vertical cooperation involves cooperation between and across bureaus, the private sector, academic institutes, non-governmental and non-profit organizations, as well as young students.

Flagship Projects

New Taipei City is leading other regions to create innovative and competitive economic and industrial environments to enhance regional economic development. Under the flagship programmes, local governments seek to promote demonstration zone projects and policies under partnership arrangements. Each partner city considers its own industrial development orientation, as well as its resource characteristics, and planning or local characteristics; and share this knowledge to create new high value-added industrial innovation. The flagship projects support sustainable economic growth and development, as well as better environmental outcomes and cleaner production methods.

There are eight flagship projects, four of which are in the cities of Taipei and New Taipei:

1. Flagship Project 1: Promoting Competitive Advantage in the Global Economy

- (i) Building an industrial alliance and cooperation platform
- (ii) Encouraging local industrial linkages and value-added integration.

2. Flagship Project 2: Low Carbon and Green Energy Environment

- (i) Planning and constructing a living carbon footprint record and management mechanism
- (ii) Conducting a carbon consumption and information system to help every city to set up their carbon reduction policies
- (iii) Promoting green energy resources, and green environmental planning.

3. Flagship Project 3: Building a Smart Technology City

- (i) Conducting an online (live) digital public service system
- (ii) Building a cross-boundary control and response system, such as a flood warning system
- (iii) Organizing a smart city alliance and platform to exchange experience

4. Flagship Project 4: Green Transportation System

- (i) Planning and constructing green public transportation (MRT and light rail transit systems)
- (ii) Promoting a car-pool system
- (iii) Conducting and promoting the YouBike and E-Bike systems.

These projects involve significant integration and cooperation to ensure quality of service inputs and outputs to production processes. The two cities are working together to integrate two public bike systems into one. Citizens can easily rent a public bike and return it anywhere in the two cities. The MRT is operated by one company even though it travels across city boundaries. The free economic zone is in New Taipei City, but most of the companies and industries come from Taipei City.

14.5.2 Taipei Clean Air Initiative

The Clean Air Initiative launched in 2005 is a partnership programme to encourage air quality protection in cities across the Asia-Pacific region.⁶⁹⁸ Its main focus is to reduce air pollution from motor vehicles.

Taipei City has 1.8 million registered motorcars and 1 million registered motorcycles, one of the highest vehicle density rates in Asia. Also, about 250,000 vehicles travel into

Taipei City every day. These vehicles are responsible for 57 percent of the air pollutants and 33 percent of the greenhouse gas emissions in the city.⁶⁹⁹

By the early 2000s, air pollution had become such a serious environmental and health hazard that city authorities took steps to address the issue. Emissions from diesel vehicles were measured and efforts made to control emissions from those vehicles. By 2014, the programme had resulted in a reduction of 104.7 tons of PM2.5 emissions per year.⁷⁰⁰

The YouBike project (discussed in Section 14.3.1.3) was launched in 2009 to achieve a modal shift from motor vehicles and motorbikes by offering a bicycle sharing option for commuters. Extensive consultations were conducted with business and the community over the introduction of the project, and to educate drivers and motorcyclists on the environmental and health benefits.

Improvements in public transportation systems also served to increase use and thereby improve air quality. In 2013, the daily traffic volume of the Taipei Metro and bus system exceeded 3.3 million, having grown 22.4 percent from 2003.⁷⁰¹ In 2014, Taipei received the Siemens C40 award for its clean air initiative.⁷⁰²

14.5 Corporate Green Competitiveness Alliance

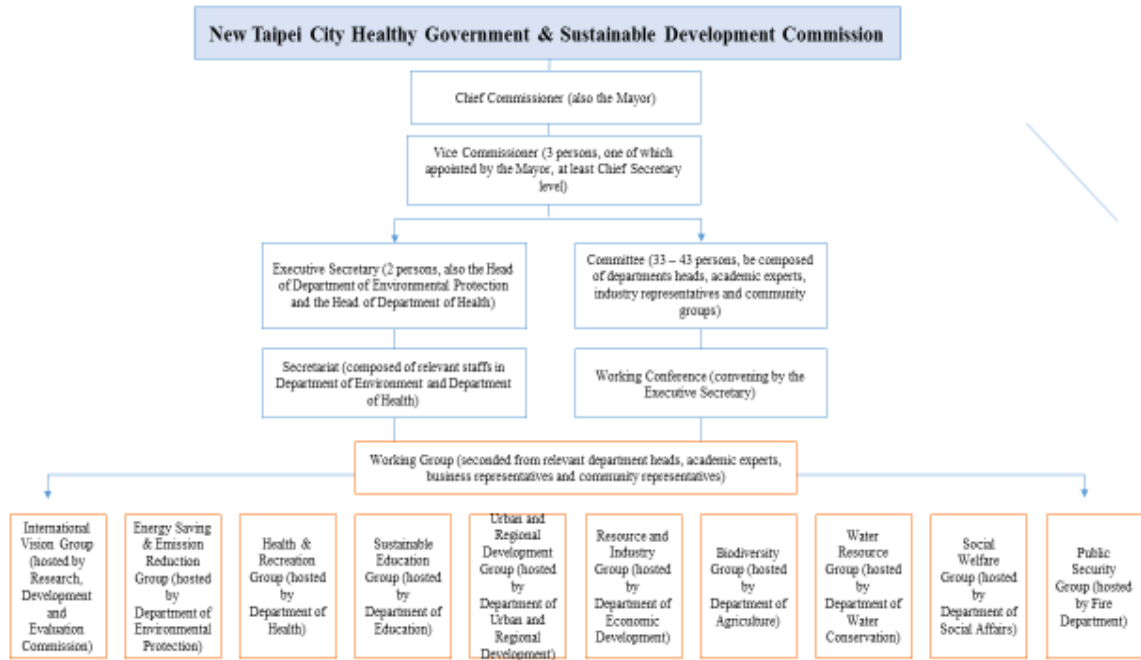
In 2010, the Taipei Computer Association worked with members of domestic information and communications technology (ICT) industry to create the Corporate Green Competitiveness Alliance. The aim was to help members of the industry address global environmental guidelines and create green value, as well as collaborate on sustainable industrial development recommendations and policy. Acer has played a key role as convener of the brand group, promoting exchanges of green information and technical specifications in the ICT industry. The alliance includes original design manufacturers (ODMs) and original equipment manufacturers (OEMs), brand enterprises and consultancy firms, and through this, a multiparty communication platform.

Through its collaborations with industry and government, the alliance has been able to provide brand enterprises with a greater understanding of the capacities of ODM/OEM firms, and of the relevant product standards. The alliance also plays a key role in providing government with information on the needs of brand enterprises and ODM/OEM firms, which could help spur industry growth. In 2014, the alliance began collecting advice from industry regarding recycling and energy labelling regulation.⁷⁰³ This is one of many initiatives in Taipei, whereby industries are entering into partnerships and collaborating on sustainability initiatives to reduce industry transaction costs and reduce waste in industry manufacturing processes.

14.5.4 New Taipei City Sustainable Development Commission

New Taipei City established a Sustainable Development Commission in 2007.⁷⁰⁴ Its mission is to promote a Healthy City and Sustainable Development. Its activities cover 10 sectors (see Table 14.8 for the department in charge of each sector, and the sector missions). Each sector invites professionals from academia, private business and third parties to participate in the discussion. The Chairperson of the commission is the City Mayor (see Figure 14.6 for the organizational structure of the commission).

Figure 14.6 Organizational Structure of the New Taipei City Sustainable Development Commission



Source: National Council for Sustainable Development (NCSO); New Taipei City Sustainable Development Commission, New Taipei Environmental Protection Department, 2014, accessed 1 September 2015, <http://www.epd.ntpc.gov.tw/en/>

Table 14.8 Sector Missions of the New Taipei City Sustainable Development Commission

Sector	Department in Charge	Mission/goal
Carbon reduction and energy saving	Research, Development, and Evaluation Commission	Green economy Low carbon ecological city Lifestyles of Health and Sustainability (LOHAS)environment
Health and LOHAS	Public Health Department	Healthy and safe society
Resources and industrial development	Economic Development Department	Green economy
Bio-diversity	Agriculture Department	Low carbon ecological city
Water resource	Water Resource Department	LOHAS environment
Social welfare	Social Affairs Department	Healthy and safe society Low carbon ecological city
Public safety	Fire Department	Healthy and safe society
Sustainable education	Education Department	Low carbon ecological city
Urban and rural development	Urban and Rural Development Department	LOHAS environment

Source: New Taipei City Sustainable Development Commission, New Taipei Environmental Protection Department, 2014, accessed 1 September 2015, <http://www.epd.ntpc.gov.tw/en/>

14.5.4.1 Benefits of Sustainable Development in New Taipei City

The New Taipei City Sustainable Development Commission has achieved many positive outcomes through its partnership with universities, industry and other parties. The most significant of these are:

A More Liveable City: With assistance from local businesses, the city government built social housing for the younger generation using the build-operate-transfer system. As of 2016, more than 1,000 units have been completed to be rented to young citizens.⁷⁰⁵ A total of 7,000 units are due for completion by 2019. The city government also recruited community planners to build a green low carbon community, and help businesses find ways to reduce energy consumption. Schools are helping to improve ecological environments. The Noah Education Project (bio-diversity campus),⁷⁰⁶ for example, which involves 15 schools, have rehabilitated 100 damaged or neglected eco-areas. Fifty-eight schools have student environmental organizations, which help to reduce carbon by 360 tons per year. The project also provides employment opportunities, and improved walking and living environments for the community.

Improved Management of Tamsui River: Tamsui River is the most important river running through the Taipei Basin. However, flooding risk remains high as coordination among governmental agencies over catchment management is insufficient. Taipei is highly vulnerable to flooding, and the risks are not distributed equally among the population.⁷⁰⁷ Under pressure from the community to prevent flooding and to clean up and restore the water quality of the river, the government has engaged with the community, interest groups and other cities, including Singapore and the Gold Coast in Australia, to develop a more collaborative approach to river catchment management and redevelopment to promote recreation and tourism opportunities.

New Taipei City works with Taipei City under a whole watershed management concept to: (i) increase flooding protection capacity to 200-year flood levels, which will protect more the 650 million people; (ii) improve the water quality by constructing a new wastewater treatment plant in Taipei City; and (iii) redesign riverbank parks using ecological engineering approaches, to provide citizens with more opportunities to reach the water body, and also allow the community to help patrol the river to identify problems in the first instance.⁷⁰⁸ To have better flooding control management, the city is also improving the previous surface in the built environment to reduce the surface runoff.

The Taipei Yearbook 2012 notes that cleaning up and reviving the Tamsui River, which has been polluted for many years, has not been easy. There are many underlying challenges, including land acquisition, political factors and the need for change in attitudes (and behaviour) toward using the river as a cesspit. The considerable efforts still being made by the city government, and the contributions from all sectors, have depended on the supervision and participation of the public. Only through partnerships with the community can the aim of ultimately revitalizing the Tamsui River and creating a wonderful place to visit and enjoy be achieved. It will take some time, but the goal of emulating the river clean-up in Singapore and other great river cities of the world is looking increasingly more realistic.

Bio-Diversity Plan: There are four main aspects to improving the bio-diversity in New Taipei City: life, live, producing and ecology. ‘Life’ refers to the protection of the native species and the prevention of intrusive species. ‘Live’ is about enhancing biodiversity, education and training, and encouraging citizen participation. ‘Producing’ is using environmentally friendly approaches to producing agricultural products. ‘Ecology’ is about protecting the ecological habitat. Currently many private enterprises are involved in these projects and in working with communities.

14.7 METROPOLITAN PARTNERSHIPS

Taipei City and New Taipei City have their own independent plans for making a better, more liveable and sustainable city. However, the cities have many issues in common, and cooperating on these are important in ensuring success. Three kinds of metropolitan partnerships exist: city-to-city partnerships; private industry developments; and partnerships involving non-governmental or non-profit organizations. These are discussed below.

14.7.1 City-to-City Partnerships

Taipei City and New Taipei City are geographically connected, and they share the same water and natural resources in the same basin area. There are four important partnerships between the cities of the Taipei Metropolitan Area.

Public Transportation: Taipei City and New Taipei City are geographically connected and economically reliant on each other. Thousands of commuters travel daily between the two cities by public transport, such as bus, MRT and train. Taipei City and New Taipei City work together to plan future metropolitan development and planning of the MRT system, which covers the whole Taipei Metropolitan Area. The MRT system is run by the Taipei Metro under Taipei City government supervision.

As discussed in earlier sections, Taipei City's YouBike and New Taipei City's NewBike have been merged into one system, allowing bicycles to be hired and returned anywhere in the metropolitan area. At the end of 2015, a public electronic motorbike service (E-Bike) was introduced. It replicates the YouBike concept and serves the whole Taipei Metropolitan Area.

The success of public transportation connections, including the bus system, is due not only to the physical structure, but also to the software management which underpins it. An 'easy card' e-payment system connects all the different transportation ticket systems. The Easy Card Company is run by the Taipei City government. Easy card is the first and the biggest e-payment system in Chinese Taipei. Originally, it was designed for the MRT system, but subsequently was expanded to include bus, train travel and small purchases from convenience and grocery stores. The convenience of the easy card system is key to the success of the green public transportation system; it helps to reduce carbon emissions directly and indirectly.

Water resources management: Three hundred years ago Taipei City was a lake (Taipei Lake), with most of the current city area under water. Many ground surface areas are, therefore, unstable. Excessive drawdown of the water table has left many parts of the city sinking. The Taipei City government has now restricted all groundwater usage. With help from the central government and New Taipei City, the issues of water access and subsidence prevention are being addressed. The Feisui Reservoir, located in New Taipei City, provides clean water to Taipei City. The majority of water consumption is by the citizens of Taipei City; however, if the need arises the Taipei Running Water Company will also provide clean drinking water to New Taipei City. The New Taipei City government also helps the Taipei City government to control the upstream land use management of the watershed.

Taipei City is located on the east side of Tamsui River while New Taipei City is on the west side. Both cities have a responsibility to maintain good water quality and manage flood risks. They work together on different platforms, such as Northern Taiwan Development Commission, to achieve best practices in water resource management.

Spatial Planning Strategy: Through the platform of the Northern Taiwan Development Commission, the cities of Taipei and New Taipei exchange spatial development experiences to create a better strategic plan. Spatial planning is no longer determined by

city boundaries, but a watershed. This also applies to the transportation network, which uses a Transport Orientated Development (TOD) concept to allocate resources. For example, the Tamhai New Town project in New Taipei City was built using the TOD concept and provides new, affordable residential areas for those who work in Taipei City. With the MRT and light rail transit network, people can reach the Taipei Main Railroad Station (in the heart of Taipei City) in 50 minutes. The partnership cooperation and new watershed management concept has enhanced the spatial planning of the Taipei Metropolitan Area.

Citywide Emergency Response System: Taipei City and New Taipei City also work together on the emergency response system, including their fire and police departments. For example, in 2012, one of the water gates in Taipei City malfunctioned causing major flooding.⁷⁰⁹ New Taipei City immediately sent water pump equipment to Taipei City to help.

14.7.2 Private Enterprise Developments

The governments of the cities of Taipei and New Taipei not only work together as partners; they also work with private enterprises. For example, the YouBike system is provided by the Giant Bicycles, the biggest bike manufacturer in Chinese Taipei. The ICT industry provides the knowledge and technology to build the smart city system. The telecommunications company helps to build the optical fibre environment.

Private companies not only provide professional support, they also set up foundations for ecological restoration. For example, many IT companies invest in farmland to practise organic farming. They also participate in environmental protection or conservation activities in the weekends, such as cleaning rivers and hiking trails. Businesses have adopted socially responsible approaches to environmental sustainability.

14.7.3 Partnerships with Non-Governmental and Non-Profit Organizations

Non-governmental and non-profit organizations play a very important role in emergency response in Chinese Taipei. Many religion-based charitable organizations, such as the Tzu Chi Foundation, show great leadership during a disaster. Because of their strong connections with the community, they can reach disaster sites quickly, and provide appropriate assistance. Such organizations also focus on environmental education activities. The Tzu Chi Foundation has the biggest recycling system in the nation. They go into the elementary schools to spread the concept of sustainable development and enlist volunteers. Such organizations play a key role in sustainable development, and empower communities to improve.

The Northern Taiwan Development Commission platform provides opportunities for collaborations with non-governmental and non-profit organizations, especially community-based organizations. Such partnerships could help governments to better understand local communities and provide improved support directly to local communities. Communities also benefit from the organizations' ability to respond quickly to emergencies, which in turn reduce response costs.

14.8 CONCLUSIONS

The Taipei Metropolitan Area dominates the Chinese Taipei economy. In 2014, the Global Liveable Cities index ranked it 27th among 64 cities as the most liveable city in the world, or 7th most liveable city in Asia.⁷¹⁰ However, the region is experiencing significant growth management problems along with structural change issues as it transitions from a manufacturing export growth economy to a more services-driven economy. The need to innovate, an ageing population and the need for integrated urban planning and regulatory reforms are having an impact on the region's competitiveness. Air and water pollution, loss of natural habitat, congestion and waste management are issues which need to be addressed to facilitate a balance between development and environmental preservation.

Over the past 10 years or so, there have been growing concerns about the sustainability of development in the Taipei Metropolitan Area. Significant efforts have been made by government, business and communities to make Taipei City and New Taipei City more sustainable. The initiative by the New Taipei City Sustainable Development Commission to improve the management of Tamsui River and its YouBike and bikeway systems are important initiatives that are helping to make the development of the metropolitan region more sustainable. The two Taipei's are moving toward a more sustainable model of development, but there is still a long way to go.

Crucial to improving the sustainability of development in the metropolitan region is the presence of responsible government that is moving toward the important reforms necessary to cope with the economic, social, technological and environmental changes. This call for fresh ideas, concepts and approaches to the management and development of the city involving the development of a wide range of partnerships and other collaborative governance and business initiatives.

The region also needs to focus more on endogenous local economic development opportunities and on fostering innovation and creativity. Better systems, and collaborative and critical thinking are needed to understand the interaction and relationship between bureaus searching for co-benefits and trade-offs to reduce current inefficiencies. The city is facing uncertainty and must learn to accommodate the new trend of disruptive technology change.

Greater cross-jurisdiction cooperation is needed across all levels of government, such as on watershed management, emergency rescue and water resources with New Taipei City and Keelung City. The participation of non-governmental and non-profit organizations is also necessary to engage the community in the decision-making process and the management of the city. This requires the support from government and the private sector, and citizens of the city need to be educated to understand the urgency of these changes.

Despite these difficulties, the cities of Taipei and New Taipei are beginning to reach out to other cities in the region to develop partnerships to improve environmental management, improve government and regulatory systems, and adopt smart industry and city ideas. From these exchanges, it is hoped that new partnerships will develop that will enable the metropolitan region to diversify, adapt and develop a more collaborative and engaging model of economic development, and through that, bring about a more

inclusive, prosperous and creative society that is able to embrace the challenges it faces as a small island economy in the APEC region.