



# Resilient Cities



## *Foreword*

The concept of resilience was originally defined in physics and psychology, and successively applied to environmental science and social and ecological systems. Through various approaches, this concept has been used in reference to regions hit by natural disasters and climate change, and, more recently, to cities facing a range of shocks and stresses, such as the global financial crisis, changes in industrial structure, demographic pressure and natural disasters.

This report assesses cities in terms of how they are able to absorb, adapt, transform and prepare for future shocks and stresses in order to promote sustainable development, well-being and inclusive growth. This report responds to the call for a better understanding of the circumstances, institutional settings and policy drivers for resilience following the 2014 meeting of the OECD Council at Ministerial Level. On that occasion, ministers discussed how to achieve “resilient economies and inclusive societies” to generate jobs and growth, empower citizens and promote their well-being.

This report discusses cities’ resilience from economic, social, environmental and institutional perspectives. Ten case studies, including Antalya (Turkey), Belo Horizonte (Brazil), Bursa (Turkey), Cardiff (United Kingdom), Kobe (Japan), Kyoto (Japan), Lisbon (Portugal), Oslo (Norway), Ottawa (Canada) and Tampere (Finland) provide important examples of how cities can promote innovative policy actions to enhance their resilience.

Enhancing resilience requires a new way of designing and delivering policies, because they are policies for changing circumstances. Collaborating with all stakeholders, in particular citizens and the private sector, is indispensable for navigating current and future challenges. Cities should work together with national and regional governments, as their success is mutually dependent. Investing in areas such as industrial diversification, innovation, infrastructure, compact urban forms, community network development and public sector capacities will help ensure that a city can better respond to and rebound from challenges, crises and shocks.

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## Executive summary

- As urban areas and populations continue to grow, so will the potential human and economic losses associated with the shocks and stresses that confront these areas. In recent years, many cities have experienced the effects of industrial structural change (i.e., deindustrialisation), economic crises (e.g., the global financial crisis in 2007-08, the European debt crisis since 2009), and natural disasters (i.e. earthquakes, floods, hurricanes), including the attendant disruptions in energy supply.
- Resilient cities are characterised by adaptive capacity, robustness, redundancy, flexibility, resourcefulness, inclusiveness and integration. Resilience is enhanced by four interrelated types of drivers: economic (industry is diversified, innovation takes place, workforce has diverse skills, and infrastructure supports economic activities), social (society is inclusive and cohesive, citizen networks are active, people have access to opportunities), environmental (urban development is sustainable, infrastructure is adequate and reliable, and natural resources are available) and institutional (leadership and long-term vision are clear, the public sector has adequate resources, collaboration with other levels of governments takes place, government is open, and citizens participate).
- One finds different degrees of resilience across cities. Policy makers need to gauge their cities' resilience, identify gaps and propose measures to fill these gaps. This makes resilience-building a cross-sectoral, multi-dimensional effort, requiring effective co-ordination among diverse interests and groups.
- Enhancing resilience requires a change of mind-set among citizens and all stakeholders. “Resilience-thinking” means mainstreaming resilience in all policy areas, and therefore depends on strong leadership. Investing in areas such as industrial diversification, innovation, infrastructure, compact urban forms, community network development and capacities for public sector will help ensure that a city can better respond to and rebound from challenges, crises and shocks.
- In addition to initiatives by individual cities, the role of national government is also important for building resilience. Most national policy frameworks for resilience stress the responsibility of the local governments as well as promote co-operation and the sharing of best practise across all levels of government. Sufficient financial, regulatory, and institutional assistance from the national level are crucial for the cities to further develop their resilience.

### Key lessons from the case studies

- Learning from past experience is the key to improving cities' adaptive capacities. Examples of this include encouraging innovation, such as in Tampere and Kobe, and promoting compact city policies, such as in Toyama and Cardiff.
- Diversifying the industrial mix, such as in Antalya and Oslo, is essential for making cities robust enough to absorb shocks. Within the 95 OECD predominantly urban regions, 16 of them have a well-diversified industrial structure, while the remainder are moderately or highly dependent on specific activities. Nonetheless, the degree of diversification increased across the OECD between 2000 and 2012.
- Having access to multiple sources of service – or redundancy - gives cities extra flexibility and margin for manoeuvre when faced with a disruptive event or extreme pressure. Investing in extra capacity for infrastructure in the case of emergencies and strategic land use, as seen in the case of Kobe, can be effective policy options.
- A well-designed long-term vision, such as those in Ottawa and Kyoto allows individuals, households, businesses, communities and government to respond to rapid change in the scope of their plans. Encouraging entrepreneurship and innovation, such as in Oslo, also makes it easier for cities to adjust to changing circumstances.
- Establishing a designated unit responsible for resilience within the city administration, such as in New York, and granting cities autonomy in tax matters, such as in Yokohama, can make cities more resourceful and able to restore the functionality of essential services and systems in a crisis situation or under difficult conditions.
- Ensuring that diverse stakeholders are consulted, engaged and empowered makes cities inclusive and improves the quality of policies. Citizen networks, such as those found in Belo Horizonte, may be one of the most important ways to help ensure resilience. Stakeholder engagement (e.g. in Lisbon) and social policies to improve the access of minority groups to employment (e.g., in Antalya) contribute to strengthening social cohesion and inclusiveness.
- Working closely with the national government and regional development agencies, such as in Bursa, and forming an alliance with surrounding municipalities to address economic, social and environmental challenges common to the region, such as in Ottawa, can help improve policy co-ordination and enable the cities to develop an integrated approach to ensure coherent decisions and effective investment. Universities can form the core of an alliance among municipalities, local industry and citizens, such as in Kyoto.

## *Chapter 1.*

### **Framework for resilient cities**

*The shocks and stresses that cities experience, as well as the consequences of those shocks, vary widely. This chapter proposes a framework for resilience, which involves the ability of cities to absorb, adapt, transform and prepare for past and future shocks and stresses. The economic, social, environmental and institutional drivers of resilience can help cities become more adaptive, robust, redundant, flexible, resourceful, inclusive and integrated.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

## Introduction

Cities are complex systems, weaving together thousands of economic, social, institutional and environmental threads that powerfully affect individual and society's well-being. Across OECD countries, metropolitan areas<sup>1</sup> cover only 4% of the land, but account for roughly half of the population and close to 55% of gross domestic product (GDP; OECD, 2015a). The world's population is also driven by the growth of urban population, from less than 1 billion in 1950 to roughly 6 billion in 2050 (UN DESA, 2014).

As urban areas and the urban population continue to grow, so will the scale and impact of shocks and stresses upon them. These stresses include industrial structural change (e.g. relocation or closure of a city's key firms); economic crisis (for example, the global financial crisis of 2007/08 and the European debt crisis since 2009); population inflow/outflow; disasters (i.e. earthquakes, floods and hurricanes); disruption of the energy supply; and leadership change. Large urban systems are particularly vulnerable to foreseen and unforeseen threats, and any sort of shock to complex systems such as these will have significant economic, social, environmental and institutional repercussions. This report discusses cities' resilience to such shocks and stresses, drawing on a growing body of discussion on the topic by various institutions.

Resilience involves the ability to **absorb, adapt, transform** and **prepare** for the past and future impacts of economic, environmental, social and institutional shocks and stresses (OECD, 2014q). This report focuses on how cities can respond to these shocks and stresses, promoting economic growth and enhancing citizens' well-being. **Four drivers** can help to enhance this process. The first is **economic**: requiring that industry be diversified and that there is room for innovation. The second is **social**: ensuring that society is inclusive and cohesive, citizen networks are active and people have access to opportunity. The third is **environmental**: if urban development is sustainable; adequate and reliable infrastructure is available; and adequate natural resources are available. Lastly, **institutional drivers** require clear leadership and long-term vision; that the public sector has proper resources; that collaboration with other levels of government can occur; that government is open and citizens can participate. This report suggests a number of practical policy measures and good practices to assist cities to define their ultimate goals and to plan accordingly.

No single policy response can address such shocks and pressures. Building resilience demands a cross-sectoral, multidimensional effort and the co-ordination of diverse interests and groups. It also requires a systematic approach. For example, addressing the issues of social inequality is one major lever for building resilience. This requires inputs from diverse policy sectors, ranging from labour, economy and housing to health, education and social services. Resilience needs to be considered at a broader scale, for example, at the level of what the OECD identifies as metropolitan areas, defined as "functional urban areas".

## What makes cities resilient?

### *Shocks and stresses for cities*

As cities grow, they can become more exposed to shocks and stresses. This report focuses on the shocks and stresses that can have an impact on the urban economy, society, the environment and institutions. It is important to note that certain shocks do not necessarily always have a negative impact. Some bring additional resources, for example,

new investment plans. Moreover, they can provide an opportunity to reconsider the economic, social, environmental and institutional structure of a city. For example, they may offer a chance to renew regional economies by introducing new goods or services or the use of new technologies to produce such goods and services (Desmet and Rossi-Hansberg, 2009). Some shocks may take the form of an unforeseen event on a single day, such as a natural disaster. Recent scientific progress may sometimes make it possible to predict certain disasters in advance, but they tend to occur as an unforeseeable event. Some shocks, such as industrial structural change, happen gradually and imperceptibly, and are then recognised as a major event when the process reaches a critical level. This section discusses the type of shocks and stresses that are the main focus of this project. The list is not exhaustive, given the diverse challenges cities face, but these shocks and chronic pressures have significant implications for local communities.

Change in the **industrial structure** of a city's core companies affects employment in that specific industry and in related industries working closely with it. Examples include the withdrawal of Nokia's research institute from Tampere (Finland), the decline of the automobile industry in Detroit (United States) and the closure of coal mining towns. Cities in logistics hubs are also exposed to industrial restructuring in other cities, as in the case, for example, of the coal-exporting port of Cardiff (United Kingdom). Decline in port functions because of international/domestic competition may have repercussions on ports or hinterland cities, such as Liverpool (United Kingdom), Copenhagen (Denmark), Naples (Italy) and New Orleans (United States) (OECD, 2014).

**New investment strategies** can have positive and negative effects on cities. For example, mega-events such as the Olympic Games can have both positive and negative impacts on a given city and its surroundings (Cashman, 2002).

**International and national economic crises**, such as financial crises, sovereign debt crises, currency crises and banking crises, have a global impact. However, the responses of given cities will differ, and their resilience will be determined by individual characteristics, including the structure of their economy (OECD, 2013g; United Cities and Local Governments, 2009; CEMR, n.d.; Martin, 2011; URBACT, 2010) and their economic situation before the onset of the crisis (OECD, 2013g; Martin, 2011). The degree of urbanisation (OECD, 2013g; CEMR, n.d.) and proximity to the capital city (OECD, 2014n; OECD, 2013g) can also be a factor, as can the size of the population (CEMR, n.d; URBACT, 2010) and the internationalisation of the local economy (Turcu, Karadimitriou and Chaytor, 2015; URBACT, 2010). Cities highly dependent on loans or national subsidies are also vulnerable to serious economic losses (CEMR, n.d.). Indeed, a national government's decision to take austerity measures impacts directly on cities. For example, of the case study cities, Cardiff (United Kingdom) had suffered from austerity measures imposed by the UK government, which has reduced fund transfers to local councils by 40% since 2010. Major economic crises affecting OECD countries since 2000 are listed in Table 1.1.

Table 1.1. Major economic crises in OECD countries since 2000

Category	Year when the main causes happened	Country of origin/ country mainly impacted	Description
Dot-com crisis	2000-01	United States/ international	Investments in Internet-based companies soared in 1999-2000, due to the abundance of venture capital and the lowering of investment banks' standards. In 2000-01, the bubble collapsed.
US housing bubble and subprime lending crisis	2007	United States/ global	From 1996 to 2006, the housing market in the United States boomed, with prices growing at an annual rate of 17% in 2004-05. It burst in 2007, resulting in the global financial crisis.
Collapse of Lehman Brothers and the global financial crisis	2008	United States/ global	The crisis in the US subprime market reduced the liquidity of US and EU banks and financial institutions. The mortgage-lending institutions Freddie Mac and Fanny Mae were bailed out by the US government, but Lehman Brothers went bankrupt in 2008.
Iceland's financial crisis	2008-11	Iceland	The global financial crisis strongly hit Iceland, which suffered from a severe banking crisis and a deep recession in the period 2008-11. The country received a bailout from the International Monetary Fund (2008-11).
European debt crisis	2009	Greece, Ireland, Portugal, Spain, Cyprus/euro zone	Greece's unsustainable levels of debt and public deficit triggered the European debt crisis in 2009, spreading to Cyprus, Ireland, Spain and Portugal.
Oil price slump	2014 (ongoing)	Global	The price of Brent crude plummeted from USD 115 a barrel in June 2014 to USD 27 in January 2016.

*Sources:* Darvas, Pisani-Ferry and Sapir (2011), "A comprehensive approach to the Euro-area debt crisis", <http://bruegel.org>; Bibbee (2001), "Turkey's crisis", [www.oecdobserver.org/news/archivestory.php/aid/435/Turkey\\_s\\_crisis.html](http://www.oecdobserver.org/news/archivestory.php/aid/435/Turkey_s_crisis.html); OECD (2002), *OECD Economic Surveys: Turkey 2002*, [http://dx.doi.org/10.1787/eco\\_surveys-tur-2002-en](http://dx.doi.org/10.1787/eco_surveys-tur-2002-en); Parker, A. (2016) "Oil price crash has far-reaching consequences for business and politics", [www.ft.com](http://www.ft.com); Arezki and Blanchard (2014), "Seven questions about the recent oil price slump", <https://blog-imfdirect.imf.org>; The Economist (2014), "What's gone wrong with Russia's economy", [www.economist.com/blogs/economist-explains/2014/12/economist-explains-16](http://www.economist.com/blogs/economist-explains/2014/12/economist-explains-16); Carey (2009), "Iceland: The financial and economic crisis", <http://dx.doi.org/10.1787/221071065826>; Kirkpatrick (2009), "The corporate governance lessons from the financial crisis", <http://dx.doi.org/10.1787/fmt-v2009-art3-en>; Bernanke (2010), Speech at the Annual Meeting of the American Economic Association, [www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm?source](http://www.federalreserve.gov/newsevents/speech/bernanke20100103a.htm?source); Towbin and Weber (2015), "Price expectations and the U.S. housing boom", [www.imf.org/external/pubs/ft/wp/2015/wp15182.pdf](http://www.imf.org/external/pubs/ft/wp/2015/wp15182.pdf); Scherbina (2013), "Asset price bubbles: A selective survey", [www.imf.org/external/pubs/ft/wp/2013/wp1345.pdf](http://www.imf.org/external/pubs/ft/wp/2013/wp1345.pdf).

**Demographic change** caused by **population inflow and outflow** may have a significant impact on a city. It will change the employment rate, taxable income, and the amount and nature of public services provided. Migration has an important impact on societies and economies, and can lead to social friction (OECD, 2014m). Local communities have to face the challenges of social integration (OECD, 2010). Such instances have been particularly acute recently in cities that accept asylum seekers.

Demographic change associated with an **ageing population** includes such economic and social challenges as: changes in local revenue, ageing of the labour force, infrastructure and social services, social isolation, accessibility to services and housing affordability, as well as the potential benefits of senior volunteers and the "silver economy" (OECD, 2015c). In the case of Toyama (Japan) and cities in northern Kyoto Prefecture (Japan), ageing was caused not by a sudden event but instead by a long-term trend of outmigration of young people, which has become a strain on the cities as well as the longevity of the population.

**Violence, crime, terrorism and war** endanger civil safety, and may present critical shocks for a city. Among the case study cities included in this report, Oslo experienced a terrorist attack on 22 July 2013 that changed attitudes to security issues in the urban area (Oslo, responses to the OECD Questionnaire, 2015). In recent decades, Juarez (Mexico) offers an instance of a city suffering from its crime rate and drug-related violence, in combination with the global financial crisis (100 Resilient Cities, 2015).

**Disasters** have a critical impact not only on a city's environment, including its physical urban development, land use and topology, but also on the economy and society. Disasters resulting from natural hazards can include earthquakes, drought, flooding, heat waves, hurricanes, typhoons, cyclones, landslides, volcanic eruptions, wildfires, tropical storms and tsunamis (100 Resilient Cities, 2016). In view of the high economic costs incurred by recent disasters, as well as significant exposure to risk going forward, strengthening financial resilience to disasters has become a policy priority in many economies, in emerging and less developed markets as well as in developed economies (OECD, 2015a). Recent examples of disasters in OECD countries and in case study cities are listed in Tables 1.2 and 1.3.

OECD countries have suffered severe **disruptions of energy supply** as a result of disasters. Recent examples include the effect of the Great East Japan earthquake on the Tohoku region (Japan) (2011) and Hurricane Sandy's impact on the east coast of the United States and neighbouring countries (2012). Disruption of the energy supply by disasters can affect a larger number of customers than other events, including equipment failure and operator error. Energy disruptions caused by disasters or accidents do not respect regional or national borders. Their impact can be spread over a wide area, given that both economic activity and electricity grids are interconnected. This needs to be considered in helping make cities resilient (OECD, forthcoming 2016a).

**Ageing infrastructure**, such as bridges, roads, public transport, water supply and sewage networks, which were built many decades ago, can increase the risk of accidents. For example, the I-35W bridge collapse in Minneapolis, Minnesota (United States) in 2007 caused casualties and disrupted regional transport. US Homeland Security notes that ageing infrastructure increases a city's vulnerability to common environmental conditions, extreme natural hazards and terrorism (US Homeland Security, 2010).

**Leadership change** and **any discontinuity of policies** (e.g. policy changes resulting from the appointment of a new mayor) can also cause disruption. So may **inadequate financial management** by city governments, and municipal bankruptcies. Recent examples include the bankruptcy in Yubari (Japan) as a result of the decline of the city's coal industry and resulting population flight (Japan Times, 2007) and the decline of the automobile industry in Detroit (United States), which reduced public service supply and also resulted in an outflow of population.

Table 1.2. Selected disruptive disasters in OECD and non-OECD countries

Event/type	Date	Country	Areas affected	Major impacts	Economic damages (USD billions) EmDat source
Hurricane Katrina	29 August-19 September 2005	United States	Southeastern United States	Its aftermath claimed more than 1 800 lives, and it ranked as the costliest natural disaster in US history.	125
UK summer floods	June-July 2007	United Kingdom	In England, South and East Yorkshire, Worcestershire, Gloucestershire and Oxfordshire were particularly hit by the flooding.	The flooding caused 13 fatalities and damaged 55 000 homes and businesses. Water and power infrastructure were severely damaged, causing power outages.	4.448
L'Aquila earthquake	6 April 2009	Italy	Near the city of L'Aquila, in the Abruzzo region of central Italy.	Forty-five towns were affected, with approximately 308 fatalities and 65 000 residents evacuated.	2.5
Chile earthquake	27 February 2010	Chile	Coast of south-central Chile.	The earthquake and tsunami were responsible for more than 500 deaths.	30
Eyjafjallajökull volcanic eruption	15-23 April 2010	Iceland	Directly affected areas: Iceland, other northern European countries and the Russian Federation.	The eruption caused disrupted air traffic, above all for the United Kingdom, European countries and North Atlantic areas. A state of emergency was declared in South Iceland, and major flooding threatened homes and critical infrastructure.	
Pakistan flood	Late July and August 2010	Pakistan	Flooding of the Indus River in Pakistan.	Affected approximately 20 million people, destroyed homes, crops and infrastructure.	
Canterbury earthquake	22 February 2011	New Zealand	Near the city of Christchurch, New Zealand, and the Canterbury Plains region.	Damage to infrastructure, with 185 fatalities mainly due to the collapse of two office buildings.	15
Great East Japan earthquake	11 March 2011	Japan	Northeastern Japan.	The earthquake caused widespread damage on land and initiated tsunami waves that devastated many coastal areas of the country. The tsunami also instigated a major nuclear accident at a power station along the coast.	210
Erciş-Van earthquake	23 October 2011	Turkey	The cities of Erciş and Van in eastern Turkey.	More than 570 people were killed, and thousands of structures in Erciş, Van and other nearby towns were destroyed.	
Thailand floods	5 August 2011-4 January 2012	Thailand	Bangkok metropolitan region and areas in the central plains of Thailand.	Thirteen million people were affected, 680 were killed. The manufacturing sector was severely hit, and six of the main industrial plants flooded.	40
Hurricane Sandy	22-31 October 2012	United States	The Bahamas, Cuba, the Dominican Republic, Haiti, Jamaica and the United States (mid-Atlantic and northeastern states).	More than 200 people were killed, with widespread property damage in the areas in the hurricane's wake.	50
Central Europe floods	May-June 2013	Central Europe	South and east German states, the Czech Republic, Austria and areas along the Elbe and Danube rivers.	The death toll was 25 and 52 500 residents had to be evacuated.	16.5-22

Source: OECD (2014e), *Boosting Resilience through Innovative Risk Governance*, <http://dx.doi.org/10.1787/9789264209114-en>.

Table 1.3. Disasters in case study cities

City	Major disaster (past/future)	Impact
Antalya (Turkey)	Floods, flooding and heavy rain	– In 2014, 116 villages and streets, 1 880 farmers and an area of 45 858 square kilo meters were damaged.
	Earthquake	– Antalya's city centre is in the second seismic zone and under the effect of the Fethiye-Burdur arc zone. – The earthquake on 11 April 1977, at a depth of 93 kilometres and with a magnitude of 4.6, is the last known earthquake centred in Antalya. – Süleyman Demirel University's (SDU) Earthquake and Geotechnical Research Centre issued a warning in March 2015 of the possibility of a huge earthquake in Antalya in the near future.
	Landslides and rock falls	– Between 2002 and 2015, 336 buildings and homes were damaged from landslides and rock falls in the districts of Antalya province.
	Forest fires	– Antalya experienced a major wildfire in July 2008, which caused damages to 75 homes, 94 barns and 2 warehouses.
Belo Horizonte (Brazil)	Floods and landslides	– Historically, the incidence of floods and landslides has been high in the territory of Belo Horizonte and neighbouring municipalities. Between 1991 and 2010, more than 500 000 of its inhabitants were affected by 5 major events.
Bursa (Turkey)	Drought (2007)	– Rural areas in Bursa were affected.
	Earthquake and tsunami (2009)	– Buildings collapsed in the 17 August 1999 İzmit earthquake (also known as the Kocaeli, Gölcük or Marmara earthquake) with a magnitude of 7.
	Flooding (2010)	– Many homes and businesses were flooded.
Cardiff (United Kingdom)	Flooding	– Cardiff was originally built on a flood plain. Throughout the city's history, there have been many instances of major flooding.
Kobe (Japan)	Earthquake (1995)	– Kobe and the surrounding area were struck by the Great Hanshin-Awaji earthquake, causing 4 571 deaths within the city and destroying or damaging much of the city's infrastructure.
Oslo (Norway)	Extreme rainfall	– With the increase of hard surfaces due to the city's densification, Oslo will be more vulnerable to extreme rainfall caused by climate change. In 2013 in Norway, it rained 20% more than it did in 1990.

Source: Belo Horizonte (2016), Response to the OECD questionnaire, <http://www.cmbh.mg.gov.br/>, (accessed June 2016); BEBKA (2016), Response to the OECD questionnaire, [http://www.bebka.org.tr/site-anasayfa-0-home\\_page.html](http://www.bebka.org.tr/site-anasayfa-0-home_page.html), (accessed June 2016); City of Cardiff (2016), Response to the OECD questionnaire, <https://www.cardiff.gov.uk/ENG/Home/Pages/default.aspx>, (accessed June 2016); City of Kobe (2016), Response to the OECD questionnaire, <http://www.city.kobe.lg.jp/foreign/english/index.html>, (accessed June 2016); City of Oslo (2016), Response to the OECD questionnaire, <https://www.oslo.kommune.no/english/>, (accessed June 2016).

### *How cities have different reaction to similar shocks and stresses*

This section explores how cities have different reaction to similar shocks and stresses. It assesses the recent economic trends between 2000 and 2012 in the 277 OECD metropolitan areas (OECD, 2016a) and 158 predominantly urban regions (OECD, 2016b),<sup>2</sup> using GDP growth, employment and household income, in view of the 2007-08 financial crises, which were commonly observed throughout the OECD region. This assessment helps to identify the cities whose society and economic stability are more vulnerable and that require greater consideration of how to enhance their resilience.

The assessment considers the year of lowest GDP growth, increase in the number of jobs, the employment rate and household income as follows (Tables 1.4 and 1.5):

- One hundred seventy-five metropolitan areas had the lowest **GDP growth rate** in 2009, and 55 metropolitan areas in 2008. Those two years mark the lowest point for 230 metropolitan areas whose GDP growth has since rebounded. Comparing the worst-performing year with 2012, GDP has increased by 6.3% on average in the 230 metro

areas, however, Canada, Chile, Estonia, Mexico and the United States had recovered more than their average in 2000-12 (Figure 1.1). There are also wide differences in the level of increase. Metropolitan areas in Mexico increased by 10.6% on average from their lowest year to 2012, while those in Korea increased by 3.2%, and those in the Netherlands by only 0.9%. Individual metropolitan areas show a more complex picture. In Stockholm, GDP growth ranged from -0.2% (2008) to 0.8% (2012); in Rome, it ranged from 2.79% (2009) to -2.76% (2012); in Nagoya (Japan), from -8.5% (2008) to 5.0% (2012) and in Calgary (Canada) from -14.2% (2009) to 4.5% (2012).

- **Total employment** does not show any clear pattern for the worst-performing years. This suggests that total employment did not immediately respond to the financial crisis in 2007-08, and that other events in years before the crisis had already depressed the growth of employment in many metropolitan areas.
- The **employment rate** shows a clearer linkage to the financial crisis. The years when the largest number of metropolitan areas had the lowest employment rate was in 2010 (71 metropolitan areas) and in 2009 (49 metropolitan areas). The year with the lowest employment rate falls after that for GDP growth. The 120 metropolitan areas that experienced the lowest growth in either 2009 or 2010 increased their employment rate in 2012 by 1.5% on average. There is a wide difference in the degree of increase, from 0.19% Philadelphia (United States) to 4.81% in Detroit (United States). One noteworthy issue is that 36 metropolitan areas with the lowest employment rates in 2012 have been on a constant trend of decreasing employment rate since 2000.
- **Household income** does not show any clear pattern for the year of lowest household income. The financial crisis does not seem to have been a major shock impacting household income during 2001-12.

Table 1.4. **Number of OECD metropolitan areas with the lowest rate of GDP growth, employment growth rate and employment rate for the period 2001-12**

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
GDP growth	12	2	3	0	6	0	6	55	175	8	3	8
Employment growth rate	26	32	37	15	17	18	4	35	31	32	23	0
Employment rate	30	22	9	6	24	2	0	0	49	71	28	36

Source: OECD (2016a), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES>, (accessed 31 March 2016).

Table 1.5. **Number of predominantly urban regions with the lowest household income for the period 2001-12**

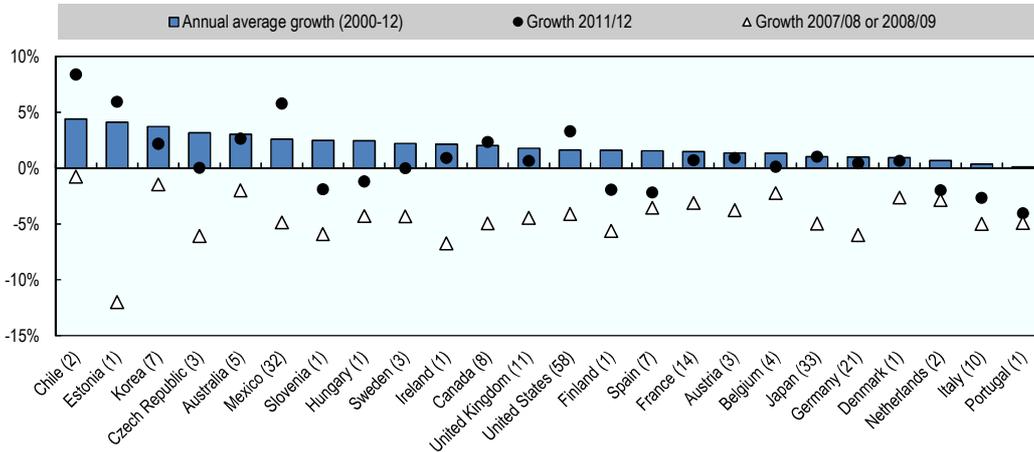
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Household income	100	16	4	6	6	2	5	2	3	1	10	3

Source: OECD (2016b), *OECD Regional Database*, [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2) (accessed 31 March 2016).

GDP growth rates and employment rates fluctuate across OECD metropolitan areas. Figures 1.2 and 1.3 show fluctuations (expressed as the gap between maximum and minimum) of the GDP growth rate and the employment rate in metropolitan areas during 2001-12. On average, the gap between maximum GDP growth and minimum GDP growth in OECD metropolitan areas is 10.4%; Milwaukee, Michigan (United States) has the smallest gap, of 2.9%, while Centro (Mexico) has the largest gap, of 35.4%. As for

the employment rate, the average gap between the maximum and minimum employment rate in OECD metropolitan areas is 4.9%; Pohang (Korea) has the smallest gap, of 0.7%, while Las Palmas (Spain) has the largest, 24.7%.

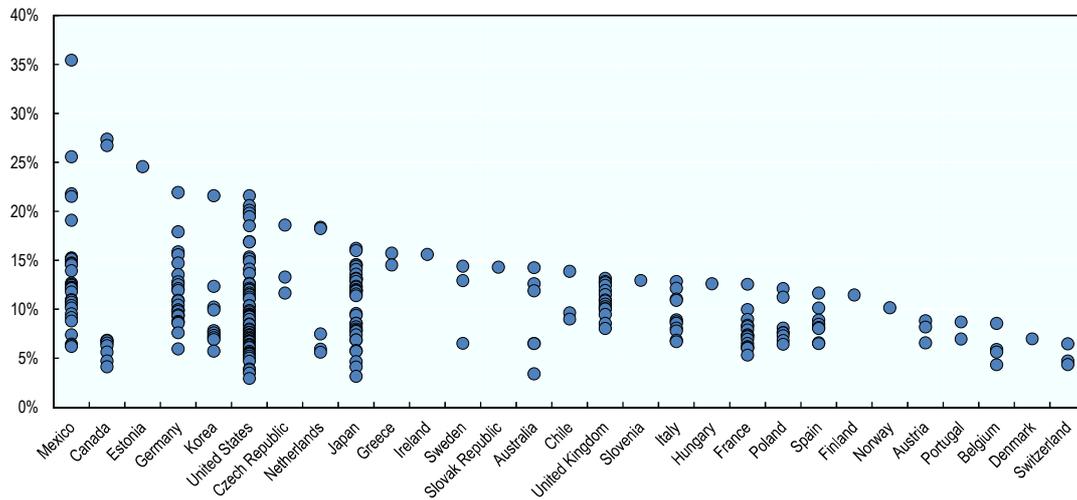
Figure 1.1. **Annual average GDP growth in OECD metropolitan areas with the lowest GDP growth rate either in 2008 or 2009 for the period 2000-12**



Note: The numbers in brackets after the names of countries show the number of OECD metropolitan areas with the lowest GDP growth either in 2008 or 2009 for the period 2000-12.

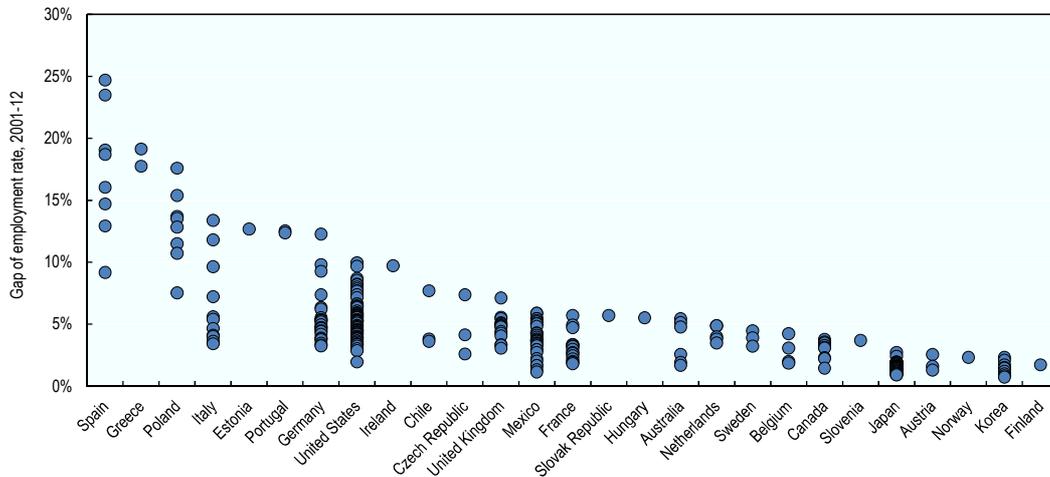
Source: OECD (2016a), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

Figure 1.2. **Difference in maximum and minimum GDP growth rate in OECD metropolitan areas, 2001-12**



Source: OECD (2016a), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

Figure 1.3. **Difference in maximum and minimum employment rate in OECD metropolitan areas, 2001-12**



Source: OECD (2016a), *OECD Metropolitan Database*, <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

### *Defining urban resilience*

Many approaches and attempts to define “resilience” and “resilient cities” have been undertaken. The OECD Ministerial Council Meeting in 2014 shed light on the importance of resilience, discussing how to achieve “resilient economies and inclusive societies” to generate jobs and growth, empower citizens and promote their well-being. It defined resilience as the ability not only to resist and recover from adverse shocks, but to rebound more strongly than before, and to learn from the experience (Box 1.1; OECD, 2014a, 2014k). The concept of resilience is further defined in the overview paper of the Ministerial Council Meeting. This took a unique approach to the concept of resilience by covering four different interlinked considerations: the economy, society, institutions and the environment. It suggested that shortcomings in any one of these four dimensions will affect the strength of the others. A regional approach to the concept of resilience was taken in the OECD study “How’s Life in Your Region?” (OECD, 2014c), which assessed the sustainability of regions’ well-being according to a number of place-based factors (Box 1.1).

This report defines resilient cities based on the OECD Ministerial Council’s overview of resilient economies and societies (OECD, 2014a) and the OECD Guidance for Resilience Systems Analysis (OECD, 2014q). The OECD Territorial Resilience Framework (Box 1.1) also takes into consideration recent approaches on resilience by various international organisations (Box 1.2).

This report tentatively defines resilient cities as those which are able to **absorb**, **adapt**, **transform** and **prepare for** the past and future impact of economic, environmental and social shocks or stresses, in order to promote sustainable development, well-being and inclusive growth.

- “**Absorb**” includes the ability to accommodate and to mitigate the impact of shocks, while retaining the capacity to carry out essential functions and without passing it on to other entities.

- “**Adapt**” includes the ability to adjust, modify or change under changed circumstances.
- “**Transform**” includes the capacity to create a fundamentally new system, so that the shock will no longer have any impact. It entails a capacity to change for the better, without returning to the *status quo*, and to bounce back. “**Prepare**” includes the ability to learn from past shocks and stresses, and plan in advance to anticipate the future shocks to perform better than before.

This report also defines that urban resilience is driven by economic, social, environmental and institutional dimensions, which are characterised by seven building blocks: adaptive capacity, robustness, redundancy, flexibility, resourcefulness, inclusiveness and an integrated approach (OECD 2014p).

### Box 1.1. How “resilience” has been discussed in the OECD

1. The OECD’s 2014 Ministerial Council Meeting concluded its discussion of the importance of “resilient economies and inclusive societies” with the following statement (OECD, 2014j):

...We discussed how we can achieve “**resilient economies and inclusive societies**” to generate jobs and growth, empower people and promote the well-being of our citizens. We share a common goal of increasing resilience of our economies by incorporating multidimensionality into policy design to help identify trade-offs, complementarities and unintended consequences of policy choices. Sound and appropriate macroeconomic management including responsible fiscal policies, further structural reforms and further global rebalancing are all essential for achieving robust, resilient and inclusive growth, taking into account rising inequality.

...

Rising inequality endangers social cohesion and weakens social resilience, thereby hampering economic resilience. A key challenge is to achieve inclusive growth by providing social protection and empowerment to people, which can strengthen human security. Appropriate flexibility and security in labour markets, and relevant education and skill programmes, can facilitate greater inclusion and participation of under-represented groups. We welcome OECD initiatives targeting these groups, including on gender equality, youth employment, ageing society and the integration of migrants. We also recognise that regional and urban policies can play a key role in empowering people and building resilience at all levels of our economies and societies.

2. The “Overview paper on resilient economies and societies” (OECD, 2014a), presented at the Meeting of the OECD Council at Ministerial Level (Paris, 6-7 May 2014), summarised the definition and the scope of the concept of resilience as follows:

The 2008 economic and financial crisis highlighted the importance of strengthening the resilience of our economies, societies and institutions. Resilience is a broad concept, centred on the ability not only to resist and recover from adverse shocks, but also to “bounce back” stronger than before, and to learn from the experience. Resilience is also multidimensional, encompassing a range of interconnected factors and conditions. Strengthening resilience is all the more essential today in the face of increasing policy complexity and interconnectedness, deep-seated demographic and technological trends, and growing environmental pressures, all of which increase the likelihood of some critical event having negative impacts on economic growth and well-being.

Being resilient involves understanding the sources of risks and opportunities and learning to cope with uncertainty. There is no single methodological approach for measuring resilience, and concrete analysis and recommendations are best developed within specific policy areas. This paper addresses resilience across four broad dimensions, covering **economic, social, institutional and environmental issues**. Each of these dimensions is relevant in its own way, and they are all strongly interconnected, reflecting the capacity of individuals, organisations and systems to withstand and recover from shocks.

### Box 1.1. How “resilience” has been discussed in the OECD (*continued*)

3. Territorial resilience was discussed in *How’s Life in Your Region? Measuring Regional and Local Well-being for Policy Making* (OECD, 2014c). In assessing the sustainability of regions’ well-being, this study defined territorial resilience as the capacity of territories or communities to absorb the effects of shocks and learn from them in order to move forward.

The example above shows that the resilience of a region refers to the adaptability of a territory, which includes the capacity of its individuals and firms to deal with upsets, and the capacity of institutions to adapt and reform. At the same time, the resilience of a region is diminished by its vulnerability, that is to say, the potential impact of the shock on the community. Vulnerability results from the exposure to shock and sensitivity to it. Additional work needs to be done to identify and monitor indicators of territorial resilience, such as, for example, trade openness, to measure the exposure of a region or education and health indicators for sensitivity. Because institutions and governance arrangements influence the capacity to adapt after a shock, measures of the quality of regional governments, open government and community engagement should be considered, as well as measures of territorial adaptability.

4. The 2015 Ministerial Council Meeting concluded its discussion of the importance of resilience and roles of cities with the following statement (OECD 2014k):

...We underline the importance of structural reforms to improve growth prospects and boost employment and strengthen economic resilience.

...We discussed the growing role of cities in fostering entrepreneurship to promote a more resilient and sustainable economy and society.

Recent OECD studies have defined resilience in another way, based on the approaches followed in member countries that aim to increase resilience at the regional level. For example, a study of the region of Abruzzo in Italy, after the L’Aquila earthquake, defined resilience as the ability to withstand and to recover from external, adverse shocks through adjustment processes that re-establish or enhance the previous state of the system (OECD, 2013b). The study noted that it helps a community to become less vulnerable to external shocks and to achieve a better long-term standard of living. This study was particularly important in highlighting the need to strengthen resilience through an integrated regional development strategy, and in building the first framework to assess resilience in the face of shocks, economic shocks included. It also pointed out that the quality of the public and private sectors is a key aspect of determining resilience at the regional level. The focus on increasing economic and social resilience was further elaborated, from the perspective of risk governance, at the OECD High-Level Risk Forum (OECD, 2014i). This underlined the importance of forward-looking risk governance, the role of trust, and an optimal and complementary mix of resilience measures. Here resilience was defined more broadly as the ability of social and economic systems to maintain function when shocked and while in a period of recovery.

*Sources:* OECD (2014j), “Resilient economies and inclusive societies – Empowering people for jobs and growth: 2014 Ministerial Council Statement”, [www.oecd.org/mcm/2014-ministerial-council-statement.htm](http://www.oecd.org/mcm/2014-ministerial-council-statement.htm); OECD (2014a), “Overview paper on resilient economies and societies”, [www.oecd.org/mcm/C-MIN\(2014\)7-ENG.pdf](http://www.oecd.org/mcm/C-MIN(2014)7-ENG.pdf); OECD (2014c), *How’s Life in Your Region? Measuring Regional and Local Well-being for Policy Making*, <http://dx.doi.org/10.1787/9789264217416-en>; OECD (2015d), “Unlocking investment for sustainable growth and jobs: 2015 Ministerial Council Statement”, [www.oecd.org/mcm/documents/ministerial-council-statement-2015.htm](http://www.oecd.org/mcm/documents/ministerial-council-statement-2015.htm).

### Box 1.2. Recent international trends in defining resilience

Many approaches and initiatives to define “resilience” and “resilient cities” have been undertaken in various organisations. A salient part of this discussion focuses on the environmental aspect of resilience, including climate change and natural disasters.

- The United Nations Office for Disaster Risk Reduction (UNISDR) Making Cities Resilient Campaign (2010) intends to support sustainable urban development by promoting resilience activities and increasing local understanding of disaster risk (UNISDR, 2013).
- UN-HABITAT’s City Resilience Profiling Program (2012-) has focused on providing national and local governments with tools for measuring and increasing resilience to multiple hazards, including those associated with climate change (UN-HABITAT, 2012).
- The World Bank also provides principles, tools and practices to encourage cities to invest in risk-based approaches and make better use of the technologies and tools available for managing disaster risks (Jha, Miner and Stanton-Geddes, 2013; World Bank (2015)).
- ICLEI – Local Governments for Sustainability has studied resilience in the context of European cities (ICLEI, 2012). At its Resilient Cities Conference in 2011, ICLEI defined a resilient city to support the development of greater resilience in its institutions, infrastructure, social and economic life, and underlined the contribution of resilient cities to sustainable development in the long term.
- The Rockefeller Foundation’s City Resilience Index (2014) takes a similar approach, highlighting the importance of using a comprehensive and holistic framework to enhance the function of cities in a system.
- The European Spatial Planning Observation Network’s (ESPON) *ECR2 Economic Crisis: Resilience of Region, 2014* identified different levels of economic recovery in 1 322 European regions after the 2008 crisis. ESPON provided a methodology to classify NUTS 3 regions within the European Union into four groups, according to their recovery scenarios. GDP and total employment data were used as the most robust indicators for identifying the socio-economic resilience of regions.
  - scenario 1: “Unaffected”, in which the assessed indicator remained unaffected by the economic crisis and remained at a constant or increasing level
  - scenario 2: “Recovered”, in which the indicator recovered from the shock and returned to pre-crisis levels or beyond
  - scenario 3: “Returning,” in which the indicator showed signs of recovery but had not fully reached pre-crisis levels within the assessed timeframe
  - scenario 4: “Declining,” in which the indicator continued to decline.

The recent important international agreements addressed resilience of people, communities, cities, infrastructure and systems against natural disasters and climate change in the following contexts:

- The Sendai Framework for Disaster Risk Reduction (2015-30) (adopted 18 March 2015) focused on resilience to natural disasters and pursued the goal of preventing new disaster risk and reducing existing risk. It used various measures to prevent and reduce hazard exposure and vulnerability to disasters, increase preparedness for response and recovery, thereby strengthening resilience (United Nations, 2015a). One of its four priorities, “investing in disaster risk reduction for resilience”, discusses increasing investment in the resilience of workplaces, national health systems and affected people.

### Box 1.2. Recent international trends in defining resilience (*continued*)

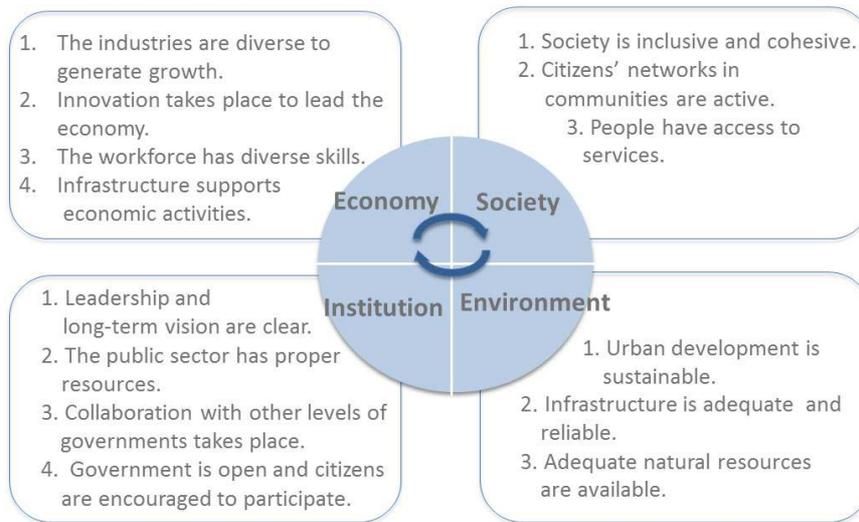
- The 2030 Agenda for Sustainable Development (adopted September 2015) addressed resilience in many of its stated goals (United Nations, 2015a). For example, Goal 1.5 focuses on the resilience of people. “By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.” Goal 9 highlighted the resilience of infrastructure: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”, and Goal 11 the resilience of cities: “Make cities and human settlements inclusive, safe, resilient and sustainable.”
- The Paris Agreement on climate change (adopted 12 December 2015) discussed resilience to climate change (United Nations, 2015b). It is important to note that this agreement required each party to engage in relevant plans to build resilience of socio-economic and ecological systems, including through economic diversification and sustainable management of natural resources (Article 7).

*Sources:* UNISDR (2013), “Making cities resilient: Summary for policymakers. A global snapshot of how local governments reduce disaster risk – April 2013”, [www.unisdr.org/files/33059\\_33059finalprinterversionexecutivesu.pdf](http://www.unisdr.org/files/33059_33059finalprinterversionexecutivesu.pdf); UN-HABITAT (2012), “City Resilience Profiling Programme”, [http://unhabitat.org/urban-initiatives/initiatives-programmes/city-resilience-profiling-programme/?noredirect=en\\_US](http://unhabitat.org/urban-initiatives/initiatives-programmes/city-resilience-profiling-programme/?noredirect=en_US); Jha, Miner and Stanton-Geddes (eds.) (2013), *Building Urban Resilience: Principles, Tools, and Practice. Directions in Development*. <http://dx.doi.org/10.1596/978-0-8213-8865-5>; ICLEI (2012), “Background paper for the Council of Europe’s report on resilient cities”, [www.iclei-europe.org/fileadmin/templates/iclei-europe/files/content/Topics/Adaptation/Background\\_paper\\_for\\_CoE\\_final\\_draft.pdf](http://www.iclei-europe.org/fileadmin/templates/iclei-europe/files/content/Topics/Adaptation/Background_paper_for_CoE_final_draft.pdf); ARUP and Rockefeller Foundation (2014), *City Resilience Framework*, [www.rockefellerfoundation.org/app/uploads/City-Resilience-Framework1.pdf](http://www.rockefellerfoundation.org/app/uploads/City-Resilience-Framework1.pdf); UNISDR (2015), *Sendai Framework for Disaster Risk Reduction (2015-2030)*, [www.unisdr.org/files/43291\\_sendaiframeworkfordrren.pdf](http://www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf); United Nations (2015a), *Transforming Our World: The 2030 Agenda for Sustainable Development*, <https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf>; United Nations (2015b), *Paris Agreement*, <https://unfccc.int/resource/docs/2015/cop21/eng/109r01.pdf>; ESPON (2014), *ECR2 Economic Crisis: Resilience of Regions*, [www.espon.eu/main/Menu\\_Projects/Menu\\_AppliedResearch/ECR2.html](http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/ECR2.html); World Bank (2015), “Urban development overview”, updated 6 April, World Bank Group, Washington, DC, [www.worldbank.org/en/topic/urbandevelopment/overview](http://www.worldbank.org/en/topic/urbandevelopment/overview) (accessed 7 July 2015).

### ***Drivers of resilient cities***

Four drivers of resilience were identified by the OECD Ministerial Council and serve as the foundational structure for this framework: the economy, society, environment and institutions. Each driver has several sub-drivers. The most relevant components for cities are listed in Figure 1.4. These components were suggested by the OECD Ministerial Council’s statement in 2014. Sub-drivers are listed based on this statement, literature research and discussion with international experts as examples of major components in each driver.

Figure 1.4. Drivers of resilient cities



Source: Adapted from OECD (2014a), "Overview paper on resilient economies and societies", available at: [www.oecd.org/mcm/C-MIN\(2014\)7-ENG.pdf](http://www.oecd.org/mcm/C-MIN(2014)7-ENG.pdf).

### *Economy*

Resilient cities have diversified industries and potential for innovation. The level of diversification of economic activity, and the effectiveness of their specialisation in building competitiveness, will influence the economic drivers (OECD, 2014a). This is also relevant to overall exposure in global economic value chains. Reliable infrastructure and the skills of the labour force contribute to enhancing resilience.

### *Society*

Resilient cities are able to cope with shocks by adopting a co-ordinated and coherent set of economic and social policies and practices (OECD, 2014a). In particular, inclusiveness and citizens' access to jobs and education can help cities address change smoothly.

### *Environment*

Resilience matters in the face of environmental degradation, the overuse of resources and the potential costs of climate change and natural disasters (OECD, 2014a). Environmental factors are critical for cities because of the large number of people living in relatively concentrated areas and the complexity of the systems that interact with them, including infrastructure networks, communication systems, water and energy distribution, housing and urban green spaces (ICLEI, 2012). Complex urban systems are particularly vulnerable to extreme weather events (OECD, 2014k). For example, built-up environments are at greater risk of localised flooding after a heavy storm, which may lead to contamination of the water supply. Building environmental resilience also needs preparedness at the local level to understand how climate change will impact their communities and to take action to safeguard human well-being and community assets (ICLEI USA, 2014).

### *Institutions*

Resilient cities ensure open, transparent and inclusive policy making and enable effective implementation. Institutions play a key role in strengthening resilience, since the impact of any shock depends on institutional capacity to respond and rebound from shocks (OECD, 2014a). In particular, city authorities are on the front line for delivering public services effectively, and building trust in government. Capacity building in local governments and development in human resources are indispensable for resilient institutions, because the capacity to reform the institution determines regional resilience (OECD, 2014c).

No one driver can be thought of or acted upon independently of the other. The four drivers are inter-related, and a success in one driver will be dependent on a success in other drivers. For instance, a city facing persistent homelessness needs to address very different questions of its economy (how easy it is to access employment opportunities?), society (what is the degree of socio-economic inequality in the city?) as well as its institutions (are there adequate resources, whether in human, financial or infrastructure terms, to meet the city's needs and those of its residents?). Although Figure 1.4 divided the sub-drivers into four categories, it does not mean that sub-drivers are mutually exclusive. Some sub-drivers contribute to other categories of drivers, For example, a sub-driver “Urban development is sustainable” is relevant for economic resilience and social resilience.

### *Building blocks for resilient cities*

Drivers are influenced by the culture, society, politics, economy, environment and demographics of a given city. Their strength varies depending on a series of qualities intrinsic to resilient systems. These include the capacity to become **adaptive, robust, redundant, flexible, resourceful, inclusive and integrated**, as defined below. While all building blocks are linked to the drivers, the most obvious and relevant linkages are summarised in Table 1.6.

- **Adaptive:** they act based on the lessons learnt from past experiences
 

An adaptive urban system manages uncertainty by evolving – modifying standards, norms or past behaviour – using evidence to identify solutions and applying the knowledge gained from past experience in taking decisions about the future. A degree of consensus emerges in the literature that adaptive capacity is perhaps the most fundamental of all facets of resilience.
- **Robust:** they have well-designed systems to absorb shocks
 

A robust urban system can absorb shocks and emerge without significant loss to its functionality or capacity to function. Its degree of robustness rests on how well the system is designed, built and managed that can absorb the impact of a shock and continue to operate.
- **Redundant:** they have spare capacity for unexpected needs
 

Redundant urban systems are able to meet the need for spare capacity when faced with unexpected demand, a disruptive event or extreme pressure. This entails intentionally developing or having access to more than one source of action, service or service provider when necessary. Different groups can perform the same function and substitute for one another in case of emergencies or change, protecting against a loss of functionality and generating greater response efficiency in times of crisis.
- **Flexible:** they respond to changing circumstances in the scope of their plans

A flexible urban system allows individuals, households, businesses, communities and government to adjust behaviour or action in order to respond to change in the moment. It helps ensure a minimum level of well-being and functional service delivery under economic, social or environmental stress.

- **Resourceful:** they find ways to meet critical needs with the resources available  
A resourceful urban system can effectively and quickly restore the functionality of essential services and systems in a crisis or under highly constrained conditions, meeting its needs, maintaining its purpose and achieving its aims in times of shock or stress, with the resources available.
- **Inclusive:** they bring diverse perspectives together  
An inclusive urban system ensures that diverse actors and communities are fully consulted, engaged and empowered in the policy process (e.g. through policy programming and local initiatives), including in the policy design stage when possible.
- **Integrated:** they work together beyond boundaries  
An integrated urban system promotes a co-operative and, ideally, collaborative or participatory approach beyond sector boundaries (public and private as well as policy sectors) and administrative boundaries to policy and programming, to better ensure coherent decisions and effective investment. It should experience less duplication and incoherence in operations, management and policy programming, creating more efficient and effective response and outcomes.

This part was adapted from Arup and Rockefeller Foundation (2014); Folke et al. (2002); Chelleri (2012); Interagency Resilience Working Group (2012); Jha, Miner and Stanton-Geddes (2013).

Table 1.6. **Building blocks of resilient cities**

Drivers	Sub-drivers	Building blocks						
		Adaptive	Robust	Redundant	Flexible	Resourceful	Inclusive	Integrated
Economy	Industries are diverse and generate growth.							
	Innovation takes place and leads the economy.							
	The workforce has diverse skills.							
	Infrastructure supports economic activities.							
Society	Society is inclusive and cohesive.							
	Citizen networks in communities are active.							
	People have access to public services.							
Environment	Urban development is sustainable.							
	Adequate and reliable infrastructure is available.							
	Adequate natural resources are available.							

Table 1.6. **Building blocks of resilient cities** (cont.)

Drivers	Sub-drivers	Building blocks						
		Adaptive	Robust	Redundant	Flexible	Resourceful	Inclusive	Integrated
Institutions	Leadership and long-term vision are clear.							
	The public sector has proper resources.							
	Collaboration with other governments takes place.							
	Government is open and citizens' participation takes place.							

*Note:* This table shows where the linkages are the most obvious and relevant. Darker cells indicate more obvious and relevant linkage than lighter-coloured cells, although this does not necessarily mean that they have no linkage with building blocks and drivers.

### ***Why policies for resilient cities require special attention among the urban policy community***

How do policies for resilience differ from good urban policies in general? First, resilience runs across a spectrum from a lesser to a greater degree. When launching a dialogue on urban resilience, perhaps the starting point is not to ask: “Is my city resilient?” but rather to ask: “What degree of resilience does this city want to pursue?” The level of resilience could be decided by establishing consensus among citizens as to how much risk the city is willing to take, considering the frequency and impact of shocks.

Second, resilience in cities focuses on the ability to absorb, adapt, transform and prepare for shocks or stress, while good urban policies focus on the outcome of policies. Policy makers should ask the question regarding good urban policies: “What kind of a city does my city want to become as a result of being resilient?”, while asking the question: “How does my city enhance the ability to absorb, adapt, transform and prepare for shocks or stresses” for exploring being resilient.

Building resilience in cities requires looking at a city in a systemic manner, since adjustments made in one area are likely to impact other areas. For example, a move to create a more resilient economy in cities can have an impact on the natural and built environment, as well as the city’s institutions and governance. A policy that supports greater innovation capacity and innovative output will require considering the city’s skills policy – both part of the economy driver – but can also mean ensuring physical access to opportunities (natural and built environment); developing and supporting amenities to attract human capital (natural and built environment); ensuring that urban development is based on a long-term vision and realised through an integrated approach to planning and implementation (natural and built environment; governance). The need for integrated policy approaches is also evident when one driver of resilience is under pressure, as other drivers will also be affected. An urban economy suffering from a long-term decline generally experiences an increase in unemployment, which can impact society, for example in terms of social cohesion, mental health (e.g. increased incidence of depression and anxiety), social isolation and overall well-being.

### **Economy in resilient cities**

Economies of resilient cities are generally characterised by greater diversity and dynamism. Innovation is critical, certainly as a source of growth, but also as a source of

change and as a possible indicator of adaptive capacity. Polèse (2015) emphasises the multidimensional nature of policy processes for building resilient urban economies. His argument is that in economic terms, resilience beyond survival is a result of policy choices spanning many years, and that the appropriate policy levers are not always found at the local level. This is reflected in key policy levers to support more resilient economies in cities that include promoting inclusive growth, innovation, entrepreneurialism and industrial diversification. The involvement of local authorities in ensuring resilient economies has to be well co-ordinated with national level policies, such as policies on education and skills, as well as labour market and industrial policies, tax policy and innovation policy.

Resilient economies have sub-drivers, which can be mainly described by a number of parameters and indicators (Table 1.7). The indicators will be discussed in detail in Chapter 2.

### *The economy in resilient cities is diverse*

A diverse industrial base provides the basis for a resilient urban economy. The Paris Agreement on climate change (adopted on 12 December 2015) also mentioned that economic diversification contributes to building the resilience of socio-economic and ecological systems (United Nations, 2015c). Local economies that rely heavily on a single industry and its supplying industries may be less likely to demonstrate the same degree of resilience as those that spread the risk of industrial change, competition, decline and shifts in the global economy across a larger set of economic sectors. The key question policy makers need to ask, then, is whether the city’s productive mix is sufficiently diversified to withstand decline in a particular industry, and how vulnerable it is to disruptions in global value chains and shifts in the global marketplace.

Table 1.7. **Parameters and possible indicators for a resilient economy**

Driver	Sub-drivers	Parameters	Possible indicators (examples)
Economy	Industries are diverse	Diversity of economic structure	– GDP by industry – Employment by industry
		Links to value chain	– Contribution of GDP in national value – Contribution of employment in national value
	Innovation takes place	Entrepreneurialism	– Business demography (the number of start-up companies, birth and death rate of companies)
		Research and development (R&D)	– Patent application – R&D expenditure
	Workforce has diverse skills	Access to education	– Employment by education
	Infrastructure supports economic activities	Fulfils expected purpose	– Back-up plans – Long-term maintenance plans – Disaster preparedness infrastructure

Polèse (2015) posits that a city’s industrial profile and its “industrial legacy” can work for or against its adaptive capacity. Cities whose economies are built on heavy or extractive industries are not only less diverse, but more vulnerable to shifts in economic developments. There is also evidence pointing to a lower capacity to diversify and adapt to change in the face of declining growth (Polèse, 2015). “Knowledge spill-overs” that are contained within the industrial sector are another factor that can hold these economies back. This is supported by Glaeser et al. (1992), who conclude that growth will depend more on knowledge spill-overs across industries than knowledge spill-overs within an

industry. The same study notes that more open societies, and those with higher labour market mobility across industrial sectors, are greater conduits of ideas and growth, which has implications for innovation capacity. Human capital and assets are both also relevant.

Attention also needs to be paid to **global value chains**. On the one hand, integration into these chains is important because they can support growth by generating new markets elsewhere. On the other, they can also increase exposure to shock and transmit the impact of an event across the value chain (Box 1.3) (OECD, 2014e). In their book, *Resilience*, Zolli and Healy illustrate how, in 2007, the path leading to civil unrest in Mexico City over the price of tortillas actually began in 1993 with the signing of the North American Free Trade Agreement (NAFTA), and its impact on oil production in the Gulf Coast in 2005 after Hurricane Katrina. This was given further impetus in 2007 with the United States to promote corn-based biofuel, leading the US government to subsidise farmers planting corn varieties appropriate to ethanol production (Zolli and Healy, 2012). Integration into the global value chain can be particularly important in smaller economies. Economic specialisation can drive growth, and smaller economies tend to be more specialised. This is beneficial in terms of efficiency and the ability to build a critical mass and sustain productivity. Based on 2009 data, it is the smaller OECD economies that appear more integrated into global value chains (Figure 1.5) (OECD, 2013h). This may expose them to shocks arising from global shifts. The degree of integration into global value chains should thus be carefully discussed.

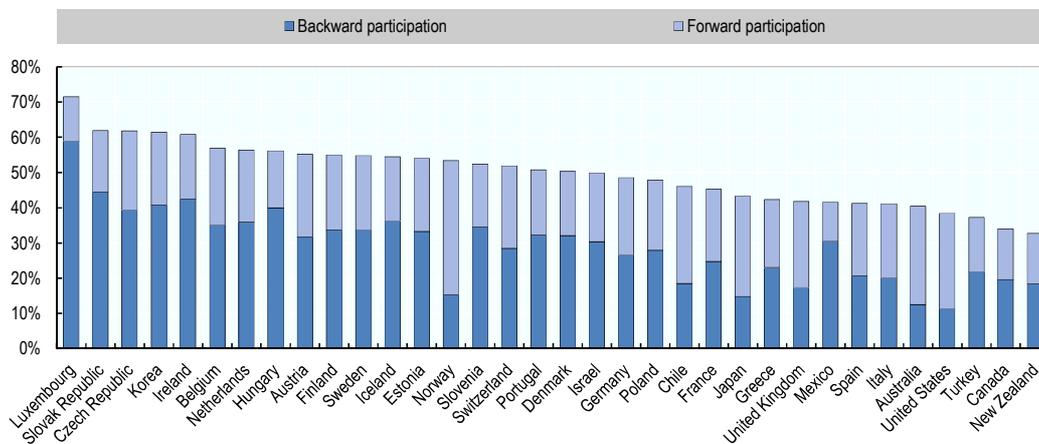
#### Box 1.3. The direct and indirect consequences of global value chain shocks on cities

Global value chains can cause a cascading effect of shocks across countries, economies and urban areas. Examples, including the impact of the Great East Japan earthquake on Detroit, Michigan (United States), in 2011, and the impact of flooding in Bangkok on the computer industry, demonstrate that the economic impact of a shock is not always confined to territorial borders.

- The Great East Japanese earthquake in 2011 had a disastrous impact in Japan. It also created slowdowns in the global electronics and automotive industries, which rely on Japan for production inputs. A car paint manufacturing facility in northeast Japan that supplies a large percentage of automobile paint worldwide was destroyed, causing disruption in the automobile supply chain. Auto manufacturers, particularly in Detroit, were also affected by a disruption in microchip controller production due to the destruction of a Japanese semiconductor factory.
- The floods that affected the Bangkok metropolitan area in 2011 hit a particularly industrialised section of the city, affecting more than 1 000 factories. Forty-five percent of the world's manufacturing capacity of computer hard-disk drives are produced in the affected area, and it is estimated that there was a 30% reduction in the global hard-disk drive supply that year.

Source: Adapted from OECD (2014e), *Boosting Resilience through Innovative Risk Governance*, <http://dx.doi.org/10.1787/9789264209114-en>.

Figure 1.5. Global value chain participation index in OECD countries, 2009



Note. Backward participation is foreign inputs in economies' exports and forward participation is domestically produced inputs used in third economies' exports (OECD, 2013a).

Sources: De Backer and Miroudot (2013), "Mapping global value chains", <http://dx.doi.org/10.1787/5k3v1trgnbr4-en>; OECD (2013a), *Interconnected Economies: Benefiting from Global Value Chains*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264189560-en>.

Regardless of their size, countries with few metropolitan areas that contribute to GDP growth, or where one metropolitan area is responsible for generating a high proportion of national GDP, may face greater economic resilience challenges, especially if a shock or crisis leads to a significant drop in output and declining employment levels. Ensuring resilient urban economies is important everywhere, but it may be even more critical in those cities that are responsible for a significant proportion of their country's economic activity.

### *Building blocks of resilience*

A diversified industrial base can reflect a city's **adaptive capacity** (i.e. acting based on the lessons learnt from past experiences), **robustness** (i.e. having well-designed systems to absorb shocks) and **flexibility** (i.e. responding to changing circumstances in the scope of the plans). A robust system is designed to spread pressure and weight throughout the system. For example, in a city with low industrial diversification, the pressure on economic growth is concentrated on a single or a number of industrial sectors. Thus, any shift in demand for the dominant output in a city can have a significant impact on the city's economy, which will be greater than in a city with a more diversified economy. In addition, the more diversified an economy, the greater the number and types of opportunities for employment, which attracts a more diversified labour force and potentially generates greater possibilities for innovation. However, it is worthwhile to note that diversification might reduce the degree of specialisation in an industry.

### *Suggested parameters and indicators*

Diversification of economy is measured by the share of GDP by individual industrial sector. It is also assessed by the share of the number of employment among the total emolument by each individual sector. To assess the link to the value chain, input-output data are useful to describe the sale and purchase relationships between producers and

consumers. For example, input-output by region within Japan is available in the 2005 Inter-Regional Input-Output Table (METI, 2010). Percentage of GDP and employment in OECD metropolitan areas among their respective countries indicates how much economic activities in metropolitan areas are contributing to the national value. It also suggests how likely they are to be influenced by any shocks that occurred to the entire country, such as the global financial crisis. It is not a direct indicator on the link to the value chain; however, it is closely intertwined with the performance of the national economy, helping to measure the level of cities' exposure to the national and global economies.

### ***Innovation takes place in resilient cities***

Innovation<sup>3</sup> is a key driver of growth, and OECD analysis indicates that innovation contributes to growth in a number of ways (Box 1.4). When these factors are taken together, innovation can account for as much as 50% of total GDP growth, depending on the country, its level of economic development and the phase of the economic cycle (OECD, 2015c). Innovation is also becoming increasingly important for future growth, particularly as labour input in growth is diminishing as a relevant factor in production, and the labour force is starting to decline in many OECD countries. An emphasis on innovation-led productivity as a primary source of future growth is becoming increasingly common. Finally, innovation leads to value creation, which in turn can increase aggregate incomes and positively impact overall living standards (OECD, 2015c).

Innovative capacity can also help diversify economies. Accomplishing this, however, can depend on ensuring that an innovation strategy and/or a competitiveness agenda are in place, together with the necessary support mechanisms. While local economic and government actors should encourage greater innovation and competitiveness, regional and national level support is also important. To take full advantage of the benefits associated with innovation in building a resilient urban economy, national and especially subnational policy makers should also be aware of and work with linkages within innovation systems (Figure 1.6).

#### **Box 1.4. How technological and non-technological innovations contribute to growth**

Innovation – whether technology-based or otherwise – is a critical driver of economic growth. Analysis indicates that innovation contributes to growth via:

- Technological progress embodied in physical capital. The most recent OECD estimates show that approximately 0.35 percentage points of annual average GDP growth between 1995 and 2013 can be attributed to investment in information and communications technology (ICT) capital alone.
- Investment in knowledge-based capital, for example research and development (R&D), design and other intellectual property, data, firm-specific skills or organisational capital. Analysis undertaken by Corrado et al. in 2012 found that business investment in knowledge-based capital accounted for 0.5 percentage points of annual average GDP growth in EU countries from 1995 to 2007 and 0.9 percentage points in the United States.
- Increased multifactor productivity growth, reflecting increased efficiency in the use of labour and capital, much of which can be attributed to innovation, including process and organisational innovation. Between 1995 and 2013, multifactor productivity accounted for over 0.7 percentage points of annual average GDP growth (about one-third of total GDP growth) in 20 OECD countries.

#### Box 1.4. How technological and non-technological innovations contribute to growth (cont.)

- Creative destruction that results from innovation, as new firms enter the market, sometimes growing rapidly and increasing their market share, replacing firms with low productivity (Andrews and Criscuolo, 2013). Recent OECD analysis shows that aggregate productivity growth is driven by resource reallocation.

Sources: OECD (2015b), “OECD Innovation Strategy 2015: An agenda for policy action”, [www.oecd.org/sti/OECD-Innovation-Strategy-2015-CMIN2015-7.pdf](http://www.oecd.org/sti/OECD-Innovation-Strategy-2015-CMIN2015-7.pdf); Corrado et al. (2012), “Intangible capital and growth in advanced economies: Measurement methods and comparative results”, <http://repec.iza.org/dp6733.pdf>; Andrews and Criscuolo (2013), “Knowledge-based capital, innovation and resource allocation”, <http://dx.doi.org/10.1787/5k46bj546kzs-en>.

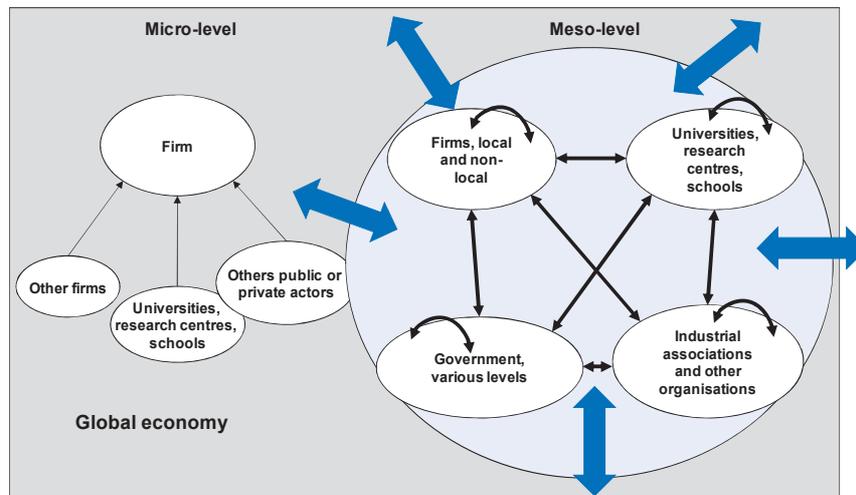
#### *Building blocks of resilience*

A city with higher innovation capacity is likely to be more resilient. This is primarily due to the greater growth potential associated with innovation, and also to the possibility of greater economic diversification that can arise as a result of new products, services, processes, etc. Innovation can be an indication of a system’s **resourcefulness** (i.e. finding alternative ways to meet crucial needs with resources available) and implies an **adaptive capacity** (i.e. acting based on the lessons learnt from past experiences), as well as **flexibility** (i.e. responding to changing circumstances in the scope of their plans).

#### *Suggested parameters and indicators*

The human and social capital that drives innovation must also be considered and built, by generating appropriate skills bases and nurturing the networks that can help bring new ideas to market. Knowledge and entrepreneurial activity are fundamental to dynamic urban economies, and both tend to concentrate in cities (OECD, 2013c).<sup>4</sup> Such activity includes **research and development** in the academic and private sector. **Entrepreneurialism** is a key element in innovation potential, which can be measured in terms of business demography data, such as birth-to-market launch rates, and successful start-up rates.<sup>5</sup>

Figure 1.6. Regional innovation system linkages: From the micro to the meso



*Note:* A regional innovation system is a localised network of actors and institutions in the public and private sectors whose activities and interactions generate, import, modify and diffuse new technologies within and outside the region. A region here can also be a city area.

*Sources:* OECD (2013b), *Policy Making after Disasters: Helping Regions Become Resilient – The Case of Post-Earthquake Abruzzo*, <http://dx.doi.org/10.1787/9789264189577-en>; originally adapted from Iammarino, Padilla and von Tunzelmann (2008), “Technological capabilities and global-local interactions: The electronics industry in two Mexican regions”, <http://dx.doi.org/10.1016/j.worlddev.2007.10.022>.

### ***Workforce has diverse skills***

A workforce base with the appropriate skills helps the economy to become more flexible and responsive to economic and social change. Governments can encourage these links by ensuring that public investments designed to build greater resilience also serve to develop the workforce. Skills are associated with social factors that contribute to or impact resilience, including building stronger communities and social networks, and an individual’s capacity to assess, manage and absorb risk – which is particularly important in times of crisis or when confronted with stress (OECD, 2014a).

### ***Building blocks of resilience***

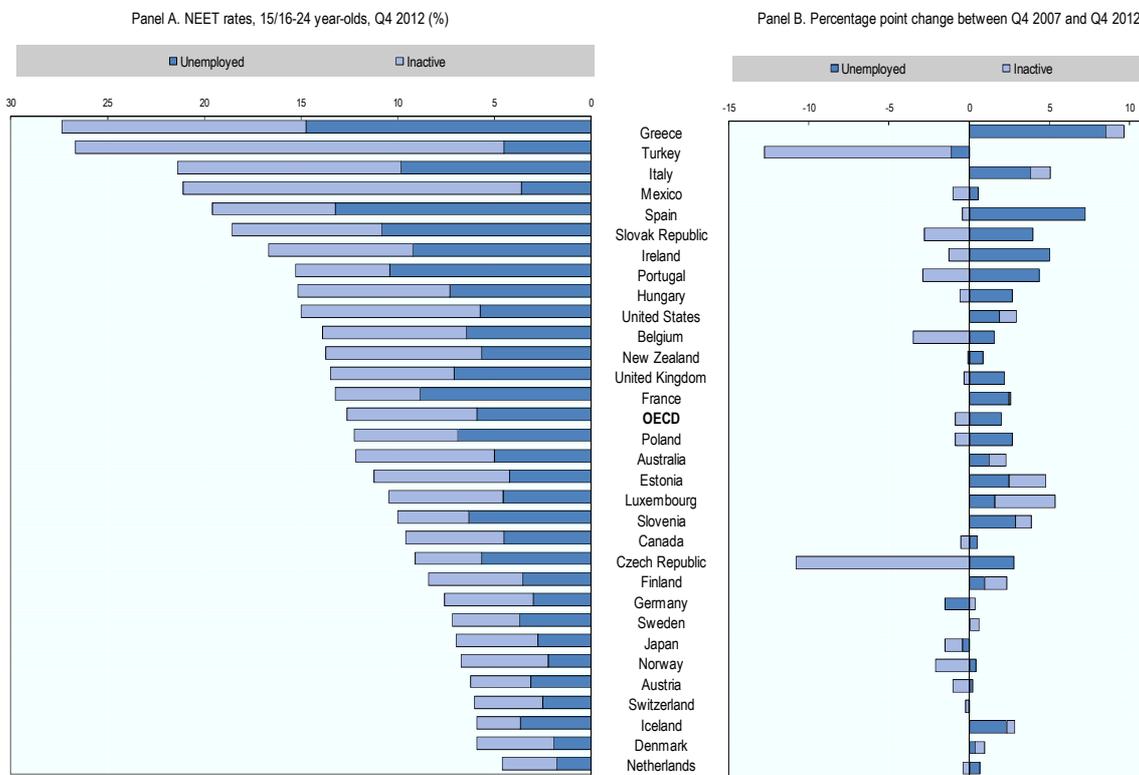
A city that facilitates access to opportunities can exhibit greater resilience through its capacity for **adaptability** (i.e. its inhabitants are able to learn), **flexibility** (i.e. they respond to changing circumstances in the moment), **resourcefulness** (i.e. they find ways to meet critical needs with the resources available) and **inclusiveness** (i.e. they bring diverse perspectives together).

### ***Suggested parameters and indicators***

**Education** has personal returns, including, for example, access to better jobs and the possibility of generating greater income; but it also has returns that can affect economic resilience in cities. The evidence indicates that inequality in education levels causes a divergence in labour productivity and salaries for both the highly skilled and low skilled (OECD, 2014c). Data on the proportion of the labour force with a tertiary education are useful to understand the educational attainment.

Access to **job opportunities** is also an important factor. One challenge facing many countries is ensuring adequate and appropriate opportunities for young people. The opportunity to participate in employment, education or training is important for them so that they can become established in the labour market and achieve self-sufficiency, as well as build social connections and social capital (OECD, 2014f). It gives also impact on the quality of the workforce in the future, if the current young population stays out of the labour market and has less experience to contribute to the economy. The number of young people who are neither in education nor employment (often referred to as NEET) has been rising in most OECD countries (Figure 1.7), and the impact is felt most strongly at the local level. The growing numbers of NEET can mean losing the current and future productivity benefits of a segment of the labour force, with negative medium- and long-term consequences for labour force preparedness, economic and inclusive growth, and social cohesion. In time, this can affect a city’s economic and social resilience.

Figure 1.7. **Young people who are unemployed or inactive and not in education or training (NEET)**



Sources: Adapted from OECD (2014f), *Society at a Glance 2014: OECD Social Indicators*, [http://dx.doi.org/10.1787/soc\\_glance-2014-en](http://dx.doi.org/10.1787/soc_glance-2014-en); OECD estimates based on national labour force surveys, *OECD Short-Term Labour Market Statistics*; OECD (2013c), *OECD Employment Outlook 2013*, [http://dx.doi.org/10.1787/empl\\_outlook-2013-en](http://dx.doi.org/10.1787/empl_outlook-2013-en); OECD (2013d), *Education at a Glance 2013: OECD Indicators*, <http://dx.doi.org/10.1787/eag-2013-en>; OECD (2013e), *International Migration Outlook 2013*, [http://dx.doi.org/10.1787/migr\\_outlook-2013-en](http://dx.doi.org/10.1787/migr_outlook-2013-en); European countries: Eurostat (2014), “Labour Force Surveys Q1-Q3 2008, Q1-Q3 2011, Q1-Q3 2012”, <http://ec.europa.eu/eurostat/web/microdata/european-union-labour-force-survey>; United States: Monthly Current Population Surveys, 2007, 2011 and 2012.

### ***Resilient cities have adequate and reliable infrastructure***

Resilient cities have adequate and reliable infrastructure that fulfils its expected functions. Infrastructure is the backbone of economic capacity, but it also impacts directly on human development, social inclusion and environmental sustainability. Infrastructure is a fundamental component in the delivery of key public services. Such infrastructure includes roads, bridges and airports; homes, offices, commercial and recreation centres; and facilities including water supply, waste repositories, sources of electricity generation and communications centres. Infrastructure is needed to satisfy basic needs not only in peacetime, but also in a crisis, such as a natural disaster, including the provision and acquisition of food, water, sanitation services, energy and shelter. Infrastructure can also help increase a city's defences against the risk of disaster, for example seismically sound construction in seismically vulnerable areas, or flood barriers in areas prone to flooding. Each of these elements is important, and a systematic, integrated approach to infrastructure is needed, from buildings to ICT, as well as consideration of the impact inadequate infrastructure may have on social stability.

However, experience across OECD countries shows that substantial benefits can be realised by better governance of public investment throughout its life cycle and across levels of government and that the quality of public governance correlates with public investment and growth outcomes as well as good budgetary governance. Conversely, poor governance is a major reason why infrastructure projects fail to meet their timeframe, budget and service delivery objectives. Governance challenges include:

- weak capacity to design a strategic vision
- insufficient focus on a well-managed consultation process
- deficient co-ordination across levels of government despite the fact that an infrastructure asset's functional area is often not the same as the political jurisdiction
- uncertainty with regards to revenue flows erodes confidence in a project's affordability
- a lack of systematic data collection on performance makes it difficult to determine which type of procurement is the most cost-effective
- allocating risks between public and private parties can be difficult
- institutional and legal incentives may generate suboptimal investment choices, e.g. off-budget financing
- unstable regulatory frameworks can prevent long-term decisions
- infrastructure procurement is vulnerable to corruption.

In addition, ageing infrastructure is not likely to meet changing demographic needs and will weaken urban resilience. Ageing infrastructure can not only fail to protect citizens, but expose them to risk. It can also jeopardise a city's capacity to ensure critical services after a disaster. Ageing infrastructure that barely maintains its function does not always guarantee the best quality of services.

In response, the OECD is currently developing a framework for the governance of infrastructure to ensure that infrastructure programmes make the right projects happen, in a cost-efficient and affordable manner, that is trusted by users and citizens to take their views into account, by offering a list of governance preconditions and a decision tree to guide countries with respect to taking sectoral decisions and overall infrastructure

decisions. Governance of infrastructure is critical to realise substantial benefits of infrastructure (OECD, 2015f). Governance of infrastructure means the processes, tools and norms of interaction, decision making and monitoring used by governmental organisations and their counterparts with respect to making infrastructure services available to the public and the public sector.

### *Building blocks of resilience*

Resilient cities provide adequate and reliable infrastructure in order to withstand, recover and rebuild from any type of shock. The **robustness** of a city’s built environment is fundamental, as is **redundancy** in many instances. Robustness (i.e. having well-designed systems to absorb shocks) and redundancy (i.e. having spare capacity for unexpected needs) are also needed.

### *Suggested parameters and indicators*

Indicators for infrastructure include those suggested by the International Transport Forum’s (ITF) *Transport Outlook 2015* (OECD and ITF, 2015). It is also important to consider whether infrastructure can meet the needs of economic and social activities and fulfil its expected function in disasters. The impact of financial crises on the supply of funds for existing plans is another consideration. Measuring the adequacy and reliability of infrastructure requires: 1) **a back-up plan for the main infrastructure network**; 2) **a maintenance plan**, in particular for **ageing infrastructure**; and 3) **infrastructure that actively withstands disasters**.

## **Society in resilient cities**

Cities that have higher levels of social capital, a stronger community fabric and a more robust social infrastructure are more able to overcome shocks. This is supported by opportunities to access public services, education and jobs. Resilient societies have sub-drivers, which can be mainly described by a number of parameters and indicators (Table 1.8). The details on indicators will be discussed in Chapter 2.

Table 1.8. **Parameters and possible indicators for a resilient society**

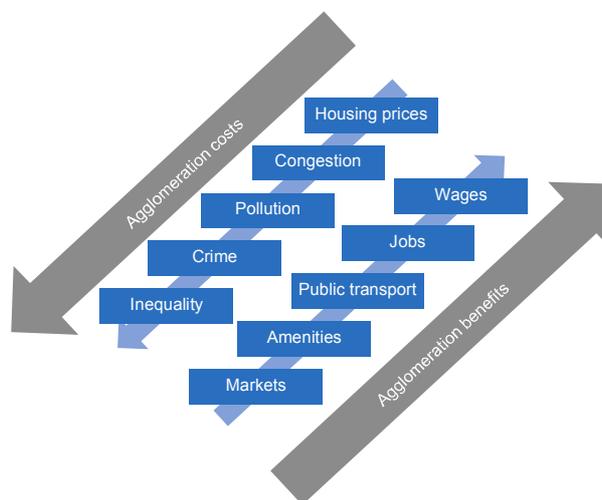
Driver	Sub-drivers	Parameters	Possible indicators(examples)
Society	Society is inclusive and cohesive	Demographic change	– Population (inflow/outflow) – Immigrants
		Income	– Household income – Poverty level – GINI coefficient
		Safety	– Perceived safety – Crime rate
	Citizens’ networks in communities are active	Citizens’ network	– Number of community associations
	People have access to services	Access to services	– Accessibility to public services (hospitals) – Accessibility to public transport

### ***Resilient cities are inclusive and promote cohesion***

Living in cities has both benefits and costs for citizens. While cities have the potential to provide jobs, better access to services and access to amenities that can build social capital, inequalities are particularly relevant in an urban context. Evidence suggests that

inequalities tend to be greater in urban areas than in their respective countries, and that across OECD countries, income inequalities are on average higher in large cities, especially in OECD metropolitan areas (Figure 1.8) (OECD, 2015a; 2014c).

Figure 1.8. **The costs and benefits of large cities**



Source: OECD (2015a), *The Metropolitan Century: Understanding Urbanisation and its Consequences*, <http://dx.doi.org/10.1787/9789264228733-en>.

When aiming to build a more resilient society, policy makers should consider the degree and causes of socio-economic inequality in a city; why it occurred; where and how it is most manifest; and how it may be impacting factors that can reduce resilience, such as poor education, poor health, low social capital, failing businesses, environmental degradation, etc. Other issues to consider include governance in general and how interventions to build a more resilient society support or undermine efforts to build greater resilience in the economy and environment in cities. At the same time, the social infrastructure of individual communities should be taken into account, specifically the people, places and institutions that form each neighbourhood. This can provide some indication as to whether the community will collectively manage to withstand a sudden shock or long-term crisis.

#### *Suggested parameters and indicators*

Demographic change influences the inclusiveness of societies. Data on **inflow and outflow of population** have to be assessed, given the various reasons that cause people to move. For example, cities with a robust economy tend to attract young people looking for jobs or education opportunities, whether from within or outside the country. The large inflow of a young, highly educated population with high income can result in the gentrification of entire neighbourhoods. The process by which higher-income households displace lower-income residents changes the character of a neighbourhood (Kennedy and Leonard, 2001). For example in Lisbon, gentrification is described as increasing the pressure on lower-income populations in the city's historic downtown area. Both the influx of younger well-educated professionals and the booming tourism sector have driven up the cost of living, leading to an outmigration of long-time residents to less expensive areas on Lisbon's periphery and suburbs. On the other hand, during a

recession, residents may move out as jobs in the city dry up. Such **migration** changes a city's social fabric. If such change occurs at high frequency and involves a large number of people, it may loosen established network ties in local communities.

**Income and household disposable income** can offer a good indication of potential economic dynamism, because they provide insight into consumption capacity. Income permits individuals and families to satisfy their basic needs as well as needs important for other aspects of their lives. Thus, from a well-being perspective, income, like employment, can impact life satisfaction and social connections (OECD, 2014c). Income and employment can support the social infrastructure of people, places and institutions, forming a cohesive community as a critical feature of a resilient urban society. Attention needs to be given to minimising agglomeration costs while maximising agglomeration benefits (OECD, 2015a). Ways of assessing this include: the **GINI coefficient**; **poverty** and **extreme poverty levels** over time, and indicators of social stability or instability (e.g. riots or other forms of civil unrest) (Box 1.5). The impact of socio-economic inequalities on urban resilience, and its relationship with the degree of social infrastructure merit further discussion.

#### Box 1.5. Measuring inequality and well-being in cities

Many socio-economic inequalities have a strong spatial dimension, in which cities play a major role. In terms of several well-being dimensions, the largest spatial inequalities are observed at the city level, especially when population is grouped by race and ethnicity (Lewis and Burd-Sharps, 2013). Within cities and metropolitan areas, income inequality tends to rise with city size and with per capita income levels, even after controlling for a wide range of factors, including industrial structure and workforce skills (Baum-Snow and Pavan, 2013). At the urban scale, inequality is often reflected in the spatial sorting of groups according to income (socio-spatial segregation). This is at the same time a driver and a consequence of interpersonal inequality. Neighbourhoods with lower incomes typically have poorer schools and local amenities and often suffer from poorer access to transport networks and thus to services, jobs and educational opportunities. On the whole, residents of such places also have poorer social networks, which can be crucial to employment prospects (Olli-Segendorf, 2005). These factors all tend to reinforce the inequalities that lead to spatial sorting in the first place. Urban policies and planning can either reinforce or mitigate such inequalities.

*Source:* Adapted from OECD (2014c), *How's Life in Your Region? Measuring Regional and Local Well-being for Policy Making*, <http://dx.doi.org/10.1787/9789264217416-en>.

Safety in neighbourhoods matters to increase cohesiveness in the community and to enhance interactions among citizens. It contributes to the attractiveness of a community, and thus supports economic dynamism. High levels of **perceived safety** (i.e. people feeling that they are safe) support greater interaction in a community, for example between neighbours, with local businesses, etc.; but the opposite can build social isolation, which weakens social infrastructure. In addition, perceived safety can make or break a city's reputation as a place to live, work, raise a family, etc. This in turn can significantly impact the city's ability to attract employers and talent. **Crime rates** affect the overall well-being of a community, particularly with respect to perceived safety. OECD work on regional well-being highlights evidence showing that crime rates are associated with other dimensions of well-being, such as education, access to jobs and social connections (OECD, 2014c). The empirical literature indicates that increasing the

level of schooling can lower crime rates, and that crime rates, in turn, drop with job accessibility (OECD, 2014c; original sources: Lochner and Moretti, 2004; Machin, Marie and Vujić, 2011; Gaigné and Zenou, 2013).

### *Building blocks of resilience*

A city that is able to show inclusiveness and cohesiveness needs to have an overall capacity of resilience, in particular, **inclusiveness** (i.e. bringing diverse perspectives together), **adaptive capacity** (i.e. fact-based on lessons learnt from past experiences), as well as **integrated** (i.e. they work together beyond boundaries).

### *Resilient cities have an active community network*

Communities where neighbours interact positively with each other, where local businesses animate commercial and daily life, and where there are local communities (e.g. neighbourhood associations) that help people establish ties to each other and to their community, all help build a stronger society in cities. If this is not characteristic of a city as a whole, it is a critical characteristic for the resilience of communities.

Rapid urban growth can also affect a city's social infrastructure. It affects population density and increases pressure on communities. For example, in Japan, the participation rate in community associations in general is lower in newly developed areas, where the proportion of the younger population is higher, and in areas with higher numbers of single households (Ministry of Internal Affairs and Communication, 2014). In addition, such growth puts stress on urban infrastructure, amenities, services and the environment. Cities that are undergoing or are expecting to undergo rapid growth, such as Cardiff (United Kingdom), are also looking to build a more resilient urban society where the pressures of growth are managed and communities can become more engaged in service provision, for example.

Social isolation can be a particular concern among older people and increase their vulnerability to natural disasters and climate change. After the Great East Japan earthquake in March 2011, for example, citizens engaged in activities in local communities in devastated areas tended to support other refugees, even though they themselves had been displaced (Figure 1.9) (Cabinet Office, 2014a). The 1995 heat wave in Chicago and the 2003 heat wave in France had an especially strong impact on older people living alone (OECD, 2015d). In a city, it is often the communities that exhibit stronger social ties, a stronger sense of identity and that encourage a sense of belonging that overcome adversity more quickly and in a transformative manner (Box 1.6).

### *Building blocks of resilience*

A city that has an active community network tends to have an overall capacity of resilience. This, in particular, enhances its **adaptive capacity** (i.e. acting based on the lessons learnt from past experiences), **robustness** (i.e. having a well-designed system to absorb shocks), as well as its **inclusiveness** (i.e. bringing diverse perspectives together) and **integrated approach** (i.e. working together beyond boundaries).

### Box 1.6. The importance of social infrastructure in overcoming adversity: Lessons from a heat wave and a hurricane

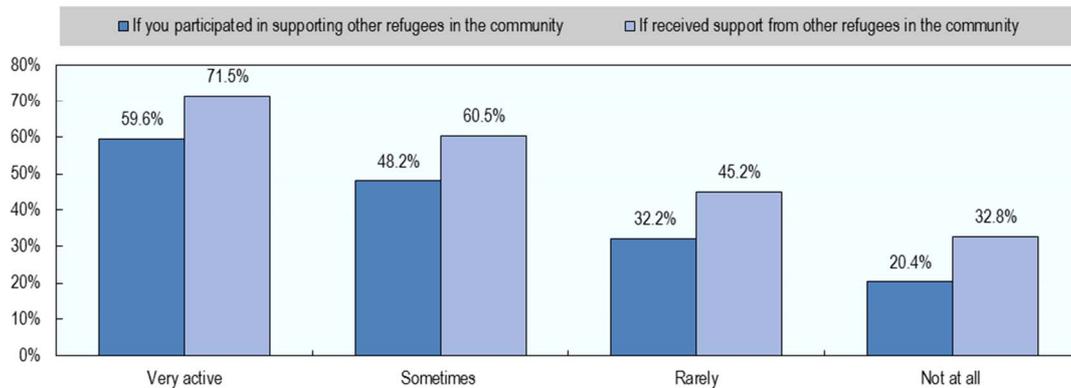
In an effort to understand and explain why some populations are more affected by a specific shock than others, researchers identified the fundamental importance of social infrastructure, i.e. people, places and institutions that build and support community ties and networks. The importance of social infrastructure on resilience is clearly illustrated by two climate-related shocks that occurred in the United States.

In July 1995, a three-day heat wave hit **Chicago, Illinois**, ultimately resulting in over 730 deaths. While none of the city was spared, some neighbourhoods were more affected than others. For example, eight out of the ten communities with the most heat wave-related deaths were almost all African-American, and were characterised by pockets of poverty, violent crime and social isolation among the aged. At the same time, three out of the ten neighbourhoods that experienced the fewest heat wave-related deaths had the same profile. One community, Englewood, experienced 33 deaths per 100 000 residents, while another, Auburn Gresham, experienced only 3 per 100 000 residents (this was a better outcome than in some very affluent neighbourhoods). Englewood and Auburn Gresham were very similar: both are in the South Side of Chicago, had similar proportions of ageing residents and were 99% African-American demographically. Researchers identified social cohesion and social infrastructure as the fundamental differences among these neighbourhoods. Between 1960 and 1990, Englewood experienced a 50% drop in residents, and also a decline in neighbourhood businesses; neighbours did not know each other, and elderly residents in particular were uneasy about leaving their homes. Meanwhile in Auburn Gresham, people knew their neighbours, felt safe walking to stores and restaurants in the neighbourhood, participated in community clubs and religious groups, and so on. When the heat wave arrived, people in Auburn Gresham were better equipped to identify those who might need assistance and check on them, particularly elderly residents and the sick and less mobile.

After Hurricane Katrina hit **New Orleans, Louisiana**, in 2005, the city was faced with rebuilding. Early official proposals floated the possibility of reducing the city's overall land mass, which meant reducing or eliminating neighbourhoods. One community that would potentially be affected, Broadmoor, had a long history of civic engagement, and an active neighbourhood organisation, the Broadmoor Improvement Association (BIA). The Broadmoor community leveraged both of these assets to strengthen the neighbourhood's capacity to fight against urban restructuring and relocation plans that had been developed without significant consultation with all of the city's communities. The BIA set out to show planning commissions that the neighbourhood was not abandoned, and maintained its vitality: neighbours located and called other neighbours who had left the area after Katrina and determined whether they were planning to return; the BIA helped individual residents restart their utility services and identify trustworthy building contractors to make their homes habitable again; and the community identified ways to combine elements of the proposals put forth by the official rebuilding commission into their own neighbourhood repopulation plan. In addition, they went to other community stakeholders, partnered with universities and raised funds to rebuild a library and a community centre, as well as using state money to finance the renovation of the neighbourhood school.

*Sources:* Klinenberg (2013), "Adaptation: How can cities be 'climate-proofed'?" ; Uberti (2015), "Ten years after the storm: Has New Orleans learned the lessons of Hurricane Katrina?" [www.theguardian.com/cities/2015/jul/27/new-orleans-hurricane-katrina-10-years-lessons?CMP=Share\\_iOSApp\\_Other](http://www.theguardian.com/cities/2015/jul/27/new-orleans-hurricane-katrina-10-years-lessons?CMP=Share_iOSApp_Other).

Figure 1.9. Community support before and after the Great East Japan earthquake



Note: Research was conducted by the Japan NPO (Non-profit Organisation) Center in 2014, under the title “Recovery of livelihood and self-support by communities”. A questionnaire was circulated to 13 441 citizens in devastated areas, specifically the Miyagi, Iwate and Fukushima Prefectures, and received 6 530 responses.

Source: Cabinet Office (2014a), “White paper on disaster prevention” (in Japanese), [www.bousai.go.jp/kaigirep/hakusho/h26](http://www.bousai.go.jp/kaigirep/hakusho/h26).

### *Suggested parameters and indicators*

The degree of citizens’ networks can be measured by community associations, which are not organised by the legitimate local authorities, but by the voluntary willingness of citizens at the neighbourhood or school district level. The number, the participation ratio of local residents and the frequency of activities of community associations could be the parameters and indicators to measure.

### *Resilient cities offer access to services*

Opportunities to learn, work and have access to public services contribute to citizens well-being as well as economic development, and thus matters to urban resilience. The extent to which a given service is accessible to an individual can be considered both from physical and economical perspectives. Physical accessibility concerns the ability to reach the place where the service is provided while economic accessibility refers to the affordability of a given service, including both the cost of the service and associated transaction costs, such as the costs of search, information and transport (OECD, 2014a).

Measuring access to services allows for deeper insight into disparities in well-being across different cities, providing an opportunity to clarify and assess their level of social resilience. Significant disparities in access to basic and advanced services such as transport, education, water and sanitation, health and ICT, persist across and within regions. Analysing access to services can be led by identifying under-serviced areas and helping to satisfy the needs.

### *Building blocks of resilience*

A city that facilitates access to services can exhibit greater resilience through its capacity for **adaptive capacity** (i.e. acting based on the lessons learnt from past experiences), **flexibility** (i.e. responding to changing circumstances in the scope of their plans), **resourcefulness** (i.e. finding alternative ways to meet critical needs with the resources available) and **inclusiveness** (i.e. bringing diverse perspectives together).

*Suggested parameters and indicators*

A simple outcome indicator in this area is the proportion of resident population living within proximity to various public services such as a supermarket, pharmacy, physician, post office, bank and hospital. Another indicator could be the level of unmet medical need, that is, the percentage of individuals who report one or more occasions on which they were in need of medical treatment or examinations but failed to receive either.

**Environment in resilient cities**

This OECD framework includes under the term “environment” the natural environment and the built environment, including urban development, supported by urban infrastructure. A great deal has been written about resilience in the face of natural and environmental disasters, and a significant number of tools are available to evaluate the resilience of urban areas in light of such challenges. Because of the large body of existing work on this topic, this OECD framework covers disaster risk reduction<sup>6</sup> in urban resilience only briefly, and discusses other factors that can support a resilient environment in cities, particularly those linked to infrastructure, urban planning and urban resource management.

Addressing environmental factors that build a more resilient urban environment can also contribute to a more resilient society. For example, air and noise pollution, both endemic in urban areas, are well-known to affect human health. Reducing air pollution can have a positive impact on a population’s cardiovascular and respiratory health, potentially reducing lung cancer, heart disease, stroke and chronic respiratory diseases such as asthma (WHO, 2014). Measuring PM<sub>2.5</sub> can give city officials, and citizens, insight on the pollution levels in their city, and what impact pollution reduction policies may be having on the environment. Meanwhile, noise pollution has significant implications for human productivity. According to the World Health Organisation (WHO), noise pollution is associated with adverse health outcomes in seven areas: 1) noise-induced hearing impairment; 2) interference with speech communication which can result in problems with concentration, fatigue, lack of confidence, decreased working capacity and a variety of stress reactions; 3) disturbed rest and sleep; 4) cardiovascular and physiological effects; 5) mental health effects; 6) effects on performance, particularly with respect to cognitive tasks; 7) effects on residential behaviour and annoyance (Berglund, Lindvall and Schwela, 1999).

Policy levers that can help build a resilient urban environment, both natural and built, include a strategically designed, long-term urban development policy; land-use planning policy; housing policy; water and energy policies; infrastructure policies; building regulations; codes and standards; and emergency response and contingency plans. In addition, activities that promote green growth and biodiversity, as well as landscaping that uses the natural environment (e.g. river beds, sand dunes, wetlands, etc.) to support the potential needs of the built environment, fulfil multiple purposes and can build resilience. Investing in cleaner and quieter transport, housing that is more energy-efficient and better waste management can all contribute to reducing air and noise pollution, and support resilience as well.

A resilient environment has sub-drivers that can be described using certain parameters and indicators (Table 1.9).

Table 1.9. Parameters and possible indicators for a resilient environment

Driver	Sub-drivers	Parameters	Possible indicators (examples)
Environment	Urban development is sustainable	Aligns with long-term urban development strategy	<ul style="list-style-type: none"> <li>– Long-term strategies (i.e. compact city policies, etc.)</li> <li>– A risk-based land-use strategy</li> </ul>
	Adequate and reliable infrastructure is available	Fulfils expected purpose	<ul style="list-style-type: none"> <li>– Back-up plans</li> <li>– Long-term maintenance plans</li> <li>– Disaster preparedness infrastructure</li> </ul>
	Adequate natural resources are available	Pollution/emissions  Energy	<ul style="list-style-type: none"> <li>– Air, water and green space quality</li> <li>– Air, water and green space quantity</li> <li>– Energy consumption and production, smart energy management</li> </ul>

### *Resilient cities are based on sustainable urban development*

Land-use planning is a crucial tool for managing risk and improving resilience. This is particularly the case for urban areas vulnerable to natural or environmental disasters, as well as for those that are facing a steady influx of population. When land-use planning is not grounded in longer-term development objectives or does not take sufficient consideration of potential risk, it puts the population and city at risk in poorly co-ordinated land use, deteriorating the quality of the living environment and causing economic losses. Land-use planning also needs to accommodate the realities of a community. This means that it should be adaptive, given that the community profile, size and density may change over time; inclusive, to ensure that socio-spatial segregation does not arise; and integrated, for example, with transport plans.

Many urban plans and long-term urban development strategies include policy guidelines for how land should be used. Plans can promote compactness, greenfield use and regeneration of city centres. As part of these larger strategies, land-use planning can offer solutions to cope with long-term urban pressures, such as growing population, ageing and over-dependence on automobiles. London’s approach to housing for its growing population includes developing areas of vacant or underutilised land, and co-ordinating this with improved transport and more intense use of town centres (City of New York, 2015b); Yokohama, a proportion of whose older population is higher than the average in Japan, is focusing on revitalising existing residential areas to offer medical, welfare, child care and commercial activities within the same building complex, so that public services for older people are provided close to their homes (OECD, 2015d); Wellington, in New Zealand, is emphasising alternative forms of transport, such as cycling and walking, which includes improving the city for cyclists and improving pedestrian accessibility, both of which depend on a land-use and a transport component (Wellington City Council, n.d.).

“Risk-based” land-use planning identifies the safest locations and the regulations necessary for guiding urban development. It can help control development in high-risk or hazard-prone areas, makes rescue operations easier and provides emergency shelter. The primary objectives of “risk-based” land-use planning are to: 1) identify and mitigate disaster risks already embedded in land development practices via building codes and regulations for land use in risk areas; 2) support more rapid response by emergency and other services, by ensuring open spaces and well-planned road networks; 3) control urban growth, by rebuilding and upgrading existing urban infrastructure without creating new risks (Jha, Miner and Stanton-Geddes, 2013).

### *Building blocks of resilience*

Land-use planning needs **adaptive capacity** (i.e. acting based on the lessons learnt from past experiences), **redundancy** (i.e. they have spare capacity for unexpected needs) and **integrated approach** (i.e. working together beyond boundaries) in multi-level governance.

### *Suggested parameters and indicators*

Land-use planning for greater resilience can be approached in two ways: 1) **integrating land-use guidelines** or objectives into **broader or long-term urban development strategies**; 2) establishing “**risk-based**” **land-use planning practices** that consider both location and safety. Assessing whether both types of land-use planning have been included is a good approach for understanding to what extent a city is based on sustainable urban development. However, such assessment tends to conclude qualitative assessment only. Note that these are not mutually exclusive, and their combination can further help to meet resilience objectives for the natural and built environment.

### *Resilient cities have adequate natural resources*

An urban area’s natural environment, including its air, water, flora, fauna and green space, can have a significant impact on resilience. Ecosystems regulate the supply and quality of air, water and soil, and parks and flora in cities can reduce the urban heat-island effect (Convention on Biological Diversity Secretariat, 2012). Ensuring the access and continual provision of resources, such as water and energy, is critical to a city’s resilience. Without water, water management and wastewater services, public health can be put at risk. Without energy, the day-to-day functioning of an urban environment can grind to a halt. For example, energy demand in cities is projected to grow by 57% between 2006 and 2030, about 2.7 times more than the growth forecast for areas outside cities (Figure 1.10). It is expected to account for 73% of the world’s energy consumption by 2030. Energy is one of the crucial elements in building resilience in cities, because it is indispensable in sustaining large populations, diverse urban functions, industry and the overall economic growth of cities. The level and type of energy use in cities has an impact not only on the economic, environmental and well-being of urban citizens, but also on residents elsewhere. Energy consumption is a cause of greenhouse gas emissions, and approximately 71% of global energy-related emissions of carbon dioxide are caused by energy use in cities (IEA, 2008). In addition, interruptions of the energy supply result in substantial increases in energy costs and can lead to costly disruption of services (OECD, 2007), with potentially wider regional or global effects through supply chains.

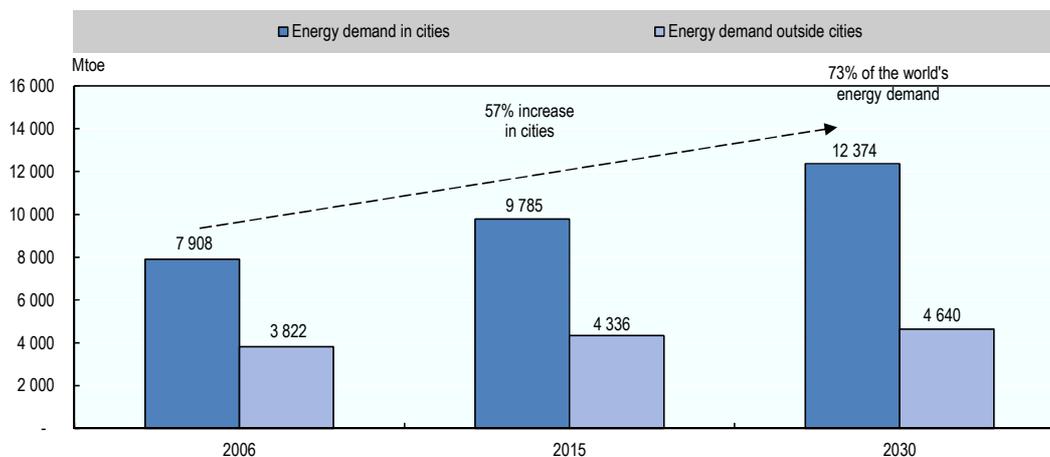
### *Building blocks*

A resilient city with adequate natural resources is **resourceful** (i.e. finding alternative ways to meet critical needs with resources available) and has **redundancy** (i.e. spare capacity for unexpected needs), as well as **adaptive capacity** (i.e. acting based on lessons learnt) and **robustness** (i.e. having a well-designed system to absorb shocks).

### *Suggested parameters and indicators*

Adequate natural resources, such as water, air and green space, can be measured both by the **quality** (PM for air, mg/l NO<sub>3</sub> for water) and by the **quantity** (square metres of space, litter, etc.). Energy is measured by the amount of consumption and production, as well as the efficiency of usage and smart energy management.

Figure 1.10. Estimated energy demand in cities



Note: “Cities” refers to all urban areas, from megacities to smaller-scale urban settlements. Energy demand was calculated by data including the United States, European Union, Australia, New Zealand, the People’s Republic of China, Tokyo and Moscow (IEA, 2008). “Outside cities” refers to the area outside the aforementioned “cities”.

Source: IEA (2008), *World Energy Outlook 2008*, <http://dx.doi.org/10.1787/weo-2008-en>.

## Institutions in resilient cities

Resilient cities cannot be realised without adequate institutions and governance systems. Unless public institutions function appropriately, the potential for resilience in this area will be weaker. It is generally understood in the literature that effective leadership and management is fundamental to ensuring urban resilience. Citizens need to be able to trust their public institutions and officials. This includes confidence in their capacity to act and react, to be reliable, to serve with integrity, and to deliver quality and affordable services even in times of shock or distress or in the face of persistent or chronic pressure. Building resilience at the city level certainly requires political will, but it also requires committed leadership and management, strong strategic capacity among local authorities, an ability to think in an integrated fashion across sectors, a good degree of resource flexibility, and a commitment to openness and transparency. Resilient institutions are essential to the other three dimensions of resilience. Policy levers that could support more resilient urban institutions and governance include “whole-of-government” approaches to management and to policy development; integrated medium- and long-term strategic planning; short-term programming with clear objectives, complemented by monitoring and evaluation mechanisms; open government and open data policies; active citizen engagement; integrated front- and back-office operating systems; and ensuring enforceable regulations and standards.

The OECD *Recommendation of the Council on the Governance of Critical Risks* (OECD, 2014h), developed by the OECD High-Level Risk Forum and adopted at the OECD Ministerial Council Meeting in May 2014, offers principles for deepening understanding of how to govern and manage complex national risks (Box 1.7).

Resilient institutions have sub-drivers, which can be outlined in a series of parameters and indicators (Table 1.10). The details on indicators will be discussed in Chapter 2.

### Box 1.7. Recommendation of the Council on the Governance of Critical Risks

This OECD Recommendation is designed to provide strategic guidance to national leaders who recognise that the implementation of this cycle faces considerable governance challenges, both at the national level and internationally. It seeks to encourage future co-operation between countries and with other key partners, including the private sector, building common ground, and promoting continuous improvement regarding the governance and management of critical risks. Key recommendations are as follows:

#### **I. Establish and promote a comprehensive, all-hazards and transboundary approach to country risk governance, to serve as the foundation for enhancing national resilience and responsiveness.**

1. Develop a national strategy for the governance of critical risks.
2. Assign leadership at the national level to drive policy implementation, connect policy agendas and align competing priorities across ministries and between central and local government.
3. Engage all government actors at national and subnational levels, to co-ordinate a range of stakeholders in inclusive policy-making processes.
4. Establish partnerships with the private sector to achieve responsiveness and shared responsibilities aligned with the national strategy.

#### **II. Build preparedness through foresight analysis, risk assessments and financing frameworks, to better anticipate complex and wide-ranging impacts.**

1. Develop risk anticipation capacity linked directly to decision making.
2. Equip departments and agencies with the capacity to anticipate and manage human-induced threats.
3. Monitor and strengthen core risk management capacities.
4. Plan for contingent liabilities within clear public finance frameworks by enhancing efforts to minimise the impact that critical risks may have on public finances and the fiscal position of the country in order to support greater resilience.

#### **III. Raise awareness of critical risks, to mobilise households, businesses and international stakeholders and foster investment in risk prevention and mitigation.**

1. Encourage a whole-of-society approach to risk communication and facilitate transboundary co-operation using risk registries, media and other public communications on critical risks.
2. Strengthen the mix of structural protection and non-structural measures to reduce critical risks.
3. Encourage businesses to take steps to ensure business continuity, with a specific focus on critical infrastructure operators.

#### **IV. Develop adaptive capacity in crisis management by co-ordinating resources across government, its agencies and broader networks to support timely decision making, communication and emergency responses.**

1. Establish strategic crisis management capacities to prepare for unknown and unexpected risks that provoke crises.

### Box 1.7. Recommendation of the Council on the Governance of Critical Risks (continued)

2. Strengthen crisis leadership, early detection and sense making capacity, and conduct exercises to support inter-agency and international co-operation.
3. Establish the competence and capacities to scale up emergency response capabilities, to contend with crises that result from critical risks.
4. Build institutional capacity to design and oversee recovery and reconstruction plans.

#### V. Demonstrate transparency and accountability in risk-related decision making by incorporating good governance practices and continuously learning from experience and science.

1. Ensure transparency regarding the information used to ensure risk management decisions are better accepted by stakeholders to facilitate policy implementation and limit reputational damage.
2. Enhance government capacity to make the most of resources dedicated to public safety, national security, preparedness and resilience.
3. Continuously share knowledge, including lessons learnt from previous events, research and science.

Sources: OECD (2014h), *Recommendation of the Council on the Governance of Critical Risks*, [www.oecd.org/gov/risk/Critical-Risks-Recommendation.pdf](http://www.oecd.org/gov/risk/Critical-Risks-Recommendation.pdf); OECD (2014b), “Governance of critical risks: Draft principles developed through the OECD High-Level Risk Forum”, [www.oecd.org/gov/risk/Governance-of-critical-risks-public-consultation.pdf](http://www.oecd.org/gov/risk/Governance-of-critical-risks-public-consultation.pdf).

Table 1.10. Parameters and possible indicators for resilient institutions

Driver	Sub-drivers	Parameters	Possible indicators (examples)
Institutions	Leadership and long-term vision are clear	Long-term vision and leadership	– Long-term vision of the city
	The public sector has proper resources	Financial resources	– Cities’ revenue by source – Capability of increasing revenue
	Collaboration with other levels of government takes place	Human resources	– Number of public officials
		Collaboration with the national government	– Co-ordinated planning with the national government
Government is open and citizens’ participation takes place	Collaboration with the neighbouring cities	– Co-ordination mechanisms with neighbouring cities	
	Open government and open data policies	– Open government data	
	Active citizen engagement	– Number of participatory programmes and citizens engaged in participatory programmes – Voting rate	

#### *Institutions in resilient cities need effective leadership and a long-term vision*

Building resilience within an urban institution and government may essentially involve ensuring that a thorough consideration of resilience becomes one of the lenses through which public officials evaluate policy options and programming opportunities. This will ask the following questions: How does a policy, programme or initiative in a given sector impact the city’s resilience? What are the risks the city runs in the medium and long term if it fails to act in the immediate or short term? Ultimately, such an

approach means mainstreaming resilience into all aspects of urban policy and planning, and ensuring that it takes root beyond election cycles.

### *Building blocks for resilience*

Having clear leadership and long-term vision requires **adaptive capacity** (i.e. acting based on lessons learnt from past experiences), **flexibility** (i.e. responding to changing circumstances in the scope of their plans) and an **integrated approach** (i.e. working together beyond boundaries). These are a necessary condition for resilient cities with effective leadership and a long-term vision.

### *Suggested parameters and indicators*

**A clearly defined strategy**, built with appropriate levels of stakeholder consultation, can help public officials, service providers, civil society organisations, businesses and citizens understand the tasks at hand and policy priorities. This level of engagement can help build ownership in a city among all stakeholders, and bring them together with a common sense of purpose, particularly in times of difficulty. Additionally, a strategic vision should be developed as inclusively as possible, bringing in the whole community. An inclusive vision can help protect a community's identity if it is threatened. It can also be used to build and support the social infrastructure strengthening links between people, places and institutions. New York City offers an example of how city leadership is incorporating resilience thinking into its strategic planning, monitoring and evaluation processes (Box 1.8). It is important to note that a cross-sectoral or integrated approach to resilience planning is essential, because resilience is a multidimensional concept. Any action taken to improve resilience in one area is likely to influence or be supported by an action in another area. This kind of approach requires anchoring a long-term vision. This will lay out what the present challenges are and those that are likely to emerge, but also to clarify the kind of urban area the city would like to develop in the medium and long run, and how addressing its concerns on resilience can help meet its development goals.

**Committed leadership** is a fundamental factor for resilient institutions. This commitment should not only involve building resilience, but commitment to monitoring, anticipating and planning appropriate responses to shocks or to the cumulative impact of chronic pressure. Local leadership alone cannot be fully responsible for low resilience in cases of long-term stressor decline, or fully responsible for its restoration. Often, the factors leading to such decline are larger, complex policy questions, resulting from a series of national level choices that can span many years, and which are outside of the control or influence of local authorities. Such leadership needs to be in place at the municipal level, but also at higher levels of government, because many of the policies that support resilience are conceived at the national level and are implemented in collaboration with the subnational level. Taking a top-down approach to building resilience may seem logical, but needs to be complemented by an approach that emphasises local knowledge, capacity and networks. This is first because local and/or regional authorities are often better informed as to where the weaknesses or challenges to resilience in their cities or regions can be found. Second, because it is often the subnational level that best understands the local context and is generally better placed to apply policy or programming for greater impact or effectiveness in its area. The final reason is because a networked approach to public governance is, by nature, more flexible and more resourceful given the diversity of actors, interests, information and knowledge that it can draw upon. In a networked model, actors are linked together vertically and horizontally, facilitating information and knowledge flows, building social capital and

increasing the potential for innovation. The 100 Resilient Cities challenge provides another, supporting selected cities to appoint a “chief resilience officer” to serve as the contact point for resilience building, lead the development of a resilience strategy and help co-ordinate resilience efforts city wide (Box 1.9). Such an officer can maintain clear lines of responsibility and accountability with respect to resilience, and acts as a steward for resilience – guiding and co-ordinating resilience building, rather than directing and controlling it – as a means to promote an inclusive, coherent and integrated process, and one where networks are mobilised, active and supportive.

#### Box 1.8. Building “resilience-thinking” into urban development and sustainability planning: *One New York*

*One New York: The Plan for a Strong and Just City* is the long-term development strategy for the city of New York. It was developed looking at the future through four lenses – growth, equity, sustainability and resiliency – and included the participation of city residents, civic and business leaders, elected officials and city agencies. The result is a long-term (until 2050), comprehensive, evidence-informed document that identifies three key challenges and opportunities: population growth, an evolving economy and growing income inequality.

With these challenges in mind, the plan establishes four long-term strategic orientations for the city. Among these is “Our Resilient City”, which sets four broad resilience goals, and associates each with a series of specific initiatives and a manageable number of targets:

1. **Neighbourhoods:** every city neighbourhood will be made safer, by strengthening community, social and economic resiliency. *Indicators and targets:* 1) increase capacity of accessible emergency shelters to 120 000; 2) increase volunteerism rates among New Yorkers to 25% by 2020.
2. **Buildings:** the city’s buildings will be upgraded to accommodate changing climate impacts. *Indicators and targets:* 1) increase the percentage of households in the 100-year floodplain with flood insurance policies; 2) increase the square footage of buildings upgraded against flood risk; 3) increase the number of homes elevated under the Build It Back programme.
3. **Infrastructure:** infrastructure systems across the region will adapt to maintain continued services. *Indicators and targets:* 1) reduce customer-hours of weather-related utility and transit service outages; 2) increase the percentage of patient beds at hospitals and long-term care facilities in the 100-year floodplain, benefiting from retrofits for resilience.
4. **Coastal defence:** New York City’s coastal defences will be strengthened against flooding and sea-level rise. *Indicators and targets:* 1) increase the linear feet of coastal defences completed; 2) increase the acres of coastal ecosystems restored; 3) increase the number of residents benefiting from coastal defences and restored ecosystems.

Success measures include: 1) eliminating disaster-related long-term displacement (more than 12 months) of New Yorkers from their homes by 2050; 2) reducing the Social Vulnerability Index for neighbourhoods across the city; 3) reducing the average annual economic losses resulting from climate-related events.

Sources: City of New York (n.d.), *One New York: The Plan for a Strong and Just City*, [www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf](http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf); City of New York (2015b), “#OneNYC: Developing the Plan”, <http://www1.nyc.gov/html/onenyc/index.html>.

### Box 1.9. What is a “chief resilience officer”?

As part of its challenge, the 100 Resilient Cities organisation is helping its selected cities establish a chief resilience officer (CRO) as part of its resilience-building initiative. This position ideally reports to the city’s chief executive (e.g. mayor) and it is hoped that the role can help cities: 1) launch a dialogue and promote interaction among diverse actors (including government agencies, local business and international organisations) with an interest in urban resilience; 2) learn from one another; 3) ensure the scalability of resilience-oriented solutions.

The CRO serves as a resilience co-ordinator across government departments, improving communications and promoting stronger collaboration, to minimise overlap and duplication and to build synergies among different city plans and projects. At the same time, the CRO convenes diverse stakeholders (e.g. government, civil society and non-governmental organisations) to better understand the city’s challenges, to build support for individual initiatives and to promote resilience overall.

The CRO takes the lead in developing a resilience strategy – a participatory process in which the city’s resilience challenges are identified. He/she also determines the capacities and plans for addressing these challenges, and the gaps between the challenges and the needs. The result of this approach is a series of strategically driven resilience-building initiatives that the CRO is then responsible for putting into action.

As the point person on resilience, the CRO also ensures that a resilience lens is applied to city initiatives, aiming to ensure that projects are integrated, synergies are identified, and ideally, that more than one resilience goal is met in each initiative. For example, a proposed flood barrier can also serve as a bike path, encouraging citizens to be healthier and to make the community more cohesive.

*Source:* Berkowitz (2015), “What a chief resilience officer does”, [www.100resilientcities.org/blog/entry/what-is-a-chief-resilience-officer1#/-/](http://www.100resilientcities.org/blog/entry/what-is-a-chief-resilience-officer1#/-/).

### *Institutions in resilient cities have proper resources*

Ensuring resilience requires human and financial resources in the public sector. The fundamental question is whether or not the city’s resources are adequate to meet its needs and those of its residents in times of sudden, unforeseen need or throughout a period of long-term chronic pressure.

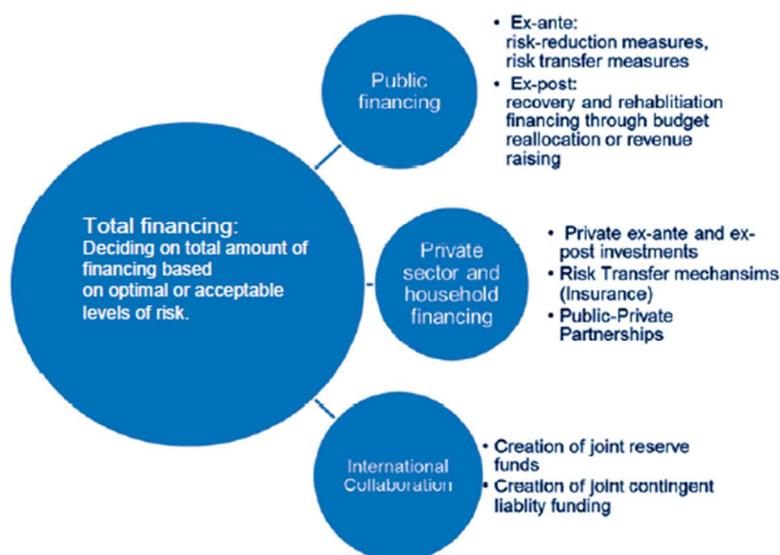
Capacity, in terms of **human resources**, is fundamental. This is true both in terms of **numbers** and in terms of **capability**. Does the civil service have the strategic planning and implementation skills, as well as the ability to think beyond sector specialisation, to work in a cross-sectoral fashion for greater resilience? Does the local administration have the ability to help the appropriate staff build such ability? Are there incentive structures in place to support a cross-sectoral approach to city administration and policy implementation that also promotes resilience? In some cases, as in Kyoto, public officials work around resource concerns by expanding the range of actors they work with. Municipalities in Kyoto have requested that academic experts and students work with northern district communities to help them revitalise their economies. Local authorities apparently felt that their human resources were insufficiently prepared to develop and implement adequate solutions. A comprehensive assessment needs to be made of whether the public sector has the appropriate capacity and staffing levels.

Finally, does the city have **the financial resources** to ensure resilience? There is a significant difference between the resources needed to meet the immediate financial

impact of a disaster and the resources to build and implement recovery and disaster risk prevention plans. Investing directly in those plans can be a challenge for governments, given resource constraints as well as uncertainty. It is politically and often financially difficult to justify expenditures to cover something without knowing for sure whether or when it will happen, and with what impact. Businesses and individuals share the same concern. An infrastructure provider with a government contract to operate a service may not invest additional resources to prepare for a shock, but instead expect the government to do so; an individual household may not purchase relatively affordable insurance against a future probable event, assuming consciously or unconsciously that the risk of costly damage will be covered by the government if the event does occur (OECD, 2014e). This can make the direct financing of resilience-building initiatives challenging, and demands important trade-offs. The disruptions a shock produces affect individual households, businesses and the public sector alike. Hence, all actors involved must decide to what degree, and how, they will invest in reducing their exposure to risk, and to what extent they will choose (or find themselves obliged) to retain risks. Governments face three challenges when designing risk-financing strategies (OECD, 2014e): 1) determining the overall amount of resources to be allocated to managing risk, and what risks they choose to assume; 2) how to finance risks; and 3) leveraging the engagement of the private sector and individual households to participate in financing resilience measures or to invest in individual risk-transfer arrangements, as well as collaborating with other countries to jointly finance risks.

Applying a risk-financing strategy that considers both *ex ante* and *ex post* measures, and spreads the cost across actors, can help governments manage financing challenges (Figure 1.11).

Figure 1.11. A risk-financing strategy mix based on a pre-identified resilience objective



Source: OECD (2014e), *Boosting Resilience through Innovative Risk Governance*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264209114-en>.

The OECD is currently reviewing the *Recommendation of the Council on Good Practices for Mitigating and Financing Catastrophic Risks* (OECD, 2011b), with the aim

of updating its guidance for governments on developing strategies for the financial management of disaster risks. The draft guidance highlights the need for an integrated approach. It considers the relative contributions of risk assessment, risk awareness and risk prevention to the effective financial management of disaster risks, and it also provides detailed principles for implementing the components of a comprehensive disaster-risk financing strategy, including: 1) a comprehensive risk assessment process that allows for the estimation of exposure and the identification of financial vulnerabilities; 2) the use of risk-financing/-transfer tools by all segments of the population and economy; 3) adequate financial support for protecting vulnerable segments of the population and economy and minimising economic and social disruption; and 4) the management of government exposure to disaster risks.

### *Building blocks for resilience*

**Resourcefulness** (i.e. finding alternative ways to meet critical needs with the resources available) is a critical attribute of resilience. It is also a matter of **redundancy** (i.e. having spare capacity for unexpected needs), **flexibility** (i.e. responding to changing circumstances in the scope of their plans) and adaptive (i.e. acting based on lessons learnt). Can city staff be deployed to other positions in times of emergency? Can funds be made available to cover unforeseen costs? Who has the authority to take these decisions: city officials, national officials or others?

### *Suggested parameters and indicators*

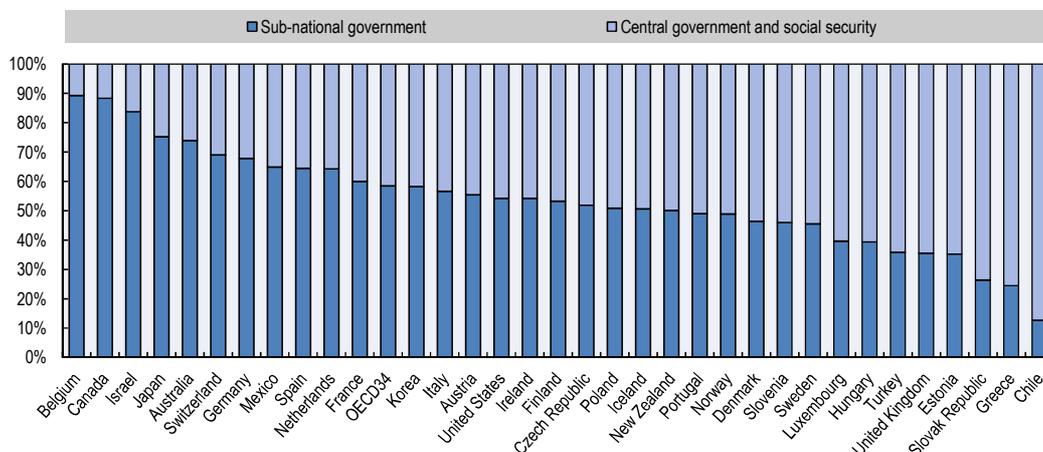
Human resources can be measured by the number of public officials. It has to be complemented by the quality of public officials, for example, examining the skills they have to serve the current needs by taking the training policies to enhance the abilities of public officials. Since technologies are advancing rapidly, skills of integrating ICT in policy making and implementation would be critical.

Financial resources are measured by the city's revenue and expenditure, as well as their measure to improve their financial consolidation. For example, a city's real debt service ratio (the percentage of the value based on the standard scale of government finances accounted for by obligation to pay) could be useful. It is also important to understand to what extent the city has the legal capability to increase its income.

### *Institutions in resilient cities are able to collaborate with other governments*

The importance of policy **co-ordination across levels of government** is pronounced when looking at public investment, which is often shared between national and subnational governments. The share of subnational governments' investment varies, although in OECD countries an average of 59% of public investment is made by subnational governments (Figure 1.12). The *Recommendation of the Council on Effective Public Investment Across Levels of Government* helps to identify challenges for investment at the subnational level and offers concrete solutions for adapting them (OECD, 2014g). The OECD's implementation toolkit provides practical solutions for cities to improve their investment strategies. Qualitative assessment of the degree of co-ordination (i.e. the methodologies of co-ordination, such as who takes the initiative, when it happens, how it is concluded and the result of the co-ordination) would be the most appropriate way to measure this parameter.

Figure 1.12. **Composition of the national and subnational public investment as a percentage of the total in selected OECD countries, 2013**



Source: OECD (2015g), “Subnational governments in OECD countries: Key data”, available at: [www.oecd.org/regional/regional-policy/Sub-national-governments-in-OECD-Countries-Key-Data-2015.pdf](http://www.oecd.org/regional/regional-policy/Sub-national-governments-in-OECD-Countries-Key-Data-2015.pdf)

**Co-ordination across municipal boundaries** is especially important in metropolitan areas. It is a prerequisite for effective policies in many fields, because decisions in one municipality can have consequences on outcomes in other municipalities. For example, a newly built residential neighbourhood in one municipality and rapid population inflow might increase congestion throughout the metropolitan area if the neighborhood is not connected to the public transport network in other municipalities (OECD, 2015g). More fragmented cities tend to have lower levels of economic productivity (OECD, 2014o). A recent OECD estimate suggests that productivity increases by 2-5% for a doubling of population size. Similar agglomeration effects could be achievable not by encouraging mergers among municipalities, but by taking an integrated and co-operated approach in neighbouring municipalities. A metropolitan-scale approach extending beyond municipality boundaries is one way of co-ordinating policy, using the OECD functional urban area as the unit for assessing policy impact. Qualitative assessment of the degree of co-ordination (i.e. the methodologies of co-ordination, such as who takes the initiative, when it happens, how it is concluded and the result of the co-ordination) would be the most appropriate way to measure this parameter.

### *Building blocks for resilience*

Collaboration with different levels of government, such as the national government and regional governments, is important in enhancing policy synergies, which can enhance **integrated approaches** (i.e. working together beyond boundaries) by ensuring coherent decisions and effective investment. Collaboration with lower levels of government (for example, the *freguesias*, or parishes, in Lisbon and its City Council) can also add value for policy making and implementation. In addition to collaboration among different levels of government, horizontal collaboration among neighbouring cities is important. Such collaboration can increase **resourcefulness** (i.e. finding alternative ways to meet critical needs with the resources available), **inclusiveness** (i.e. bringing diverse perspectives together) and **adaptive capacity** (i.e. acting based on lessons learnt from past experiences). Accumulated local knowledge can help city governments respond, depending on the fabric of social and economic circumstances at the neighbourhood level.

### *Suggested parameters and indicators*

Degree of collaboration with the national government and neighbouring cities is difficult to measure quantitatively. Indicators of co-ordination of public investment for regional development are now being developed by the OECD based on the OECD *Recommendation of the Council on Effective Public Investment across Levels of Government*. This approach is specific in that it systematically categorises a range of multi-level governance elements of public investment for regional development. It therefore takes into account, to the extent possible, the different facets of these multi-level governance relations (institutional, fiscal, regulatory and planning) between national and subnational governments (vertically) as well as across subnational governments (horizontally).

### *Institutions in resilient cities depend on openness and citizen engagement*

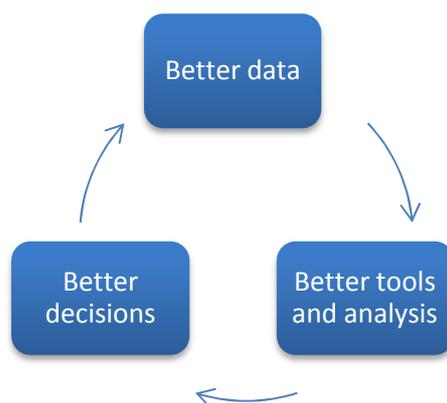
Openness and transparency are at the heart of resilience: they bring citizens and government closer together. Open and inclusive policy-making processes help ensure that policies are better informed and that they match citizens' needs. Budget transparency should be explored, based on the complete and timely publication of budget documents and regular reporting on expenditures, revenues, performance and audits. Budget transparency is a key element in restoring public trust in citizens and businesses, because it allows citizens to assess how their government is able to act strategically, as well as to anticipate possible economic crises (OECD, 2015e).

One way to build greater openness and transparency is through **data sharing and open data policies**, as well as open government initiatives. Effective data sharing between government institutions, and between government and citizens, can enhance resilience and result in greater accountability. As for mitigating and managing risk, information sharing that is based on open data practices and effective data exchange can build a virtuous circle and help authorities prioritise risk-reduction initiatives (Jha, Miner and Stanton-Geddes, 2013), regardless of whether the risk involves a natural, environmental, economic or social crisis (Figure 1.13). Not only do such data practices support government entities in building greater urban resilience, they can also help businesses, citizens and other stakeholders consider risk reduction, and thereby integrate the concept of resilience into their decision making (Jha, Miner and Stanton-Geddes, 2013). As noted above, civil society organisations and local neighbourhood bodies play a key role in ensuring social infrastructure. Engaging these entities in dialogue, consulting with them in policy and programming, and obtaining information and insights from their constituencies, can help build an evidence base and create buy-in for initiatives. This, in turn, can promote more effective policy design, development and implementation.

Social media is an increasingly powerful tool for information/data communication, especially in a crisis. An OECD survey of objectives for social media use among governments indicated that among the top five reasons were improved public communications, improved service delivery and improved capacity to manage the crisis or emergency situations (Mickoleit, 2014). Because social media is a decentralised communication tool, it helps transmit information repeatedly and through various channels, increasing the probability that those requiring the information will obtain and understand it. Information relating to disasters is among the most widely forwarded data in social media. On the positive side, social media keeps people informed and can help monitor disaster and recovery situations. At the same time, care needs to be taken, as the information may not be accurate, given the rapidly changing nature of emergency

situations. Government communications strategies may need to include the ability to monitor social media (e.g. Twitter) to transmit essential information to first responders and other authorities (Jha, Miner and Stanton-Geddes, 2013). Along with Twitter, Ushahidi is another platform used by local governments and other authorities around the world to obtain real-time data on the incidence of crime or natural disasters (OECD, 2014a). However, to optimise these systems and other social media, telecommunication systems and their supporting infrastructure must be robust, and are likely to require a degree of redundancy.

Figure 1.13. **The virtuous cycle of open data for greater resilience**



Sources: Jha, Miner and Stanton-Geddes (eds.) (2013), *Building Urban Resilience: Principles, Tools, and Practice. Directions in Development*, <http://dx.doi.org/10.1596/978-0-8213-8865-5>.

**Citizen engagement** that includes active participation by citizens in shaping their urban environment is a key factor in building resilience. People have a major role to play in ensuring high-quality public services and achieving shared public policy goals (OECD, 2009; Box 1.10). Facilitating greater citizen participation can build confidence in government, and create a sense of ownership in public initiatives (OECD, 2014a).

#### *Building blocks for resilience*

The ability of governments to gather data and learn from internal and external stakeholders, as well as to build networks with civil society, enhancing awareness among the private sector and other stakeholders of the imperatives of resilience, feeds directly into the qualities of co-ordination mechanisms for **integrated approaches** (i.e. working together beyond boundaries) that promote exchange. **Inclusiveness** (i.e. bringing diverse perspectives together), **adaptability** (i.e. being able to learn), **flexibility** (i.e. responding to changing circumstances in the scope of their plans) and **resourcefulness** (i.e. finding alternative ways to meet critical needs with resources available) can also support openness and citizens' engagement.

#### *Suggested parameters and indicators*

The openness of the government can be measured by the number of requests made through the **freedom of information (FOI) laws**. Open government requires access to information. FOI laws led the way by creating a framework of legal rights for citizens to request public sector information. Almost all OECD countries have an FOI law in place, although there are differences in the breadth and depth of these laws as well as in their implementation mechanisms (OECD, 2015g).

### Box 1.10. OECD Guiding Principles for Open and Inclusive Policy Making

Complex policy issues cannot be solved by government alone. People have a major role to play in ensuring high-quality public services economically and achieving shared public policy goals. How are OECD governments putting the principles of open and inclusive policy making into practice? How can they ensure broader, more inclusive, participation? Based on a survey of governments in 25 countries, 14 in-depth country case studies and 18 opinion pieces from leading civil society and government practitioners, the OECD proposed 10 guiding principles to support open and inclusive policy making and service delivery in practice.

1. **Commitment:** Leadership and strong commitment to open and inclusive policy making is needed at all levels – politicians, senior managers and public officials.
2. **Rights:** Citizens’ right to information, consultation and public participation in policy making and service delivery must be firmly grounded in law or policy. Government obligations to respond to citizens must be clearly stated. Independent oversight arrangements are essential to enforcing these rights.
3. **Clarity:** Objectives for, and limits to, information, consultation and public participation should be well defined from the outset. The roles and responsibilities of all parties must be clear. Government information should be complete, objective, reliable, relevant, and easy to find and understand.
4. **Time:** Public engagement should be undertaken as early in the policy process as possible to allow a greater range of solutions and to raise the chances of successful implementation. Adequate time must be available for consultation and participation to be effective.
5. **Inclusion:** All citizens should have equal opportunities and multiple channels to access information, be consulted and participate. Every reasonable effort should be made to engage with as wide a variety of people as possible.
6. **Resources:** Adequate financial, human and technical resources are needed for effective public information, consultation and participation. Government officials must have access to appropriate skills, guidance and training as well as an organisational culture that supports both traditional and online tools.
7. **Co-ordination:** Initiatives to inform, consult and engage civil society should be co-ordinated within and across levels of government to ensure policy coherence, avoid duplication and reduce the risk of “consultation fatigue.” Co-ordination efforts should not stifle initiative and innovation but should leverage the power of knowledge networks and communities of practice within and beyond government.
8. **Accountability:** Governments have an obligation to inform participants how they use inputs received through public consultation and participation. Measures to ensure that the policy-making process is open, transparent and amenable to external scrutiny can help increase accountability of, and trust in, government.
9. **Evaluation:** Governments need to evaluate their own performance. To do so effectively will require efforts to build the demand, capacity, culture and tools for evaluating public participation.
10. **Active citizenship:** Societies benefit from dynamic civil society, and governments can facilitate access to information, encourage participation, raise awareness, strengthen citizens’ civic education and skills, as well as support capacity-building among civil society organisations. Governments need to explore new roles to effectively support autonomous problem-solving by citizens, civil society organisations and businesses.

Sources: OECD (2001), *Citizens as Partners: Information, Consultation and Public Participation in Policy-Making*, <http://dx.doi.org/10.1787/9789264195561-en>, updated in OECD (2009), *Focus on Citizens: Public Engagement for Better Policy and Services*, <http://dx.doi.org/10.1787/9789264048874-en>.

The number of **citizens' participatory programmes** and the number of **the participating citizens** can measure the degree of citizens' participation. Whether or not people **vote** in elections can signal public confidence in government and citizen participation in the political process (OECD, 2014d). At national levels, higher voter turnout generally indicates a strong degree of participation in the country's political system. Low voter turnout, however, can be more difficult to interpret. It could reflect satisfaction by citizens with how the country is being managed or that the political system reflects the will of a limited number of citizens (OECD, 2011a).

## Conclusion and further issues to explore

This framework explores the various dimensions that contribute to resilient cities: the economy, society, environment and institutions. It links some important characteristics of resilient cities with the qualities upon which resilience is based, and teases out a few questions that policy makers may need to consider in thinking about building resilience in their cities.

Key points to underscore include:

- Resilience in cities runs across a spectrum. A city must necessarily absorb, adapt, transform and prepare in the face of current and future shocks or stresses in order to maintain its core purpose. A city is either more or less resilient; but no city is entirely lacking in resilience. The challenge for policy makers is to identify where their city may lie along this spectrum, and how far they wish to move it. The public sector, as well as a city's leadership, citizenry, businesses and environment, can push cities along the resilience spectrum.
- The foundations of resilience include adaptive capacity, resourcefulness, robustness, redundancy, flexibility, inclusiveness and integration. A system that cannot demonstrate these qualities in times of crisis will be less resilient.
- Enhancing resilience requires investment, and investing to prepare for the unknown or unforeseeable circumstances. The first step is to ensure that cities know in what to invest. It requires the leadership and long-term visions based on scenario-reading for the future regarding what may happen in how much likelihood, and to what extent they are prepared for. "Resilient-thinking" has to be mainstreamed in all policy areas.
- Policy levers to build resilience are multisectoral, across levels of government. A resilience agenda rests on a clear vision of how a city and its residents wish to meet, manage and adapt to the unexpected.
- Building resilience is a multi-level governance exercise. Often, the inability to withstand sudden shock, or the factors leading to long-term decline, are larger, complex policy questions, the result of national level policies and choices that span many years. Local authorities can use their influence to mitigate the impact of these decisions in their administrative jurisdiction. However, it is important to think of resilience beyond the administrative areas of individual cities. Building resilience requires that city, regional and national authorities work together as part of a broader urban policy and urban development agenda. This broader perspective may be the most effective way to ensure that cities are prepared to manage the unforeseen, and ideally emerge stronger than they were.

## Notes

1. This is defined by the OECD as a functional urban area of 500 000 residents or more.
2. Of a total of 281 OECD metropolitan areas, 4 do not have comparable data for assessment of the long-term trend of GDP and employment for 2001-12. Among the OECD's predominantly urban regions, 142 do not have complete data available to assess the trends in household income for 2001-12.
3. Innovation is defined according to the *Oslo Manual* for measuring innovation, which identifies four types of innovation: product (a good or service that is new or significantly improved); process (a new or significantly improved production or delivery method); marketing (a new marketing method that involves significant changes in product design or packaging, product placement, product promotion or pricing); and organisational (a new organisational method in business practices, workplace organisation or external relations) (OECD, n.d.).
4. In places where there are many low-technology, small and micro-enterprises, including family-owned firms, the result can be low levels of innovation capacity due to a lack of firm's scale and skills gaps (OECD, 2013c).
5. Methods to measure innovation levels frequently involve using patent applications as a proxy. However, it should be remembered that what builds growth is the ability to commercialise patent activity.
6. For a comprehensive OECD discussion on disaster risk reduction and resilience, see OECD (2014e).

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## *Chapter 2.*

### **Measuring resilience in cities**

*This chapter proposes indicators to measure resilience and explains them by using currently available data. This chapter also reviews the specific challenges to measure resilience, in particular, understanding how different indicators give comprehensive messages on the degree of resilience.*

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

Monitoring and evaluating the impact of policies requires measurement. Indicators are useful for local governments to facilitate their policy-making and consensus-building processes. Indicators that provide comparable data, to benchmark any efforts made, and to evaluate financial investment, help to prioritise policy action. In the context of policies for building resilience, measurements are useful to assess the degree of resilience and to guide future policy design and implementation. This chapter will review the specific challenges of measuring resilience, outline possible indicators and discuss how the different drivers of resilience are related.

### What it means to measure resilience

Several issues that are less pronounced in the measurement of other policy areas emerge in measuring resilience. One salient question has provoked some debate in the field: whether the focus of measuring should be on the ability to address shocks and stresses or the outcome of exercising those abilities. Peyroux (2015), for example, argues that measuring resilience implies measuring both the capacity of a system to achieve resilience and the outcomes resulting from this capacity. However, a high outcome does not necessarily mean that the process of capacity building has been satisfactory. If an output indicator is high, but process indicators are low, the system may still not be resilient (Lisa, Schipper and Langston, 2015). The reason why a city is concerned about its resilience is also at play: whether the concern is to enhance the city’s ability to manage the process, or to produce better outcomes. An example of indicators shows the appropriate timeframe for measuring indicators (Box 2.1).

#### Box 2.1. Timeframe for measuring resilience

The United Nations Office for Disaster Risk Reduction’s (UNISDR) Making Cities Resilient Campaign’s Local Government Self-Assessment Tool (LGSAT) (2012), which focuses on natural hazards, develops a specialised framework in which the notion of risk is more salient. Key questions are not only about pre-disaster time (for example: Essential 7: “Ensure education programmes and training on disaster risk reduction are in place in schools and communities”) but also about post-disaster time (Essential 10: “Ensure that the needs and participation of the affected population are at the centre of reconstruction”). They also insist on actions that should be implemented during a disaster (Essential 9: “Install early warning systems and emergency management capacities”).

*Source: UNISDR (2012), The Making Cities Resilient Campaign.*

Resilience to what is a critical question (Maddox, 2015). Different sets of indicators are needed for one city to measure resilience to different challenges. For example, indicators to measure resilience against disasters and resilience against economic stresses are different, even for the same city. The large numbers of existing tools and methods to measure resilience reflect the diversity of resilience. Resilience is, by nature, context-specific and place-based. Different economic, societal, institutional or environmental situations have an impact on how a response to a challenge contributes to or threatens resilience. Cities need to consider their own set of indicators.

Quantitative indicators are not always available for measuring the process of becoming resilient. For example, “collaboration with other levels of government” to work towards the shared goal of a resilient community can be usefully monitored with a qualitative approach (Dunbar, Maddox, and Peyroux, 2015). Certain indicators can offer such qualitative assessments (Box 2.2). An effort to increase the availability of data as

well as the methodology for combining qualitative and quantitative data analysis is nevertheless an area that requires further work.

### Box 2.2. Qualitative indicators

The Hyogo Framework for Action Local Government Self-Assessment Tool, developed under the Making Cities Resilient Campaign (UNISDR, 2012), offers qualitative indicators for measuring resilience, but notes that they can be taken as a starting point for city managers and local planners or economists to develop quantitative indicators at the city level, which will serve to set targets and assess improvement.

The Rockefeller Foundation and ARUP’s City Resilience Index (CRI) (2015) gathers both qualitative and quantitative information. The assessment process invites the city to define what worst and best performances against each indicator could look like and to assess where it stands. Where possible, cities are also invited to use quantified metrics that can be used as proxies for past and current performance.

*Source: UNISDR (2012), The Making Cities Resilient Campaign.*

This report proposes the measurement of indicators from the following perspectives.

- The measurement focuses on the ability to change (adapt, absorb, transform and prepare) according to four drivers, not the *outcome* of exercising that capacity, because this project aims to discuss how cities can enhance their resilience, not what cities should become after recovering from shocks or stresses.
- Since this project covers resilience against various types of shocks and stresses, the proposed indicators are relevant for any shocks and stresses from economic, social, environmental and institutional perspectives.
- Given the set of indicators needed to measure resilience, it is important to consider how different indicators are related to or impact each other. Assessing the correlation between indicators will help to shed light on the degree of resilience.

### ***Current trends for measuring resilience***

Various indicators are being developed by many international organisations and research institutions. In the existing research on measurements of urban resilience, much focus is placed on environmental drivers (natural and human-induced hazards) (Box 2.3), because the discussion on resilience itself started as resilience to natural disasters and climate change.

Nevertheless, given the need to develop generic frameworks (Béné, 2013), efforts are being made to harmonise various measurements of resilience. The World Urban Forum, held in 2014, was a milestone in this respect. In setting up the Global Collaboration for Urban Resilience, major international institutions have collectively agreed to collaborate in order to help cities become more resilient through knowledge and financial resources.<sup>1</sup> It aims to encourage harmonisation of the existing approaches and tools that were created to help cities build resilience. The Toolkit for the Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (UNU-IAS et al., 2014) involves communities through a “resilience assessment workshop”, in which participants provide scores for indicators based on their own perception (Dunbar, W. , Maddox, D. and Peyroux, E., 2015).

### Box 2.3. Examples of recent indicators measuring resilience

The United Nations Office for Disaster Risk Reduction's (UNISDR) Local Government Self-Assessment Tool (LGSAT) has been developed under the Making Cities Resilient Campaign (2012). Other efforts, such as the Rockefeller Foundation and ARUP's City Resilience Index (CRI) (2015), adopt a broader approach, taking into consideration economic, social, institutional and environmental drivers.

- UNISDR's LGSAT lists 41 key questions for self-assessment, based on 10 "essentials": institutional and administrative framework; financing; risk assessment; infrastructure; schools and hospitals; planning; training and awareness; environment; preparedness; and reconstruction. The questions contribute to, and can be aligned with, the Hyogo Framework for Action Core indicators, which national governments use to monitor progress. For each question, level of progress can be measured from 1 (minor achievements) to 5 (comprehensive achievement, commitment and capacities to sustain efforts at all levels). Both the LGSAT and the CRI are directly addressed to local governments and take the form of an interactive online assessment tool (the CRI is expected to become available in 2016). They introduce variables for measuring resilience at a city scale, aim to help understand gaps and challenges in risk reduction, and provide means to assess and monitor how a city is progressing on its trajectory towards resilience.
- The Rockefeller Foundation's City Resilience Index includes 12 indicators and 58 sub-indicators, based on 4 categories: health and well-being of individuals; infrastructure and environment; economy and society; leadership and strategy. Each indicator measures relative performance over time and is assessed based on responses to an average of three questions per sub-indicator (156 questions in total). Those responses allow for a score to be accumulated. A justification for why each score was given will, over time, allow for an understanding of the path the city followed to achieve resilience. Seven qualities of resilient cities (inclusiveness, integration, reflectiveness, resourcefulness, robustness, redundancy and flexibility), and their relevance by sub-indicator, are presented as a way to provide a more complete measure of resilience. A majority of sub-indicators do not apply to a crisis (only a few concern emergency situations) but instead embody long-term goals (for example: 1.1 "Safe and affordable housing"; 4.2 "Cohesive communities"; 11.1 "Adequate education for all").

*Source:* UNISDR (2012), *The Making Cities Resilient Campaign*.

### ***OECD proposal on indicators to measure resilience***

This report proposes indicators to measure resilience, based on the four drivers of resilience. Table 2.1 shows the possible parameters and indicators that help to proxy the presented parameters. The proposed indicators do not always reflect the availability of internationally comparable data.

Cities that aim to develop their indicators based on the indicators outlined in this report need to consider which areas of shocks and stresses require further exploration in their respective context. Cities should develop more detailed indicators relevant to such shocks and stresses. It is recommended to measure different indicators comprehensively.

Table 2.1. Parameters and possible indicators for resilient cities

Drivers	Sub-drivers	Potential parameters	Possible indicators (examples)
Economy	Industries are diverse	Diversity of economic structure	– GDP by industry – Employment by industry – Contribution of GDP in national value – Contribution of employment in national value
		Links to value chain	
	Innovation takes place	Entrepreneurialism	– Business demography (the number of start-up companies, initiation and closure of companies)
		Research and development (R&D)	– Patent applications – R&D expenditure
Society	Workforce has diverse skills Infrastructure supports economic activities	Access to education	– Employment by education
		Fulfils expected purpose	– Back-up plans – Long-term maintenance plans – Anti-disaster structure
Society	Society is inclusive and cohesive	Demographic change	– Population (inflow/outflow) – Immigrants
		Income	– Household income – Poverty level – GINI coefficient
		Safety	– Perceived safety – Crime rate
	Citizens' networks in communities are active People have access to services	Citizens' network	– Number of community associations
Environment	Urban development is sustainable	Access to services	– Accessibility to public services (hospitals) – Accessibility to public transport
		Aligns with long-term urban development strategy	– Long-term strategies (i.e. compact city policies, etc.) – Risk-based land-use strategy
	Adequate and reliable infrastructure is available	Performs the expected function	– Back-up plans – Long-term maintenance plans – Anti-disaster structure
Institutions	Adequate natural resources are available	Pollution/emissions	– Air, water and green space quality
		Energy	– Air, water and green space quantity – Energy consumption and production, smart energy management
Institutions	Leadership and long-term vision are clear	Long-term vision and leadership	– Long-term vision of the city
	The public sector has proper resources	Financial resources	– City's revenue by sources – Capability to increase revenue
		Human resources	– Number of public officials – Expenditure on training
	Collaboration with other levels of government takes place	Collaboration with the national government	– Co-ordinated planning with the national government
Government is open and citizens' participation takes place	Collaboration with the neighbouring cities	– Co-ordination mechanism with neighbouring cities	
	Open government and open data policies	Active citizen engagement	– Open government data – Number of citizens engaged in participatory programmes – Voting rate

### Application of selected indicators in OECD regions and metropolitan areas

Assessing to what extent a city is resilient requires considering various indicators comprehensively. The assessment makes use of various different indicators, as resilience is driven by diverse economic, social, environmental and institutional dimensions, which require scrutiny from different angles. This section shows the result of selected indicators, which are outlined in Chapter 1.

Since this report focuses on resilience at city level, data on metropolitan areas was primarily used for the assessment. If data on metropolitan areas were not available, data on OECD regions, in particular predominantly urban areas, were used. Subnational data, which are the aggregated data of subnational governments by country, were also used when there were not any data available from individual metropolitan areas or regions. When no data for OECD metropolitan areas, OECD regions nor subnational government level were available, country data were used to understand the issues of each indicator. Data sources used were:

- *OECD Metropolitan Database*: 281 OECD metropolitan areas, defined as functional urban areas, in 29 OECD countries
- *OECD Regional Database*: 2 197 TL3 regions in 34 OECD countries are available for 3 types of regions, predominantly urban, (PU), intermediate (IM) and predominantly rural (PR), and 417 TL2 regions in 34 OECD countries
- data from case study cities' questionnaires.

### ***Diversification of the economic structure***

This report has assessed the concentration of employment and gross value added (GVA) in 517 TL3 regions and 708 TL3 regions respectively applying the Herfindahl-Hirschmann Index (Box 2.4) to understand economic diversification in urban regions across the OECD. TL3 level data was the smallest geographic unit of analysis for which data on employment and GVA according to ten industrial groups was available. TL3 regions are grouped according to three categories that take into account geographical differences among regions. This includes predominantly urban (PU), intermediate (IM) and predominantly rural (PR), while “predominantly rural close to a city” and “predominantly rural remote” were accounted for under “predominantly rural”. Data on employment by industrial classification are available, for a total of 517 regions (including 95 predominantly urban regions) from 20 countries (employment), and data on GVA by industrial classification are available for a 708 regions (including 223 predominantly urban regions) from 21 countries. According to the 2008 SNA classification (System of National Accounts) or latest available data, industry classifications contain:

1. agriculture, forestry and fishing
2. industry, including energy
3. construction
4. distributive trade, repairs, transport, accommodation, food service activities
5. information and communication
6. financial and insurance activities
7. real estate activities
8. professional, scientific, technical activities, administrative, support service activities
9. public administration, compulsory social security, education, human health
10. other services.

### Box 2.4. Herfindahl-Hirschmann Index

The Herfindahl-Hirschmann Index (HHI) is conventionally applied to measure market concentration. It is a widely accepted measure for the geographic concentration of industries (ONS, 2012). For example, to measure the concentration of labour forces in different industry groups, the HHI represents the squared shares of labour force in each industry. The resulting values are expressed as fractions and account for the average weighted share of the indicator that is measured. It can be expressed by  $H = \sum_{i=1}^n s_i^2$ . As such, the result of the concentration level can range from 0 to 1.0. Increases in the HHI generally indicate an increase in concentration, whereas decreases indicate the opposite.

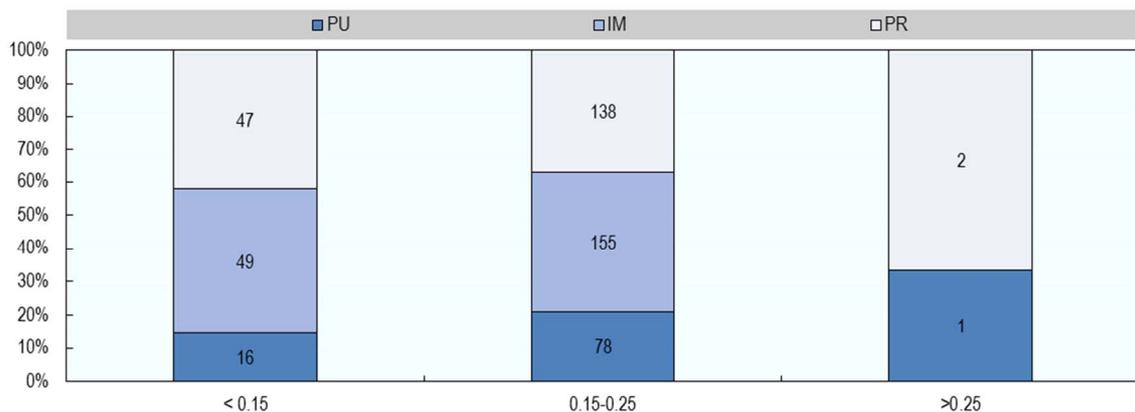
An HHI that results:

- “**not concentrated**” for a value below 0.15
- “**moderately concentrated**” for a value between 0.15 and 0.25
- “**highly concentrated**” for a value above 0.25 (US Department of Justice, 2015).

#### *Concentration of labour force across ten industries*

Employment by industrial groups in OECD regions, in general, has less concentration. Among the 517 OECD regions, 112 (21.6%) show no concentration of the labour force (below 0.15 on the HHI scale), 402 (77.7%) are moderately concentrated (between 0.15 and 0.25), while only 3 (0.6%) are highly concentrated (above 0.25) (Figure 2.1). According to the type of region, on average, the labour force in predominantly urban regions is more concentrated than in intermediate and rural areas. Predominantly urban regions have the highest HHI (0.176) compared to intermediate (0.171) and predominantly rural ones (0.173) (Table 2.2). The concentration of employment across industries in predominantly urban regions declined across the OECD in the period from 2000 to 2012 (Table 2.2).

Figure 2.1. Number of TL3 regions in the range of labour force concentration, by type of region, 2012



Notes: PU: predominantly urban; IM: intermediate; PR: predominantly rural.

Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

Table 2.2. Average concentration of the labour force by type of region, 2012

	Predominantly urban	Intermediate	Predominantly rural
Herfindahl-Hirschmann Index	0.176	0.171	0.173

Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

Table 2.3. Average concentration of the labour force across 95 predominantly urban regions, 2000-12

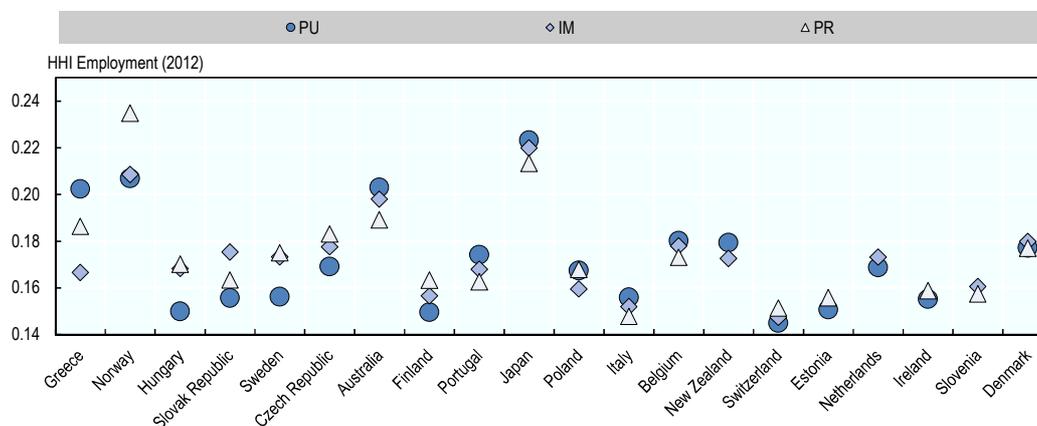
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Herfindahl-Hirschmann Index	0.186	0.183	0.182	0.181	0.181	0.181	0.179	0.179	0.178	0.179	0.171	0.170	0.177

Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

Comparing the concentration of the labour force across industries according to the regional typology and by country reveals large disparities in the regional concentration of labour across countries (Figure 2.2). The types of regions with the largest concentration vary by country. For example, Japan and Australia have the highest concentrations in predominantly urban regions, in distributive trades and food service activities (Japan), and public administration, education and healthcare (Australia), while Norway and the Czech Republic have the highest concentrations in predominantly rural regions: in public administration, education and healthcare in Norway and in industry (including energy) in the Czech Republic. The difference in the concentration of labour across industries is larger in Greece and Norway.

Figure 2.2. Average labour force concentration in TL3 regions by type of region, 2012



Notes: PU: predominantly urban; IM: intermediate; PR: predominantly rural.

Source: OECD (2016a), *OECD Regional Database*.

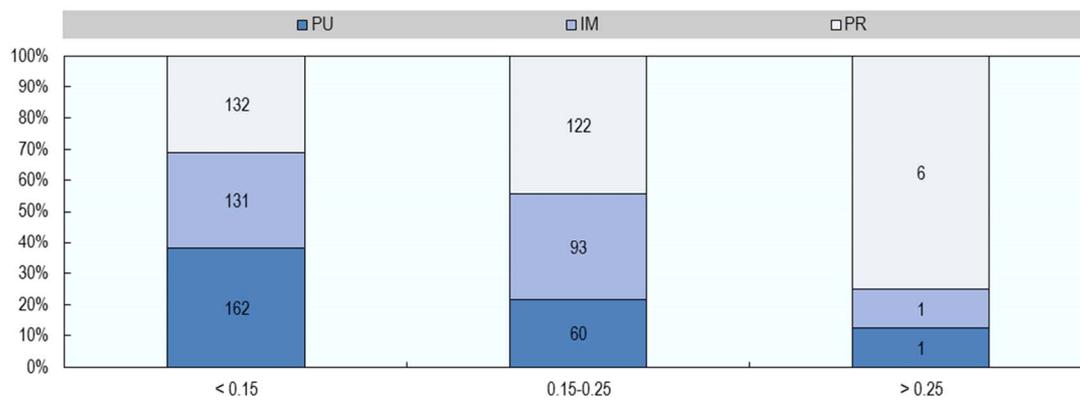
[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

### Concentration of gross value added across ten industries

Regional gross value added is a viable indicator for understanding regional economic activity. As with the concentration of labour across industries, GVA can be used to analyse whether or not the concentration of economic output in a limited number of industries has an impact on the economic performance of a region over time. To measure

the concentration of regional GVA, the Herfindahl-Hirschmann Index has been calculated for 708 TL3 regions where GVA data from 10 industries were available. Among the assessed regions in 2012, 425 show a concentration below 0.15, 275 are moderately concentrated and 8 are highly concentrated (Figure 2.3). Predominantly urban regions have the lowest HHI (0.146) compared to intermediate (0.152) and predominantly rural regions (0.158), which is the obverse of the trend of concentration of employment across industries according to their regional typology (predominantly urban is more concentrated) and GVA (predominantly rural is more concentrated) (Table 2.4). Although the difference is marginal, it is worth assessing which industry caused the different concentration levels for the labour force and GVA.

Figure 2.3. **Number of TL3 regions in the range of gross value added concentration, by type of region, 2012**



Notes: PU: predominantly urban; IM: intermediate; PR: predominantly rural.

Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), own calculations.

Table 2.4. **Average concentration of gross value added by type of region, 2012**

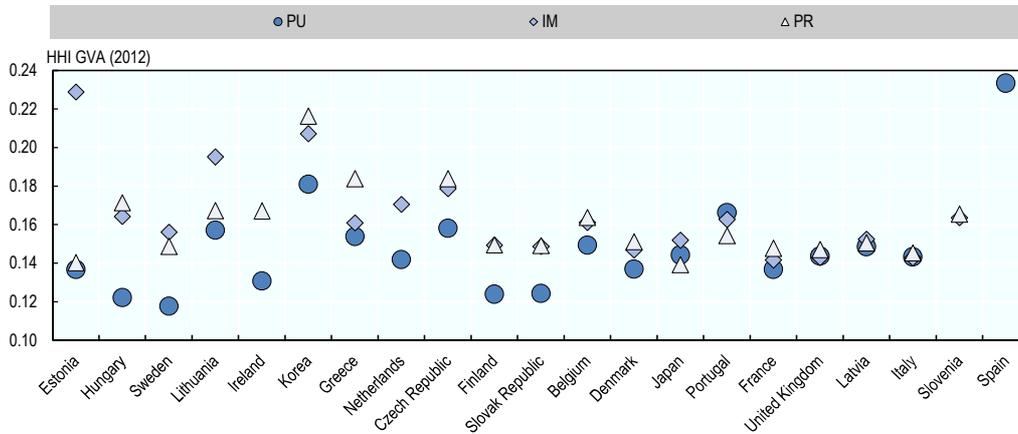
	Predominantly urban	Intermediate	Predominantly rural
Herfindahl-Hirschmann Index	0.146	0.152	0.158

Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

Comparing the concentration of the GVA across industries according to the regional typology and by country reveals disparities among regions across countries (Figure 2.4). Predominantly urban regions are in general less concentrated than other types of regions within a given country. For example, Finland, Hungary and Sweden have the lowest concentration in predominantly urban regions. Korea (agriculture, forestry, fishing and manufacturing) and the Czech Republic (agriculture, forestry, fishing and public administration, education and health) have a higher concentration in predominantly rural regions (Figure 2.4).

Figure 2.4. Average gross value added concentration in TL3 regions, by type of region, 2012



Notes: PU: predominantly urban; IM: intermediate; PR: predominantly rural.

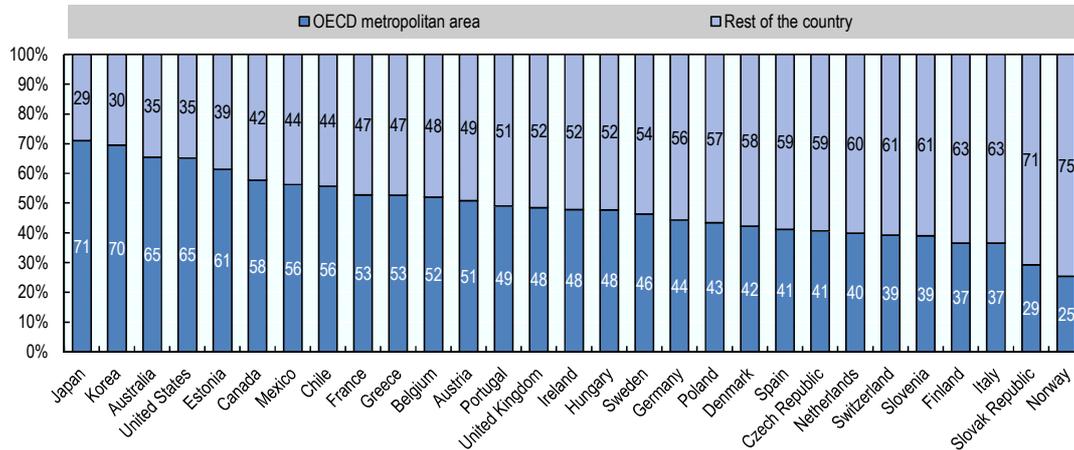
Source: OECD (2016a), *OECD Regional Database*.

[http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculations.

### Contribution to national value

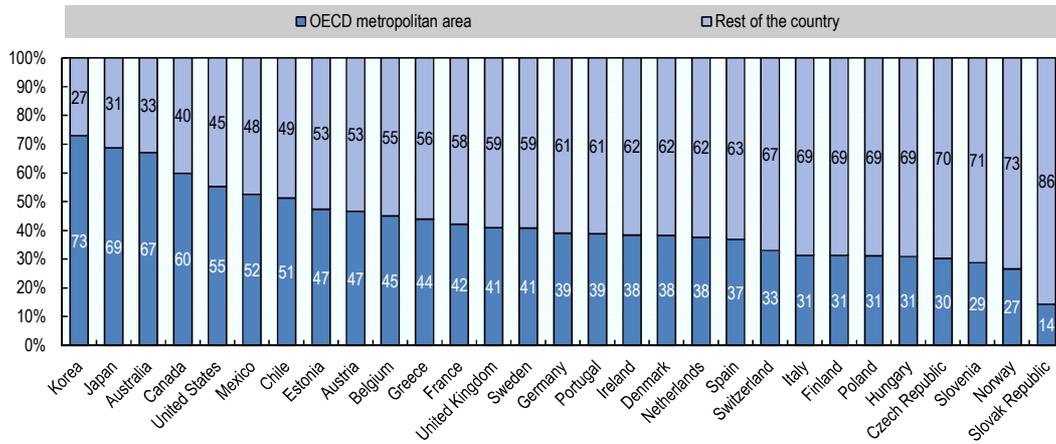
The contribution of gross domestic product (GDP) and employment in OECD metropolitan areas to the national value is available for 281 OECD metropolitan areas in 29 OECD countries (Figures 2.5 and 2.6). The percentage varies among countries. Japan has the largest percentage of GDP in metropolitan areas (71%), while Norway has the smallest (25%). The percentage of employment in metropolitan areas is the highest in Korea (73%), while it is the smallest in the Slovak Republic (14%).

Figure 2.5. Percentage of GDP in OECD metropolitan areas and the rest of country



Source: OECD (2016b), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

Figure 2.6. Percentage of employment in OECD metropolitan areas and the rest of country



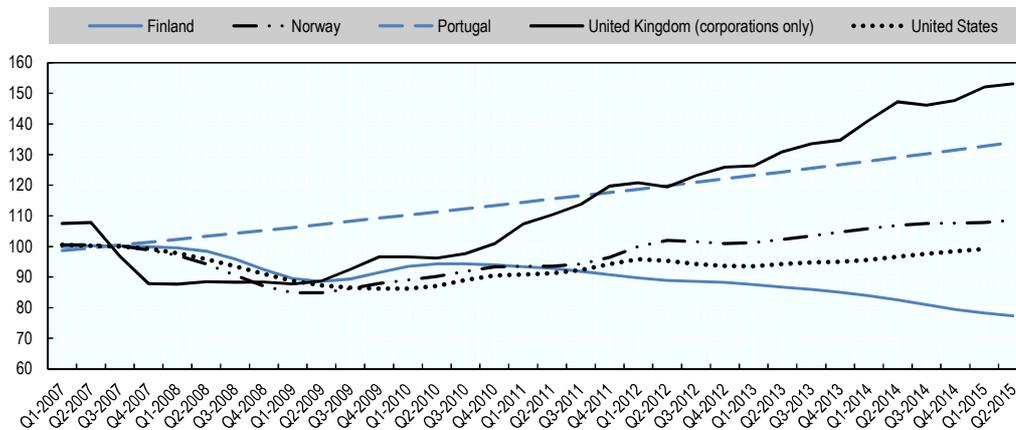
Source: OECD (2016b), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

### Entrepreneurialism

Business demography statistics, such as the birth of new enterprises, the growth and survival of existing enterprises (with a particular focus on their employment impact), and enterprise deaths, suggests business dynamics, in particular, entrepreneurialism. For example, new enterprises or fast-growing enterprises tend to be innovators that achieve efficiency gains and improve the overall competitiveness of an economy, while relatively high death rates may indicate economic activities that are no longer profitable (OECD, 2015). In most countries, new enterprise creations have been on an upward trend since the height of the last economic crisis, in particular in Portugal and the United Kingdom, while Finland shows a decline since 2010 (Figure 2.7). Birth and death of enterprises follow a similar falling trend. Both birth and death rates are relatively close and remain within a similar range, except in Brazil, which has birth rates that in general are twice as high as the death rate (Figure 2.8).

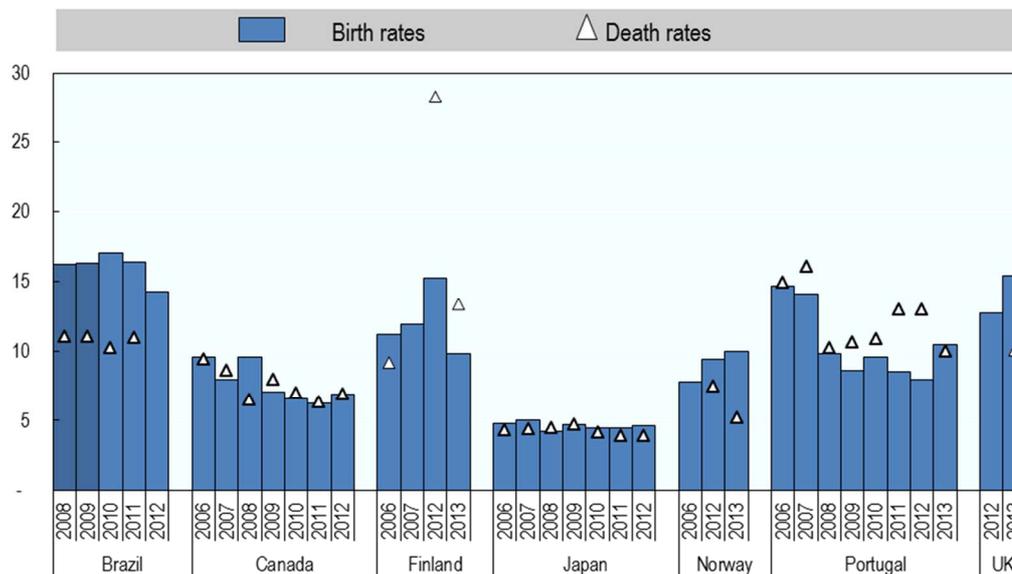
Figure 2.7. New enterprise creation, selected countries

Trend-cycle, 2007=100



Source: OECD (2015), *Entrepreneurship at a Glance*, OECD Publishing, Paris, [http://dx.doi.org/10.1787/entrepreneur\\_aag-2015-en](http://dx.doi.org/10.1787/entrepreneur_aag-2015-en).

Figure 2.8. Enterprise birth and death rates



Source: OECD (2015), *Entrepreneurship at a Glance*, OECD Publishing, Paris, [http://dx.doi.org/10.1787/entrepreneur\\_aag-2015-en](http://dx.doi.org/10.1787/entrepreneur_aag-2015-en). Data for Japan are from Small and Medium Enterprise Agency (2014), "White paper on small and medium enterprises in Japan", using Annual Report on Employment Insurance Programmes (Ministry of Health, Labour and Welfare).

Business demographic data at subnational level are available from several different statistical databases. For example, they are available for TL2 regions in EU countries (Eurostat, 2015), TL3 levels (prefectures) in Japan (Ministry of Internal Affairs and Communications and Ministry of Economy, Trade and Industry, 2012) and in the United States. Table 2.5 shows the data of business demography available from the case study cities (Table 2.5).

Table 2.5. Number of start-up companies

	Year	(1) Number of new companies	(2) Birth rate	(3) Mortality rate	(4) Survival rate
Akershus (Norway)	2015	6 858	14.8%		28.3% (2007-11)
Cardiff (United Kingdom)	2014	1 835	15.9%	9.6%	40.4% (2009-14)
Lisbon (Portugal)	2013	48 151	15.8%	17.6%	47.47% (2011-13)
Tampere (Finland)	2014	1 299	9.2%	9.2%	

*Notes:*

Akershus: (1) The number of newly established enterprises in one year, all sectors included. The number of newly established enterprises is the number of new enterprises corrected for the change of ownership. New enterprises that take over existing activities are not counted as newly established enterprises. A newly established enterprise in year  $t$  is considered to have survived in  $t+n$  ( $n \geq 1$ ) if it is active in terms of turnover and/or employment in any part of  $t+n$ .

Cardiff: (1) The number of newly opened enterprises, which are defined as businesses having either turnover or employment at any time during the reference period. (2) A percentage of active enterprises in the same year. A birth is identified as a business that was present in year  $t$  but not in the previous years. (3) The death rate of enterprises as a percentage of active enterprises in the same year. A death is defined as a business that was on the active file in year  $t$ , but was no longer present in the active file in  $t+1$  and  $t+2$ .

Lisbon: (2) The creation of a combination of production factors with the restriction that no other enterprise is involved in the event. It does not include the creation of enterprises following mergers nor only changes of

economic activity for a same enterprise. An enterprise is a legal entity (natural or legal person) that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision making, especially for the allocation of its current resources.

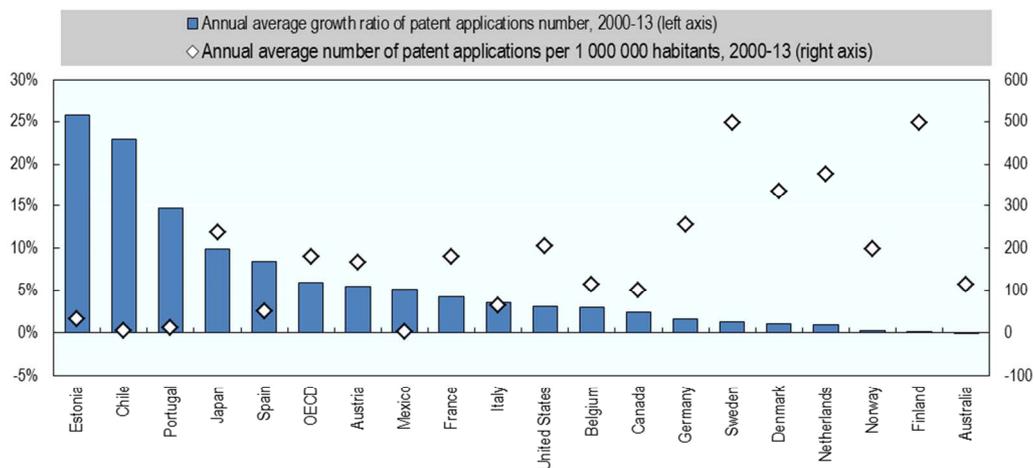
Tampere: (1) The number of enterprises engaged in business activities that are liable to pay value-added tax or act as employers. Excluded are foundations, housing companies, voluntary associations, public authorities and religious communities. (3) The enterprise closures over the stock of enterprises in the same year.

Sources: Statistics Norway, Table 10219, [www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/fordem/aar/2015-10-23?fane=tabell#content](http://www.ssb.no/en/virksomheter-foretak-og-regnskap/statistikker/fordem/aar/2015-10-23?fane=tabell#content); UK Office for National Statistics, *Business Demography Database*, [www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/businessdemographyreferencetable](http://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/businessdemographyreferencetable); Statistics Portugal, *Business Demography Database*, [www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine\\_indicadores&indOcorrCod=0008642&contexto=bd&selTab=tab2](http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&indOcorrCod=0008642&contexto=bd&selTab=tab2); Statistics Finland, [www.stat.fi/meta/til/alv\\_en.html](http://www.stat.fi/meta/til/alv_en.html).

### Research and development

Research and development activities in OECD metropolitan areas are measured by the number of patent applications (Figure 2.7). Annual average growth ratio of the number of patent applications suggests the level of dynamics in R&D activities. For example, annual average growth ratio is high in Estonia (25.7%), Chile (22.9%), Portugal (14.7%) and Japan (10.0%). The average number of patent applications needs to be considered simultaneously, because it also suggests the volume of R&D activities in respect to the population size. The number of applications per 1 000 000 habitants is larger in Denmark, Finland, the Netherlands and Sweden, which are not showing fast growth in the number of applications.

Figure 2.9. Annual average growth ratio of the number of patent applications and patent applications per 1 000 000 habitants in OECD metropolitan areas, 2000-13



Source: OECD (2016b), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

### Employment by education

The quality of human capital is central to increasing productivity, as the ability to generate and make use of innovation depends, among other factors, on the skill level of the labour force (OECD, 2013). The proportion of the labour force with a tertiary education is a common proxy for a region's capacity to produce and absorb innovation (OECD, 2013), and hence higher concentrations in tertiary educated labour force are generally associated with higher levels of economic stability in the long term. To assess

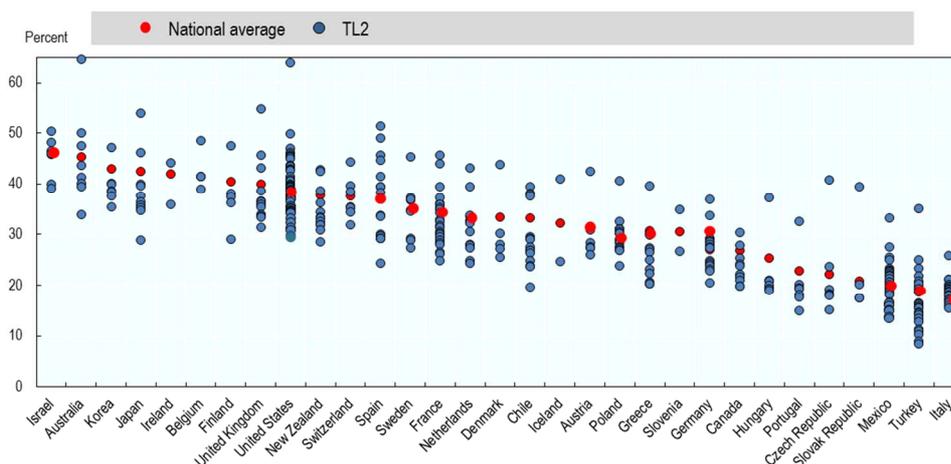
the regional impact of tertiary educated labour on regional growth, 417 TL2 level data from 31 countries for the year 2000 have been assessed against the regional annual average growth rates in GDP for 2000-12, since it is the only available data on educational attainment of the labour force at subnational level that are available through the *OECD Regional Database*.

### Demographic change

Population in OECD metropolitan areas is increasing across the OECD, with the exceptions of Estonia and Greece, where from 2000 to 2014 the total population slightly declined. In most countries, this urban population growth is mirrored across all age groups (Figure 2.11), with particularly high growth rates of the older population. The latter showed the highest increase of all age groups in 25 out of 29 countries. Strikingly, in 12 countries, the population younger than 14 declined, while in Ireland and Spain, this population group significantly increased. This suggests the positive or negative change in the increase of working-age population in the future. The working-age population (15-64 years old) declined in in four countries, but accounted for the highest increases in Norway and the United Kingdom.

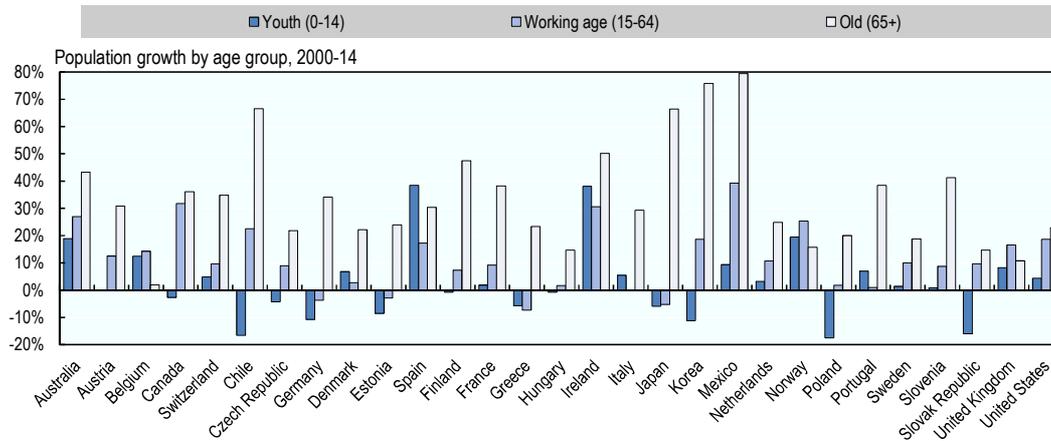
Case study cities show different patterns of population migration, reflecting the different dynamics of economic activities in each city (Table 2.6). Population inflow exceeds outflow in most cities except Kyoto. The main drivers for a positive net migration in case study cities are employment opportunities attracting new residents from within their countries and internationally. The percentage of migrants in the total population will have a large impact on the demographic composition of cities. For example, in Cardiff, 7.1% of the citizens in 2014 were newcomers and 6.9% of the population moved to other areas, meaning that the percentage of the population that stayed in Cardiff in both 2013 and 2014 was 86%, showing a high fluidity of citizens. Such high fluctuations in the population may make it difficult for cities to maintain established communities in their neighborhoods.

Figure 2.10. Share of tertiary education across the labour force, TL2, 2014



Notes: Data refer to Territorial Level 2, which is the only widely available data on educational attainment across the labour force for OECD countries. The data show the share of the labour force with education levels ISCED 5-8, out of the total number of people in the labour force. Norway is excluded due to lack of data and/or comparable years. Estonia and Luxembourg are excluded, as they each have only one defined TL2 region that is equal to their national territory, and hence no regional disparities can be captured. Source: OECD (2016a), *OECD Regional Database*. [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016).

Figure 2.11. Population growth in OECD metropolitan areas according to age groups, 2000-14



Source: OECD (2016b), *OECD Metropolitan Database*. <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed 31 March 2016).

Table 2.6. Population inflow/outflow in case study cities, 2014

	Inflow population	Outflow population	Total population	Inflow/total population	Outflow/total population
Antalya (Turkey)	9 057	64 631	2 222 562	4.2%	2.9%
Bursa (Turkey)	80 717	65 027	2 787 539	2.9%	2.3%
Cardiff (United Kingdom)	25 097	24 546	354 294	7.1%	6.9%
Kyoto (Japan)	4 488	4 508	1 469 604	0.3%	0.3%
Oslo (Norway)	44 113	36 422	634 463	7.0%	5.7%

Source: Case study cities.

Assessing the impact of population migration according to different age groups, it becomes clear that the magnitude of the impact will vary by age group. For example, in Bursa (Table 2.7) and in Oslo (Table 2.8), population migration is very high in the 20-29 year old age group. Population inflow and outflow is more active for all age groups in Oslo than in Bursa. In particular, in Oslo, the dynamic change of population in the 20-29 year old age group is observed (21.4% inflow and 11.6% outflow), suggesting the very unstable composition of citizens in the age group.

Table 2.7. Population inflow/outflow in Bursa, 2010-14 average

Age group	Inflow population	Outflow	Total population	Inflow ratio	Outflow rate
0-19	23 832	19 234	807 864	2.9%	2.4%
20-29	24 568	20 821	429 179	5.7%	4.9%
30-39	12 426	9 423	468 007	2.7%	2.0%
40-49	6 197	4 561	380 489	1.6%	1.2%
50-59	3 677	3 374	297 435	1.2%	1.1%
60-over	3 471	3 342	311 886	1.1%	1.1%

Source: BEBKA (2016), Response to the OECD questionnaire, [http://www.bebka.org.tr/site-anasayfa-0-home\\_page.html](http://www.bebka.org.tr/site-anasayfa-0-home_page.html), (accessed June 2016).

Table 2.8. Population inflow/outflow in Oslo, 2010-14 average

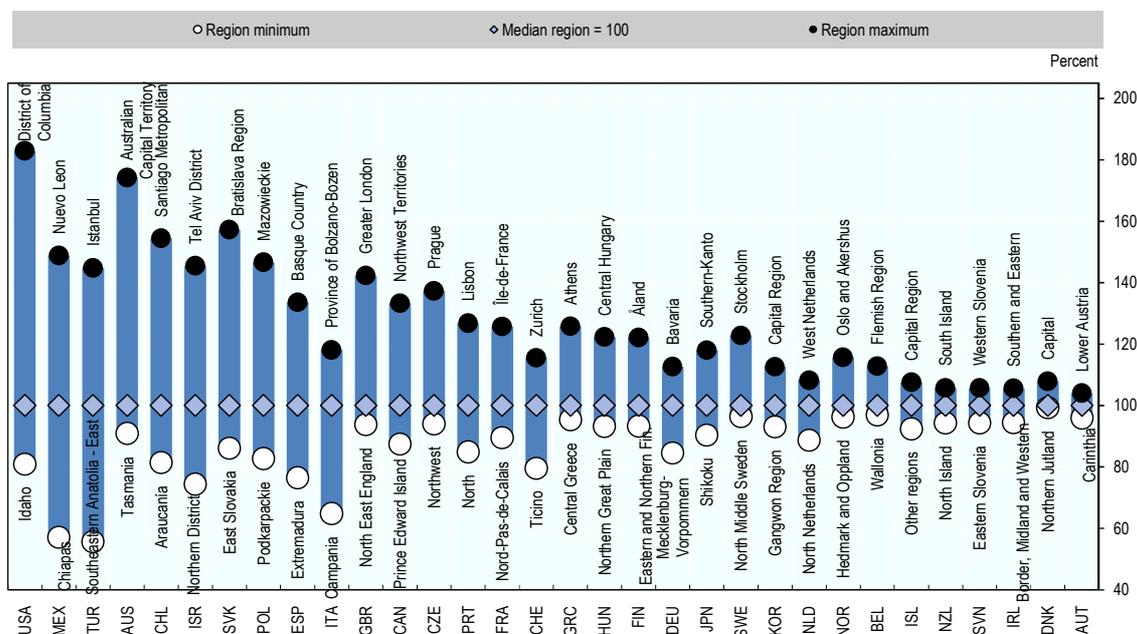
Age group	Inflow population	Outflow	Total population	Inflow ratio	Outflow rate
0-19	6 275	7 154	111 923	5.0%	5.7%
20-29	20 982	11 456	104 190	21.4%	11.6%
30-39	7 919	9 527	95 184	7.1%	8.6%
40-49	2 987	3 191	71 979	3.7%	4.0%
50-59	1 590	1 661	80 735	2.5%	2.6%
60-over	1 046	1 589	336 535	2.5%	2.5%

Source: Oslo (2016), Response to the OECD questionnaire, <https://www.oslo.kommune.no/english/>, (accessed June 2016).

### Income

Income is widely accepted as a key driver of individual well-being, not only because of its relevance to living standards, but because it is also associated with life satisfaction, perceived status and social connections (OECD, 2015). Inter-regional disparities in household income are large in many OECD countries. In Australia, Chile, Israel, Mexico, Poland, the Slovak Republic, Spain, Turkey and the United States, people in the top income bracket were more than 30% richer than the median citizen in 2011 (Figure 2.12). High income gaps are also observed between urban and rural areas. In Europe in 2011, for example, households living in densely populated areas had incomes about 10% higher than all other households (Eurostat, 2013). Regions with lower income may have more difficulty in building social resilience, in particular, building inclusive and cohesive societies. However, more precise analysis is needed to understand disparities among citizens within a region to assess social resilience.

Figure 2.12. Regional range of household income as a percentage of income in the country's median region, 2011

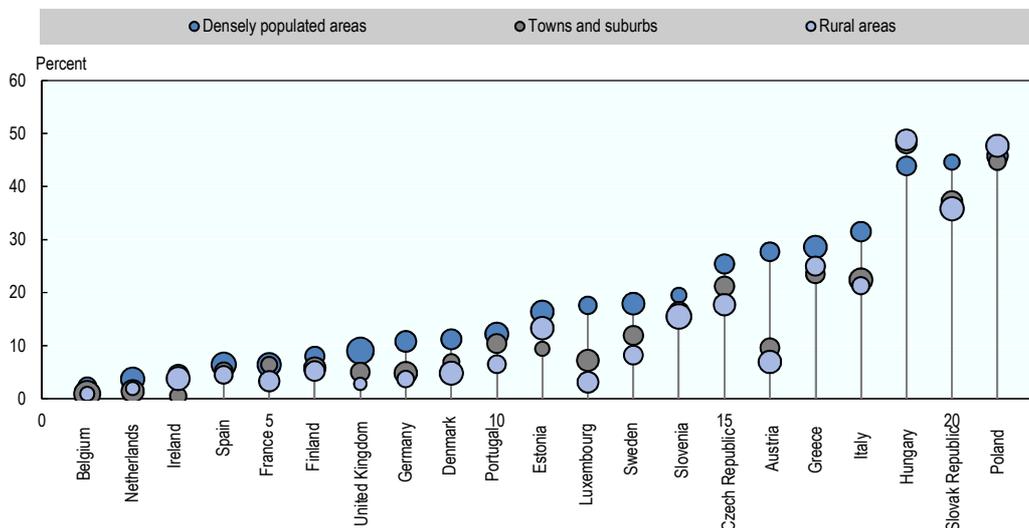


Source: OECD (2014), *Regional Well-Being (database)*, <http://dx.doi.org/10.1787/888933120955>.

## Safety

The data availability across OECD regions makes it necessary to use objective indicators for safety, among which the murder rate is one of the most robust. This indicator shows relatively large disparities across OECD regions, especially in North America and Chile. Measures of perceived safety are increasingly being used in many countries. For European countries, for example, the EU Survey on Income and Living Conditions (EU-SILC) makes it possible to measure the perception of safety according to the type of settlement patterns (Figure 2.13). Figure 2.13 shows that, in most countries, those who live in cities report lower levels of safety than those living in rural areas. Regions with a higher share of people who have higher levels of safety may have more difficulty in building social resilience, in particular, building inclusive and cohesive societies. However, more precise analysis is needed to understand the disparities among citizens within one region for the assessment of social resilience.

Figure 2.13. **Share of people who perceive crime, violence and vandalism as a problem in the area they live in, by type of area, 2012**

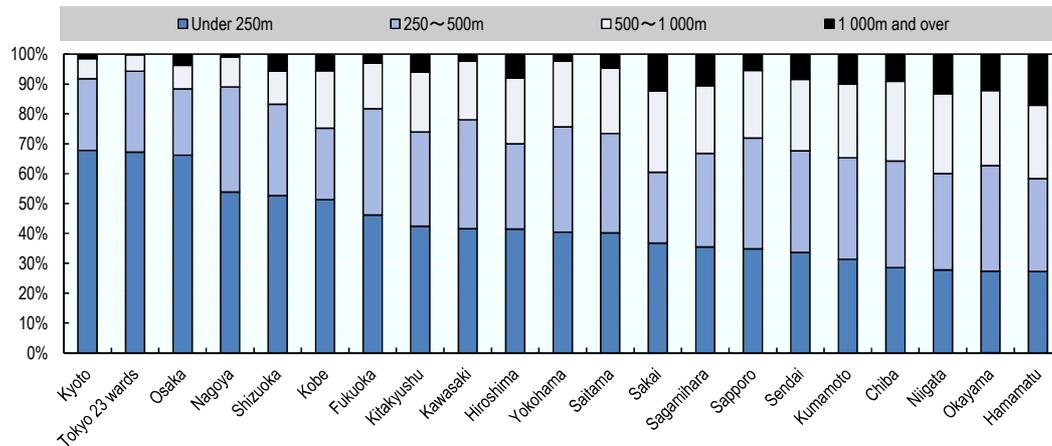


Source: Eurostat (2013), “European Union Statistics on Income and Living Conditions (EU-SILC)”, <http://ec.europa.eu/eurostat/web/income-and-living-conditions/data/database> (accessed March 2016).

## Access to public services

Access to public service is typically measured by access to hospitals in terms of physical distance. For the case of France, Germany, Italy, Mexico, Portugal and the United States, it is the average distance to hospital by small region (TL3), where such distance is weighted by the localisation of people in each square kilometer (Ruiz and Veneri, 2014; OECD, 2014b). Figure 2.14 shows the case of Japan. The Housing and Land Survey of Japan (Ministry of Internal Affairs and Communications, 2013) shows the number of households by the distance from medical facilities by small region (TL3) and 21 major cities in Japan. Nearly 70% of households are in under a 250 metre distance from medical facilities in Kyoto, Tokyo 23 wards and Osaka, while approximately 10% of households are over 1 000 m distance in Sakai, Sagamihara, Kumamoto, Chiba, Niigata, Okayama and Hamamatsu.

Figure 2.14. Dwellings by distance to the nearest medical facilities in 21 major cities in Japan, 2013

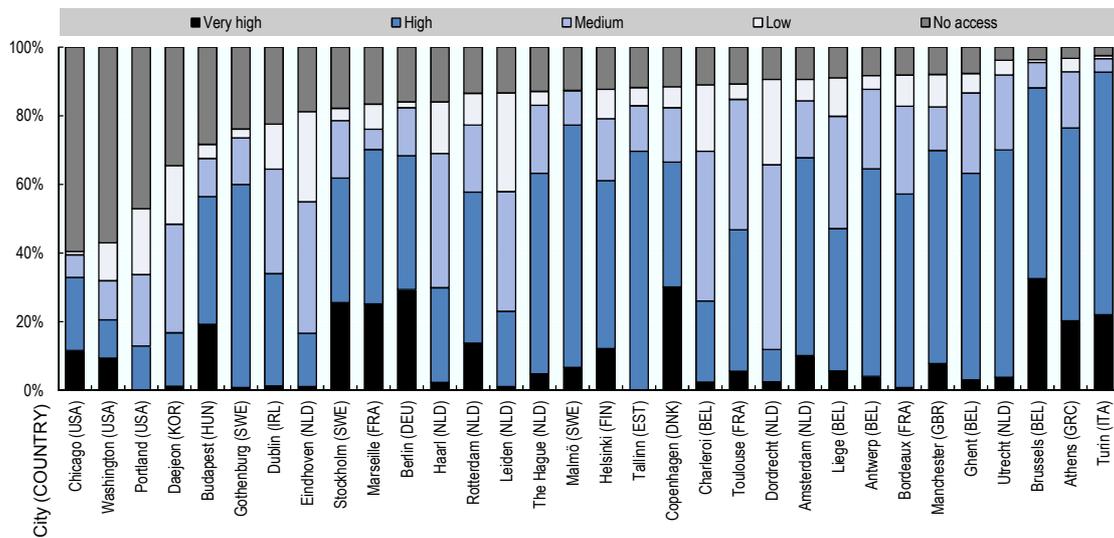


Note: Medical facilities include permanent hospitals, clinics and so on with at least one department of internal medicine, surgery and paediatrics.

Source: Ministry of Internal Affairs and Communications (2013), Housing and Land Survey. <http://www.stat.go.jp/data/jyutaku/> (accessed 31 March 2016).

The accessibility of public transport is one indicator measuring access to public services in cities (OECD, 2014b). A common methodology for identifying public transport catchment areas (areas within walking distance of service stops) for different typologies of transport in functional urban areas (OECD, 2014b) has been developed by the OECD in collaboration with the European Commission. After combining the catchment areas with service frequency by transport mode (bus, metro, light rail, etc.), the share of population and its varying degrees of access to public transport was computed. Preliminary results for 32 OECD metropolitan areas show large differences in the access to transport in cities (Figure 2.15). A larger share of the population in urban core areas of European cities has access to public transport than in American cities: no less than 70% of the population in European cities have some access to public transport. Among the non-European cities, Chicago, Washington and Portland have the largest shares of population with “very high” and “high” access.

Figure 2.15. Access to public transport in a selection of cities



Source: OECD (2014b), *How's Life in Your Region?: Measuring Regional and Local Well-being for Policy Making*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264217416-en>.

### Access to natural resources

Green area (land in the metropolitan area covered by vegetation, forest and parks in 2000) per million population is measurable in OECD metropolitan areas (OECD, 2016). Case study cities calculated not only the green area, but also the percentage of residents who live close to such areas (Table 2.9). Each city has its own indicator, either by distance or walk-minute, and own definition; however, it gives a more concrete idea how much citizens are able to enjoy physical access to green areas.

### Revenue of subnational governments

Data on subnational government revenue were available from the *OECD Regional Database* based on national account data, aggregated for 33 countries. Data from 2014 show that across OECD countries, large differences exist in the share of revenue that subnational governments are able to impose (Figure 2.16). In particular, tax revenues in subnational governments vary from over 80% (Iceland) to just below 5% (Estonia). Generally, in unitary countries, local revenues consist of more than 50% of taxes. As discussed in Chapter 1, subnational governments in most OECD countries have the authority to increase taxes, although in reality, this instrument is not fully utilised. However, there are other possibilities for increasing revenue, such as through tariffs and fees. Most countries show that the share of subnational revenues from tariffs and fees ranges between 3.8% and 24%.

Table 2.9. Percentage of population living in proximity to green space

City	Indicator	Data	Definition
Antalya (Turkey)	Percentage of the population living within 300 metres from a public open space larger than 5 000 m <sup>2</sup>	69% (2014)	Green space includes residential and regional open and green areas stated in Antalya's five central districts' master plans, including public open and green areas such as parks, playgrounds, recreational areas.
	Percentage of the population within a 15-minute walk to a green space	55% (2014)	15-minute walk distance is considered as approximately 1 000 metres.
Belo Horizonte (Brazil)	Percentage of the population living up to 300 metres from a green area bigger than 5 000 m <sup>2</sup> and open to the public	21% (2016)	Greens areas open to the public are all green areas with a significant and/or preserved area, public or private that are open to the public.
Oslo (Norway)	Proportion of resident population living up to 500 metres to the nearest recreation area (% of total population)	Oslo: 52% (2013) Aakersus: 49% (2013)	Recreation areas are defined by Statistics Norway as areas such as playgrounds, ballgrounds, beaches, parks or public spaces with an area less than 200 decares (200 000 square meters), accessible within a safe walking distance.
Tampere (Finland)	Percentage of citizens living within 300 metres from public open space larger than 5 000 m <sup>2</sup> (% of total population)	City: 98.5% (2015) Region: 52% (2015)	It excludes public forested recreational areas and other semi-closed spaces.
	Percentage of the population within 15 minutes from a green space of at least 1.5 ha (% of total population)	100% (2015)	

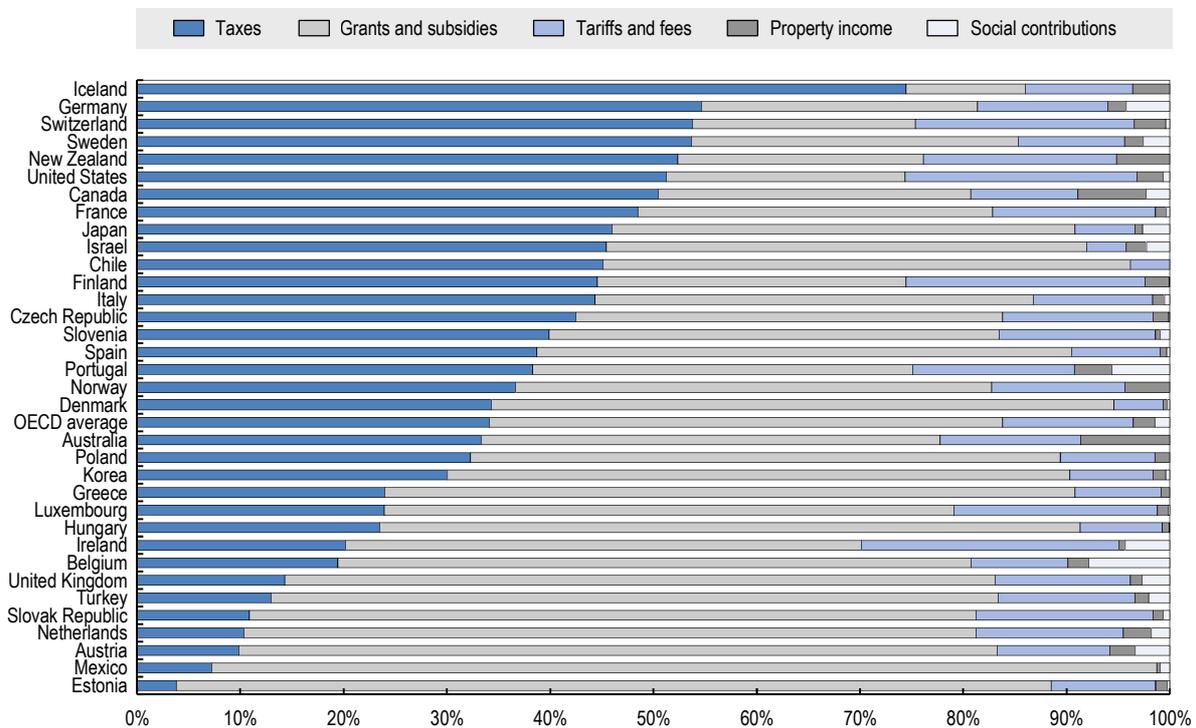
Sources: BAKA (2016), Response to the OECD questionnaire, <http://www.investinwmr.org.tr/default.aspx>, (accessed June 2016); Belo Horizonte (2016), Response to the OECD questionnaire, <http://www.cmbh.mg.gov.br/>, (accessed June 2016); Oslo (2016), Response to the OECD questionnaire, <https://www.oslo.kommune.no/english/>, (accessed June 2016); City of Tampere (2016), Response to the OECD questionnaire, <http://www.tampere.fi/en/index.html>, (accessed June 2016).

## Future research

This chapter demonstrated suggested indicators, using available data. However, listing individual data does not fully explain to what extent a city is resilient. No single impact indicator can show the definitive status of resilience at any point in time (OECD, 2014a). This is because resilience spans a range of complex layers of society, the economy and the environment. Future investigation should correlate diverse indicators so that multilateral assessment of the degree of resilience is possible, for example, diversification of industry and worker income level. This might reveal fruitful correlations.

Indicators are not in linear motion, meaning that a larger or smaller value does not always mean a greater or smaller degree of resilience. This is typically the case for industrial diversification, because it has to be considered by the balance of specialisation. A greater number of start-up companies might suggest a more robust economy, but this must be assessed against the nature of the business in which those companies engage. The methodology for evaluating indicators needs to be explored.

Figure 2.16. Structure of subnational government revenue, 2014



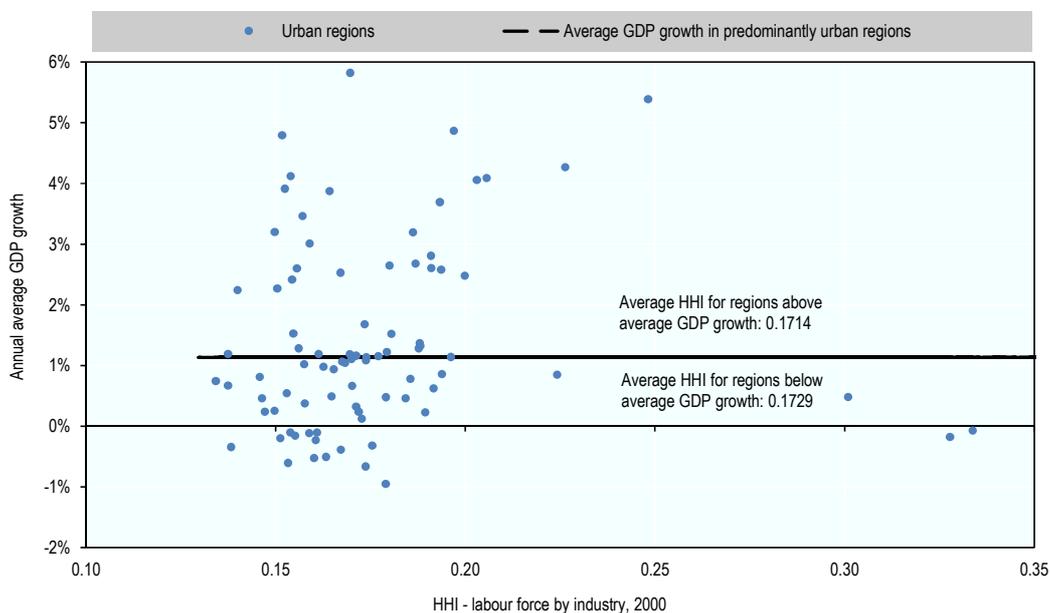
Source: OECD (forthcoming 2016b), "Regions at Glance 2016", OECD Publishing, Paris; based on data from OECD (2016). *OECD Regional Database*. [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 20 April 2016).

Assessment of the contribution of indicators to the outcome of cities' resilience might help understand the meaning of individual indicators, for example, by assessing how industrial diversification leads to GDP growth or employment growth. The concentration of labour in ten industry groups was assessed against annual average GDP growth in OECD predominantly urban regions between 2000 and 2012 (Figure 2.17). In general, it was not easy to draw any immediate conclusions on the relationship between the industrial diversification and GDP growth/employment; however, in regions with above-average annual GDP/employment growth, lesser concentration in employment by industrial group could be observed (Figures 2.17 and 2.18).

Future work could include an extended collection of data, in particular, data on GDP and employment by industry group, as well as the tertiary educated labour force in OECD metropolitan areas. Data on social cohesion in metropolitan areas could be indispensable, using poverty levels and disposable income.

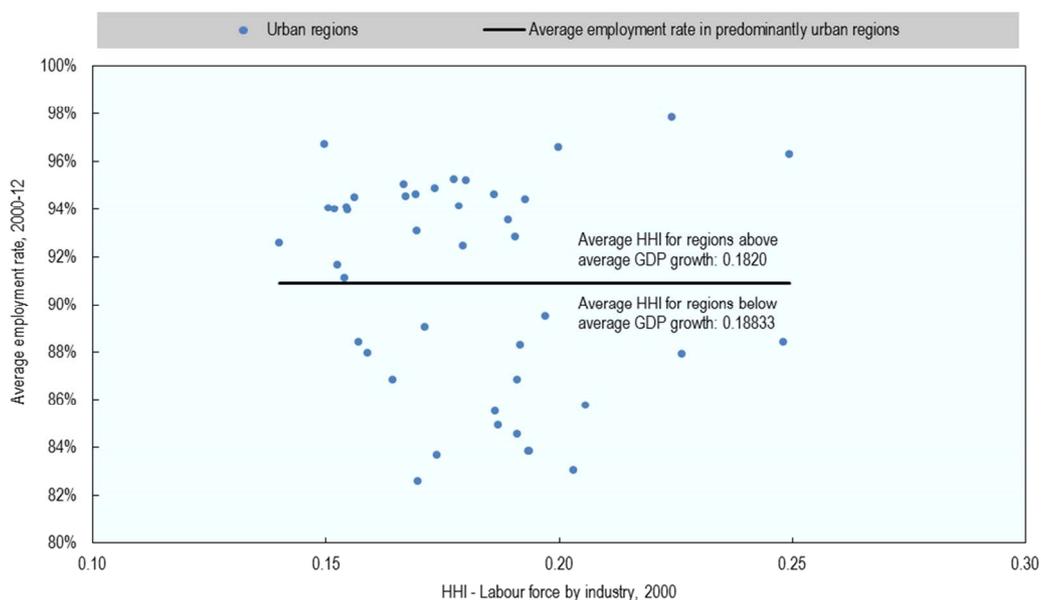
Areas where only qualitative data are available, such as cities' long-term visions and strategic plans, could also be further explored, for example, assessing how visions have been implemented and what results they have had. Further assessment to disentangle the complex nature of resilience, in particular the co-relationship between different indicators, would be useful.

Figure 2.17. **Regional labour force concentration in 95 predominantly urban regions (2000) and annual average GDP growth (2000-13)**



Source: OECD (2016a), *OECD Regional Database*. [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016). Own calculation.

Figure 2.18. **Regional labour force concentration in 43 predominantly urban regions (2000) and average employment rates (2000-14)**



Source: OECD (2016a), *OECD Regional Database*. [http://stats.oecd.org/Index.aspx?datasetcode=REG\\_DEMO\\_TL2](http://stats.oecd.org/Index.aspx?datasetcode=REG_DEMO_TL2), (accessed 31 March 2016), Own calculation.

## Note

1. It includes the UN Human Settlements Program (UN-HABITAT), the UN Office for Disaster Risk Reduction (UNISDR), the World Bank Group, the Global Facility for Disaster Reduction and Recovery (GFDRR), the Inter-American Development Bank (IDB), the Rockefeller Foundation, 100 Resilient Cities, pioneered by the Rockefeller Foundation, the C40 Cities Climate Leadership Group, and ICLEI – Local Governments for Sustainability.

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## *Chapter 3.*

### **Policy approaches to help cities build resilience**

*This chapter proposes policy approaches to enhance cities' resilience. Policy approaches are suggested in accordance with the most relevant building blocks of adaptive capacity, robustness, redundancy, flexibility, resourcefulness, inclusiveness and integrated approach; however, the same policies can contribute to other building blocks as well. It also includes specific policy approaches in relation to energy management and natural hazard management.*

This chapter proposes policy approaches to enhance building blocks of resilient cities, based on the experience of the case study cities and literature research. Policies are suggested in accordance with the most relevant building blocks of adaptive capacity, robustness, redundancy, flexibility, resourcefulness, inclusiveness and an integrated approach; however, the same policies can contribute to other building blocks as well (Table 3.1).

Table 3.1. Policy approaches for building resilience

Strategy 1: Adaptive: Resilient cities act based on the lessons learnt from past experiences
✓ Cities need to encourage innovation by developing business and talent strategies with the private sector and universities.
✓ Compact city policies help cities under pressure of urban development to pursue the Sustainable Development Goals.
Strategy 2: Robust: Resilient cities have well-designed systems to absorb shocks.
✓ Foster new competitive industries as new sources of growth to encourage industrial diversification.
✓ Develop investment strategies on reliable infrastructure to ensure robust economic development.
Strategy 3: Redundant: Resilient cities have spare capacity for unexpected needs.
✓ Cities need to invest in infrastructure to generate extra capacity to ensure economic development in face of any critical moment.
✓ Strategic land-use planning multiplies the value of limited natural resources.
Strategy 4: Flexible: Resilient cities respond to changing circumstances in the scope of their plans.
✓ Long-term vision provides guidance for cities in changing circumstances.
✓ Entrepreneurship and innovation offer cities options to create new economies in changing circumstances.
Strategy 5: Resourceful: Resilient cities find ways to meet critical needs with the resources available
✓ A special administrative section for building resilience is the key for strengthening public sector resources.
✓ Cities need to explore fiscal reform and find their new financial resources.
Strategy 6: Inclusive: Resilient cities bring diverse perspectives together
✓ Stakeholder engagement can improve the quality of policies and empower local communities.
✓ Ensuring access to opportunities for all citizens.
Strategy 7: Integrated: Resilient cities work together beyond boundaries
✓ Multi-level governance promotes better policy co-ordination.
✓ Universities can become the centre of alliances inviting stakeholders on board.
✓ Forming alliances with other cities makes possible a metropolitan-scale effort.

Policy approaches are mainly addressed to local governments, assuming that they are in collaboration with other players, such as the national government, surrounding municipalities, non-governmental organisations, local citizens and the private sector. Development and implementation of each proposed policy requires a comprehensive approach by different stakeholders. Breaking down policy silos is the most important element.

Improving one suggested policy can contribute to other building blocks. It is important to note that the impact of a policy strategy could be felt simultaneously across different building blocks of resilience.

Cities do not have to address all policies at the same time to enhance their resilience. Collecting indicators to measure the performance of their existing policies and mechanisms will be the first step to determine the policy areas most in need of improvement.

## Horizontal approaches

### *Approach 1. Adaptive: Resilient cities act based on the lessons learnt from past experiences*

Resilient cities need to be adaptive to be able to manage uncertainty by evolving – that is, modifying standards, norms or past behaviours – using evidence to identify solutions and applying the knowledge gained from past experience in taking decisions about the future.

### *Cities need to encourage innovation by developing business and talent strategies with the private sector and universities*

Innovation, which involves the introduction of a new or significantly improved product, process or method, is increasingly needed to drive growth and employment and improve living standards (OECD, 2010a). Innovation will strengthen **adaptive** capacity, by improving conventional methods, using past experience for better solutions and applying lessons learnt for future growth. Cities increasingly seek to promote their economic development by supporting innovation. They define and implement strategies and policy instruments to build on their strengths and to shift course. Encouraging innovation requires taking a systemic approach – focusing on the people involved, the information they are using, the ways in which they are working together, as well as the rules and processes that govern their work (OECD, 2014d).

**Tampere**, **Kobe** and **Lisbon** are good examples of cities redefining their business strategies on innovation and shifting their course, using their local resources, including people and universities. For example, **Tampere** changed the format of innovation in the region by encouraging a shift away from the previous cluster-based emphasis on sectoral specialisation towards a focus on cross-cutting platforms that support more open innovation processes. This change was accelerated by the downsize of Nokia and its related industries, which had been the main innovation centre. By adopting the Open/Smart/Connected strategy and the creation of various platforms, Tampere has promoted innovation, creating more than 100 new companies and more than 600 new knowledge-intensive jobs since 2012 (City of Tampere, 2015). Similarly, **Kobe** strategically targeted the rapidly growing medical and pharmaceutical industries, considering that investing in innovation in these industries would help restore its economic growth and bring spinoff benefits to small and medium-sized enterprises (SMEs) in the city with weak business prospects in their traditional markets. Kobe already had a cluster of SMEs with a wide range of technology for steel, shipbuilding and electric industries. Innovation in the medical and pharmaceutical industries has enabled these SMEs to apply their existing skills to medical-related devices, which have market growth potential given Japan's rapidly ageing population. In **Lisbon**, innovation is supported by creating an environment favourable for start-ups, without promoting a specific sector. While Lisbon's economy suffers overall from its lack of integration in global value chains, support for entrepreneurship and start-up business aims to close this gap. Despite its focus on business services to cultivate start-ups, Lisbon also focuses on attracting established firms, particularly in the digital economy, because the presence of a major company in one sector is seen as critical for encouraging further innovation and entrepreneurship.

The attraction of skilled talent is also a key component in advancing business strategies on innovation and strengthening a city's **adaptive** capacity. This has become particularly relevant to many cities which have an increasing elderly population as the

current working population begins to leave the workforce and growth in the labour force is expected to slow. To this end, **Ottawa** plans to develop a Talent Attraction Toolkit with other stakeholders, to provide Ottawa's private sector with common messaging and marketing for attracting talent. Similarly, the city plans to increase collaboration between the private sector and Ottawa's academic institutions, by recruiting international students. A strategy currently under development will facilitate community and business linkages for international students studying in Ottawa, to make efforts to encourage them to work and live in Ottawa after they graduate (City of Ottawa, 2015b).

*Compact city policies help cities under pressure of urban development to pursue the Sustainable Development Goals*

Compact city policies, which involve dense development, good public transport and accessibility to local services and jobs (OECD, 2012), can help cities adjust their urban form to accommodate needs both for expanding and shrinking sustainably. This can also improve the city's **adaptive** capacity. It is important that such policies be supported by land use for citizens and the private sector. They can also help cities cope with an ageing and shrinking population.

Ottawa and Oslo are good examples of the needs of increasing population. Faced with a rising demand for housing and population growth, **Ottawa** has adopted the compact city approach. The policy has intensified residential use and designated as green zone areas where development is prohibited. Brownfield development was encouraged in the city centre. For the five-year period from 2007 to 2011, the city aimed to achieve intensification for 36% of new units in the urban area. The target was achieved, with intensification averaging 39.3% (City of Ottawa, 2015a). A similar approach was taken in **Oslo**, where policies to increase the compactness of the city are explicitly addressed in the city's Development Master Plan, increasing densification to accommodate population growth. On the other hand, **Toyama City** has been pursuing compact city policies, in light of the ageing and declining population (OECD, 2012; 2015b) (Box 3.1). This is a successful case of how cities are able to enhance their resilience in shrinking pressure of demographic change through compact city policies.

To develop public transport, which is an indispensable component in compact city policies, the case study cities have made a variety of efforts to collaborate with neighbouring municipalities and different levels of governments. For example, **Cardiff** is working with the Cardiff Capital Region, which comprises ten local authorities in Wales, to propose integrated planning and provision of transport services across the local authorities in the region. This improves access to jobs for people living outside the city of Cardiff, where access to transport is generally better, facilitating transfers between different transport modes. The city of Cardiff and the Cardiff Capital Region have also been working on better integration of transport services to support local economic growth, and to cope with a projected population growth of 23% until 2030. The city of **Oslo** and the adjacent county of Akershus are integrating public transit along four transit axes. Younger families moving out of the city or towards its periphery, and new residents who find it more appealing to live in these areas because of the lower cost of housing, are driving the demand for better access to public transit. The Oslo Region, the co-ordinating institution for transport planning in the metropolitan area, understands that better public transport connectivity drives local economic growth. In **Lisbon**, the City Council is collaborating with the national government, which is responsible for transport planning, to improve transfers between different modes of transport and improve the walkability of cities, for better access to service stops.

### Box 3.1. Toyama’s approach for resilience

Toyama City is located in the centre of Japan, with a population of 419 907 in 2014. The city faces a declining, ageing population. The percentage of older people 65 or over is expected to reach 38% by 2040 (OECD, 2015b). This demographic shift has resulted in declining tax revenues, making it difficult to maintain and update the existing transport infrastructure. Without access to convenient and reliable transport, elderly residents face isolation and health problems associated with limited mobility. Toyama City’s Comprehensive Plan (2007-16) outlines an overall vision for a compact city and efficient public transport networks. Its central concept is an urban structure designed to enhance the mobility of citizens who do not have access to private vehicles, a policy of encouraging residents and businesses to relocate along the new transport lines, and to renew the city centre to make it more suitable for pedestrians.

Toyama was chosen as one of 100 Resilient Cities by the Rockefeller Foundation in 2014. To enhance its resilience, the city has also created an Office of Strategic Planning and Resilience, and appointed a chief resilience officer. The office is currently developing a new Resilient Cities Strategy, which will be launched by the end of 2016.

Sources: [www.100resilientcities.org/cities/entry/toyama#/-\\_Yz5jJmg%2FMid1PWI%3D](http://www.100resilientcities.org/cities/entry/toyama#/-_Yz5jJmg%2FMid1PWI%3D); 100 Resilient Cities, “Toyama’s resilience challenge”, [www.city.toyama.toyama.jp/kikakukanribu/johotokeika/tokei/zink/osui/toyamashijinkodotai26.html](http://www.city.toyama.toyama.jp/kikakukanribu/johotokeika/tokei/zink/osui/toyamashijinkodotai26.html); OECD (2015b), *Ageing in Cities*, <http://dx.doi.org/10.1787/9789264231160-en>.

### ***Approach 2. Robust: Resilient cities have well-designed systems to absorb shocks***

Resilient cities need to be robust so that they can absorb shocks and emerge unscathed or without significant loss to their capacity to function. Industrial diversification and development of reliable infrastructure are key factors.

#### *Foster new competitive industries as new sources of growth to encourage industrial diversification*

Cities are more likely to be able to cope with future changes in the industrial structure if they invest in diversifying the industrial mix and strike a balance between promoting existing industries and encouraging new ones. This will favour the **robustness** of their economy, and provide a buffer to mitigate such industrial structural change. On the other hand, it is important to note that specialisation in a core industry needs to be balanced with strategies for diversification (OECD, 2014a). Industrial diversification can be achieved through a number of measures, such as attracting more firms to the city to encourage new industries, and supporting existing businesses in the city to expand their operations in another industry.

The key factor for successful industrial diversification is a clear commitment of the city and the firm, backed by resources within the relevant constituencies and well-designed strategies for implementation. For example, **Antalya** and **Ottawa** identified tourism as their new source of growth. Antalya is expanding MICE (meetings, incentives, conferences and exhibitions) tourism and medical tourism as a supplement for its beach resorts, diversifying its markets to secure a constant flow of visitors throughout the year. Ottawa invested on creating a dedicated institution, Events Ottawa, responsible for pro-actively targeting and attracting a variety of major events.

*Develop investment strategies on reliable infrastructure to ensure robust economic development*

Infrastructure is the backbone of **robustness** of cities, and has a direct impact on economic development, social inclusion and environmental sustainability. Developing reliable infrastructure is a fundamental concern for urban resilience. OECD estimates suggest that annual global investment requirements by 2030 for telecommunications, road, rail, electricity (transmission and distribution) and water are likely to account for approximately 2.5% of world gross domestic product (GDP). If electricity generation and other energy-related infrastructure investments in oil, gas and coal are included, the annual share rises to 3.5% of GDP (OECD, 2007). In addition, substantial benefits can be realised by better managing public investment throughout its life cycle and across levels of government by co-ordination among city, regional and national governments; and ensuring that the quality of public governance correlates with public investment and growth outcomes, at both national and subnational levels (OECD, 2013). Well-designed transport infrastructure improves connectivity among regions, thus expanding the economic and social opportunities. **Kyoto** has a good example of developing the Kyoto Juukan Highway and the Kitakinki Tango Railway to connect the northern regions with the south.

*Approach 3. Redundant: Resilient cities have spare capacity for unexpected needs*

Resilient cities need redundancy to meet the need for extra capacity when faced with unexpected needs, a disruptive event or extreme pressure. It will enhance resilience to prepare for the future shocks and stresses by developing or having an alternative source of action, service or service provider when necessary. Developing extra capacity for infrastructure in case of emergencies, and strategic land use, for example, can provide cities a way to prepare for unexpected circumstances.

*Cities need to invest in infrastructure to generate extra capacity to ensure economic development in face of any critical moment*

Cities need to invest in infrastructure to be equipped with the extra capacity to add **redundancy** of infrastructure for unexpected needs. **Kobe**, one good example, has developed an innovative water reservoir and water pipe system to guarantee emergency water supply, in response to the lessons learnt in the 1994 Kobe earthquake. The emergency water retention system is configured with emergency shut-off valve systems and earthquake-resistant cisterns installed in the serving reservoirs. In the event of a disaster, the emergency valves close and fresh water is retained in the reservoirs, ensuring a water supply of 3 litres per resident for seven days (City of Kobe, n.d.). In addition to the reservoirs, the city also completed a project in 2015 to install large-capacity water pipes across the city centre. This could function as an alternative source for emergency water supplies, providing 3 litres of water for every resident for 12 days (City of Kobe, n.d.).

*Strategic land-use planning multiplies the value of using limited natural resources*

Land-use planning is often defined as “a systematic and iterative procedure carried out in order to create an enabling environment for sustainable development of land resources which meets people’s needs and demands” (FAO/UNEP, 1999). Land is a limited resource, but if its usage is planned strategically to share multitasking, it can contribute an additional benefit of **redundancy**. Kobe’s Restoration Plan (June 1995)

aimed to control buildings, their sites and public facilities as a whole to help make the city resistant to fire in case of a disaster. It sought to utilise the land strategically, updating urban functions by securing open spaces such as plazas and parks, improving public facilities such as roads and supplying urban housing of good quality. As a result, 25 parks were carefully designed and developed as disaster prevention centres, with firebreak belts and emergency routes. They not only provide citizens green space, contributing to their well-being, but are expected to serve as local emergency operation centres for evacuation and restoration activities in case of a disaster. Similarly, the city developed 28 “pocket parks” in 11 areas, small open spaces built along thoroughfares. The goal is to improve city amenities and also offer safe and accessible spaces in case of emergency (City of Kobe, 2015a). The Act on Regional Development for Protection of Tsunami in **Japan** (2011) mandates such elaborated design to leave land empty to create value in case of emergency. The act allows the prefectural governor to designate a “special warning zone against tsunami disaster”, which prohibits development projects and construction of buildings (Ministry of Land, Infrastructure, Transport and Tourism of Japan, n.d.). The act restricts development in certain areas identified by prefectural governments as prone to tsunami inundation.

#### ***Approach 4. Flexible: Resilient cities respond to changing circumstances in the scope of their plans***

Resilient cities adopt a flexible system that allows individuals, households, businesses, communities and government to adjust behaviour or action to respond to change in the moment within the scope of their expected scenario reading. Well-designed long-term vision provides cities a solid foundation for achieving policy goals and governing their operations, including responses in unforeseen situations. Similarly, encouraging entrepreneurship and innovation also increases options for cities to respond to changing circumstances and helps create a flexible economic base.

##### *Long-term vision provides guidance for cities in changing circumstances*

A clear long-term vision that describes future socio-economic development goals of a city provides an opportunity to assess changing circumstances and serve as tangible action plans for all stakeholders, increasing capacity to respond to any changes in a **flexible** manner. Visions must have indicators to measure the policy impact, as well as action plans and mid-term goals so that the way to realise those visions can be monitored and adjusted if necessary. They should also consider the impact of the potential shocks and outline possible paths to inform policy making. Ideally, long-term visions should be respected regardless of election cycles and potential leadership changes, including the relevant stakeholders in different policy areas.

Most case study cities have such visions. In **Cardiff**, the city’s 2016-18 Corporate Plan established its vision to be “Europe’s most liveable capital city” (City of Cardiff, 2014). To achieve this vision, seven key outcomes are sought, formulated with the help of public and private stakeholders.

**Ottawa** also has a very clearly delineated vision for its development. The city acknowledged that many aspects of the community were likely to change in the next 50 years, triggered by the shifting global economy, resource scarcity and rising energy prices, changing climate and new population dynamics. To allow the city to remain flexible to deal with such changes, Ottawa developed the Sustainability and Resilience

Plan in 2012. This overarching plan identifies a long-term vision and sets goals for economic, social, cultural and environmental aspects of sustainability.

In 2011, **Kyoto** Prefecture launched *Tomorrow's Kyoto*, a long-term development strategy set to run through 2040. It originates in the prefecture, but is to be implemented in conjunction with municipalities. While municipal involvement is voluntary, the prefecture encourages it through subsidies for projects of specific local interest and direct investment by the prefecture government. The strategy includes a medium-term plan through 2020, as well as annual action plans and annual evaluation reports that can act as immediate, short-term guidance and evaluation mechanisms. *Tomorrow's Kyoto* underlines the importance of a number of factors to encourage resilience, including inclusive society, conservation of the environment and co-operation among all stakeholders.

### *Entrepreneurship and innovation offer cities options to create new economies in changing circumstances*

Supporting entrepreneurship and innovation is one of the important drivers for making a city's economic base more diverse and **flexible**, to respond to any changes. A set of guidelines for government policy to stimulate entrepreneurship include: 1) make the formation of entrepreneurial activity a government priority; 2) ensure that government policy is broadly focused rather than cherry-picking areas of special interest; 3) build on existing industries in the region or country, rather than trying to generate new industries from greenfield sites; 4) ensure that all industry sectors, not just high-tech, are considered; 5) adopt a "top-down" and "bottom-up" approach delegating responsibility to local and regional authorities; and 6) develop policies that address the needs of both the business and its management team (Mason and Brown, 2014).

**Oslo** has developed several support programmes to facilitate entrepreneurship in the city. For example, an online help service, Oslo Start-up, supports entrepreneurs in the Oslo region to receive guidance on start-up-related questions (Oslo Business Region, 2016). This online platform, made possible through Oslo Business Region, also offers information on co-working spaces and maker spaces, quick guides and other useful support for start-ups and growth companies. Some of the new start-up services are digitally based, while others are physical meeting points for networking and skills-building. The aim is to spread knowledge about what kind of business and start-up initiatives are evolving in the region, and to support entrepreneurs in optimising ideas and opportunities for their businesses.

### *Approach 5. Resourceful: Resilient cities find ways to meet critical needs with the resources available*

Resilient cities are also resourceful in terms of funding and human resources, and can restore essential services and systems in a crisis or under highly constrained conditions. It is not easy to provide financial and human resources after shocks and stresses; however, those are the essential elements in planning and implementing other strategies. Resources can be developed internally or in co-operation with external stakeholders. Policy measures for increasing cities' resources include establishing a designated unit responsible for resilience policy in the city administration, mobilising external experts, increasing tax revenues, and attracting and retaining talent.

*A special administrative section for building resilience is the key for strengthening public sector resources*

Building a new administrative office dedicated to resilience building can be a way of enhancing **resources**. The new section has to be closely linked to the leadership of the city government, and granted relative autonomy. It must also be able to be the centre of accumulated knowledge and expertise, and function cross-sectorally, with good networks at different levels of government. Appointment of a chief resilience officer (see Box 1.9 in Chapter 1) and the Offices of Sustainability and of Recovery and Resilience in **New York City** are good examples (Box 3.2).

**Box 3.2. The Office of Sustainability and the Office of Recovery and Resiliency: New York City**

The Mayor’s Office of Sustainability (MOS) and the Office of Recovery and Resiliency (ORR) were established as part of the New York City Mayor’s Office’s plan to improve the city’s quality of life, environmental sustainability and resilience to climate change, by using evidenced-based analysis to develop initiatives with measurable outcomes. The MOS and ORR focus on implementing the sustainability and resilience dimensions of the city’s 2015 development plan: *One New York: The Plan for a Strong and Just City*, as well as the ten-year resilience plan, “A stronger, more resilient New York”. Their brief is to develop cohesive long-term initiatives for New York City to enhance the economy, build greater efficiency and improve quality of life. The offices employ a diverse set of professionals, from architects and engineers to economists and policy analysts, lawyers and communications specialists. The MOS and ORR partner with the city government, including the departments of city planning, administrative services, education, design and construction, environmental protection and transport, as well as academic institutions, civil society organisations and businesses.

Source: City of New York (2015), “Sustainability”, “Resiliency”, [www.nyc.gov/html/planyc/html/home/home.shtml](http://www.nyc.gov/html/planyc/html/home/home.shtml).

*Cities need to explore fiscal reform and find their new financial resources*

Administrative and fiscal reforms also provide an opportunity to improve the city’s financial **resources**. In particular, when austerity measures are imposed and grants and subsidies from the national government are declining, cities need to consider other financial resources for which they can be responsible themselves.

By introducing a new tax, raising local tax rates and/or to broaden their tax bases, they can offset declines in central government grants (Ahrend, Curto-Grau and Vammalle, 2013). This can be done by modifying the property or real estate tax levied on buildings and domestic or business properties (European Commission, 2012) or introducing a new tax programme which aligns with their policy priorities. In Japan, **Yokohama** introduced a “green tax” to secure a stable funding source to protect and promote the city’s green areas. This per capita levy on residential tax generates extra revenue of JPY 2.4 billion per year on average (City of Yokohama, n.d.). In **Lisbon**, the Local Finance Law and the Portuguese Local Accounting Law allow local authorities administrative and financial autonomy. Local authorities cannot create new taxes, but they can decide the level of taxation and exemptions on municipal taxes (on property, vehicles and corporate income). However, because raising taxes is unpopular (Bahl, 2010) and because it can increase tax competition among subnational governments, local

authorities' taxing power is often not exercised, and cities refrain from raising their taxes even if they have the right to do so (Blöchliger and King, 2006). Toyama has experience of an increase in tax revenue, which has been anticipated while designing compact city policies. Encouraging relocation of residents to the city centre by providing subsidies was considered to contribute to the increase the property tax revenue. Property tax revenue in the city steadily increased in 2013 and 2014, contributing to the increase in tax revenues overall (City of Toyama, n.d.).

Imposing tariffs and fees, for example, for access to city centres by car, as **Oslo** or **London** have done, can provide revenue sources for cities while addressing other policy issues relevant for cities, such as traffic congestion.

**Kobe** is a successful case in administrative and fiscal reforms. Following the earthquake in 1995, the restoration and reconstruction plunged the city of Kobe into financial crisis. As part of the city's reforms, Kobe has checked and overhauled all administrative operations, and actively used private sector skills to install efficient, effective management. The city has reduced the total fixed number of city employees by about 7 200, and the outstanding balance of city bonds by about JPY 600 billion since fiscal year 2004. Moreover, Kobe has worked to secure new financial resources by such means as marketing naming rights (the rights to name sport facilities). These administrative and fiscal reforms have produced financial resources of approximately JPY 290 billion, helping to grow out of the financial crisis. The funds generated as a result of administrative and fiscal reforms have been used not only to maintain resident services, but also to improve other services. For example, Kobe has increased the capacity of children's day nurseries and special nursing homes for the elderly, and has made elementary and junior high school buildings earthquake-resilient.

Public-private partnerships are a way of increasing usable **resources** for public purposes. In **Canada**, the federal government encourages public-private partnerships (PPPs) through PPP Canada. This incorporates the P3 Canada Fund, which provides funding for PPP projects undertaken by provinces, territories and local governments. The fund was created to improve the delivery of public infrastructure and provide better value, timeliness and accountability by increasing the effective use of PPPs. In **New Zealand**, changes to the Local Government Act opened the way for councils to look at joint financing approaches with the private sector, particularly in water services. This is complemented by a recent joint local and central government initiative that established the Local Government Funding Agency, a debt vehicle that raises bonds on the local and international market to on-lend to local governments at competitive interest rates (OECD, 2014a).

### ***Approach 6. Inclusive: Resilient cities bring diverse perspectives together***

Resilient cities have an inclusive system that ensures that diverse actors and communities are fully consulted, engaged and empowered at every stage of the policy-making and implementation process. Strategies and plans have a greater chance of being effective – that is, being implemented coherently by the relevant authorities and accepted by citizens and other stakeholders – when they are developed taking diverse interests, needs and perspectives into consideration, and synthesise them into a vision with a viable path forward. Measures such as stakeholder engagement and social integration policies for minority groups will help cities incorporate diverse perspectives into their decision making.

*Stakeholder engagement can improve the quality of policies and empower local communities*

Cities are actively engaging with citizens and other stakeholders, for example, in **New York City** and **Sydney** (Box 3.3). BOKOMI (disaster preventive welfare community) in Kobe is also a good example which organises disaster prevention and reduction activities such as evacuation drills and fire drills. Currently, 191 BOKOMI are working in every district in the city.

**Box 3.3. Incorporating stakeholder perspectives into urban resilience-building**

In 2006, New York City established a Climate Change Adaptation Task Force to develop a co-ordinated climate adaptation strategy as part of its long-term development and sustainability plan, PlaNYC (to 2030). The task force was made up of more than 40 public and private sector stakeholders and supported by scientists, academics and private sector experts. The planning office, co-ordinating with relevant city departments, met with over 100 advocacy organisations, held community meetings in each borough and collected citizen input through email on its website. A networked or “stakeholder interactive approach” was used by building contacts with national, regional and local agencies involved in such sectors as urban planning, transport, environmental management and disaster response. Both plans, launched in 2007, saw more than 25 city agencies working together toward the vision of a greener, greater New York. As a result of the plans, by 2011, hundreds of acres of new parkland had been built, and existing parks improved. In addition, over 64 000 housing units were created or improved, together with new neighbourhoods with access to transport. Greenhouse gas emissions were reduced to 13% below 2005 levels. Of the 127 initiatives included in PlaNYC, more than 97% were launched within a year of the plan’s release, and almost 60% of the 2009 targets were achieved completely or almost completely.

Sydney is incorporating resilience-building into its long-term development plan, and launched the process with a multistakeholder agenda-setting workshop to: 1) develop a shared understanding of resilience; 2) discuss Sydney’s resilience challenges, strengths and weaknesses; 3) identify stakeholders from metropolitan Sydney that should be involved in the strategy’s development, which is expected to be a two-year process. The resilience strategy is part of the long-term development plan “Sydney 2030”.

*Sources:* Jha, Miner and Stanton-Geddes (eds.) (2013), *Building Urban Resilience: Principles, Tools, and Practice. Directions in Development*, <http://dx.doi.org/10.1596/978-0-8213-8865-5>; City of Sydney (2015), “Sydney: Agenda Setting Workshop: Summary report”, [www.cityofsydney.nsw.gov.au/\\_data/assets/pdf\\_file/0004/241789/Sydney-Agenda-Setting-Workshop-Summary-Report-accessible.pdf](http://www.cityofsydney.nsw.gov.au/_data/assets/pdf_file/0004/241789/Sydney-Agenda-Setting-Workshop-Summary-Report-accessible.pdf); City of Sydney (n.d.), “Vision”, [www.cityofsydney.nsw.gov.au/vision](http://www.cityofsydney.nsw.gov.au/vision).

The process of designing and implementing policies in the city of **Lisbon** is developed in a co-operative, **inclusive** manner. Continuous engagement of stakeholders on a participative and interactive basis includes public representatives, citizens and others who provide resources and knowledge that need to be mobilised. For example, the BIP/ZIP (priority intervention neighborhoods [BIP] or zones [ZIPs]) local partnerships programme promotes local development by encouraging citizen participation and locally devised solutions to improve living conditions at the neighborhood level.

In the context of open and transparent policy making, **Antalya** Metropolitan Municipality has made sure to involve residents in its decision-making process before undertaking any major projects. Projects are launched only after obtaining the approval of citizens. In August 2014, the municipality conducted a referendum for the EXPO Rail

Line System Project in which 8 777 people from 20 neighbourhoods participated, 98.34% of them supporting the project (Antalya Metropolitan Municipality, 2015).

### *Ensuring access to opportunities for all citizens*

Cities have to ensure that all citizens enjoy access to opportunities: access to education, employment and public services. **Inclusiveness** and cohesiveness, which ensure that all community members have access to opportunities, empower the citizens and enable them to absorb shocks, adjust to new circumstances, transform themselves and prepare for future shocks. Policies to secure access to opportunities are expected to consider marginalised groups in particular. Increasing the employability of marginalised groups is another major goal (European Commission, 2014).

For example, human development and social integration are part of the West Mediterranean Development Agency's core strategies for **Antalya's** development, which has been under pressure from rapid population growth and the resulting social disparities. For people migrating to Antalya, a training course entitled "Basic Life Skills for Migrant Youth" was introduced in co-operation with the UN Joint Programme. Since its launch in 2011, 1 200 young people in need have taken the training, the majority of them migrants (United Nations Joint Programme, 2012).

Similarly, **Oslo's** social policies target foreign-born residents who find it difficult to integrate in the labour market and into local communities, in addition to socially disadvantaged groups whose socio-economic background or low educational attainment prevents them from fully engaging in society. In 2012, the city government revised its social policy initiative with the new "City Government Decision 152/12 – Diversity Opportunities". This acknowledges that while much has been achieved, many challenges remain, particularly the high dropout rates of minority youth and the lower representation in the labour market of minority women. Its main decisions are to: 1) develop a plan for the project Job Match Oslo as a venue for collaboration, making immigrants visible as a resource for business and industry in Oslo; 2) fight all forms of racism, bullying and discrimination, and establish a contingency network against hate speech and harassment of minorities on the Internet; and 3) launch [www.oxlo.no](http://www.oxlo.no) to communicate information about integration and diversity (Council of Europe, 2012).

### ***Approach 7. Integrated: Resilient cities work together beyond boundaries***

Resilient cities promote a co-operative and, ideally, collaborative or participatory approach to policy and programming, to better ensure coherent decisions and effective investment. Multi-level governance and forming alliances with surrounding municipalities and local stakeholders can help mobilise the best available resources and respond to complex challenges at a metropolitan scale.

#### *Multi-level governance promotes better policy co-ordination*

Collaboration with other levels of government is one of the key drivers to ensure a coherent and **integrated** approach to resilience. For example, subnational governments often consume a large share of national investment, which highlights the importance of incorporating subnational governments into the national policy frameworks. The OECD *Recommendation of the Council on Effective Public Investment across Levels of Government* (2014) helps both national and subnational governments identify challenges for investment at the subnational level and practical solutions to adapt them using multi-

level governance. In addition, the Effective Public Investment Toolkit further assists cities in developing effective investment strategies in urban areas.

Many national governments have plans for reinforcing their countries' resilience (see Annex 3.A1). Of the 45 national policy frameworks on resilience, 39 mention the role of cities or subnational governments for building national resilience in the national policy frameworks on resilience. They refer to the importance of local actions for resilience by: 1) emphasising that local authorities are primarily responsible for building resilience, with such plans as the “National Disaster Recovery Framework” in the **United States** (2011), and the “Fundamental Plan for National Resilience – Creating a Strong and Resilient Country” in **Japan** (2014); and 2) promoting intense co-operation and sharing of best practices at all levels of government, such as in **Israel's** “Sustainability Outlook 2030” (2012). Some frameworks on resilience include very specific roles and missions for cities. For instance:

- **Denmark's** “Action Plan for a Climate-Proof Denmark” (2012) makes it mandatory for municipalities to assess risk at the local level and to prepare action plans.
- The **United Kingdom's** “Climate Resilient Infrastructure: Preparing for a Changing Climate” (2011) plans for cities to upgrade and adapt infrastructure to boost local resilience and minimise economic risks.
- **Australia's** “Industry Innovation and Competitiveness Agenda” (2011) encourages the reduction of the regulatory burden at local levels, to enhance effective action in the field of resilience.
- **Hungary**, with its “Convergence Programme” (2015), plans for changes in the state-financing system of municipalities, to improve their economic resilience.

In some cases, regional development agencies have helped develop resilience in cities. In both **Antalya** and **Bursa**, a variety of policies to address development challenges in the region have been initiated by the West Mediterranean Development Agency and the Bursa Eskişehir Bilecik Development Agency, in close co-operation with the municipalities (Box 3.4).

Another example of an **integrated** approach is multi-level financing, where central government funds can be used for local level projects that affect resilience. This approach is proposed by the **Wellington** City Council in its development plan (Wellington City Council, n.d.) and has been implemented by **New York City** (Box 3.5). **Kobe** also takes advantage of financial support provided by the national government, such as the preferential treatment measures for businesses granted under the Ordinance of Kobe Enterprise Zone, business entry support programmes and by the Act on the Promotion of Establishment of Enterprises. These measures include tax reductions and a variety of subsidies and loan programmes, in a bid to attract businesses and investment to Kobe.

#### *Universities can become the centre of alliances inviting stakeholders on board*

Cities are able to benefit from universities, as the centre of community alliances inviting the participation of relevant local stakeholders. For example, **Kyoto** launched the Kyoto Alliance in 2013 as a collaborative project between universities, the government, the private sector and civil society, to develop human resources in the local public sector. The Kyoto Alliance presented an example of a new collaborative effort including universities, local businesses and local governments through “COC” (Center of Community) programmes (2013) and “COC plus programmes” (2015), which were

prepared by the Ministry of Education, Culture, Sports, Technology and Science. In particular, universities are playing the roles of hubs to achieve the goal of this “COC plus” programme to develop human capital and to help local economies create industries in collaboration with stakeholders.

#### Box 3.4. The role of regional development agencies in Turkey

In the 1990s, Turkey began to discuss establishing regional development agencies (RDAs), given the impetus for joining the European Union. In 2006, the Law on the Establishment, Co-ordination and Duties of Development Agencies was approved by the Turkish parliament to establish RDAs and to set up a network of 26 operating at the NUTS II level, with each agency covering 1 to 6 of the 81 provinces (OECD, 2015e). The Ministry of Development is responsible for the co-ordination of the agencies. Each RDA is composed of a development council, an executive board and a general secretariat, as well as investment support offices. The development council is a consultative platform bringing together public, private and civil society; and the executive board is the decision-making body of the agency and is composed of provincial governors, mayors and chairmen of the provincial chambers of industry and commerce (Montabone, 2010). RDAs are the critical governance element for regional development in Turkey.

Agencies are primarily charged with three functions: 1) planning, research and analysis; 2) conducting grant programmes for profit and not-for-profit institutions; 3) promoting and supporting investments. The RDAs’ main goal is to promote sustainable regional development by activating the local potential (Montabone, 2010). Since they are designed to minimise inter- and intra-development imbalances in regions, they have a critical role in improving the economic performance and social development of cities and rural areas. They also enhance the capabilities of communities to achieve sustainable livelihoods and strengthen the capacity of non-governmental organisations. RDAs run financial and technical support programmes. Financial programmes are classified into three groups: credit interest support, interest-free credit support and direct financial support. Direct financial supports are implemented in three types: call for proposals, guided project support and direct activity support. Technical supports are provided for institutional and capacity-building activities, contributions to project drafting and consultancy services.

RDAs articulate regional development plans which outline development priorities for the regions. For the local private sector, RDAs aim to strengthen local markets and local firms’ competitiveness (Toktaş, Sevinç and Bozkurt, 2013) and to attract investment and to promote innovation. In this respect, RDAs support small and medium-sized enterprises and start-ups in their management, production or financing processes. Besides investment promotion, they also guide national and foreign investors through administrative procedures specific to regions (OECD, 2015e; Toktaş, Sevinç and Bozkurt, 2013; Montabone, 2010). RDAs also have the goal to improve co-operation among each player of regional development, namely the public, private and civil society sectors (OECD, 2015e; Young-Hyman, 2008).

Financial resources mainly come from the national level, with approximately two-thirds (EUR 662 million) of RDAs’ resources being transferred from the central budget during 2008-15 period. The High Planning Council allocates resources according to population, level of regional development and performance of each agency. The remaining third (EUR 329 million) is made up of local shares of income from municipalities, provincial administrations and chambers of industry and commerce, and from RDAs’ own operations (OECD, 2015e).

*Sources:* OECD (2015e), “Regional development agencies (RDAs): A tool for regional development”; Toktaş, Sevinç and Bozkurt (2013), “The evolution of regional development agencies: Turkey case”, <http://oeconomica.uab.ro/upload/lucrari/1520132/31.pdf>; Young-Hyman (2008), “The potential for effective regional development agencies in Turkey: A comparative analysis”, [www.tandfonline.com/doi/pdf/10.1080/13597560802223953](http://www.tandfonline.com/doi/pdf/10.1080/13597560802223953); Montabone (2010), “From regionalisation to territorial management: The role of the ‘regional’ development agencies in Turkey”, <https://halshs.archives-ouvertes.fr/halshs-00781751/document>.

### Box 3.5. Multi-level financing for resilience-building projects

In 2013, the US Department of Housing and Urban Development (HUD) launched the Rebuild by Design competition to promote resilience in areas affected by Hurricane Sandy. The objective was to promote innovation by developing regionally scalable solutions to resilience challenges, which were also relevant locally. In this competition, New York City was awarded USD 355 million for investments dedicated to building coastal resilience. Of the total award, the city devoted USD 335 million to developing an East Side integrated flood-protection system in Lower Manhattan, intending to enhance resilience against flooding, while expanding public access to East River Park and adjacent esplanades. When complete, the project is expected to benefit thousands of public housing and other residents in a particularly vulnerable sector of Manhattan. It is also expected to provide a new model for integrating coastal protection into neighbourhoods in order to remain aligned with the city's vision of resilience.

Sources: US Department of Housing and Urban Development (HUD) (n.d.), “Rebuild by Design”, <http://portal.hud.gov/hudportal/HUD?src=/sandyrebuilding/rebuildbydesign> (accessed 18 September 2015); City of New York (n.d.), *One New York: The Plan for a Strong and Just City*, available at: [www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf](http://www.nyc.gov/html/onenyc/downloads/pdf/publications/OneNYC.pdf).

### *Forming alliances with other cities makes possible a metropolitan-scale effort*

Working with neighbouring cities will increase agglomeration benefits. Without merging the municipalities, such benefits can be achieved by changing the way individual cities work, with policies that require co-ordination on the metropolitan scale. In looking to initiate a reform, cities need to assess not only the trade-offs relating to it, but also the process of designing, implementing and sustaining the reform. The following steps can guide effective metropolitan governance reforms: 1) motivate collaboration by identifying concrete metropolitan projects; 2) build metropolitan ownership among key stakeholders; 3) tailor reliable sources of metropolitan financing; 4) design incentives and compensations for metropolitan compromises; and 5) initiate a long-term process of metropolitan monitoring and evaluation (OECD, 2015a).

To avoid fragmentation in a region, horizontal policy co-ordination can be organised with neighbouring municipalities, as is the case in **Ottawa** and **northern Kyoto**. Ottawa inherits a multifaceted cultural identity, sharing two official languages, French and English, and forming the Capital Region with the neighbouring city of Gatineau. This means the city needs to work closely with the city of Gatineau and the National Capital Commission, forming a close partnership to provide a common framework to guide their decisions on major plans, policies and programmes. The Northern **Kyoto** Regional Alliance, since 2015, is a cross-district approach by the five cities and two villages in the northern Kyoto Prefecture. It also enabled them to join the cities piloting the “Compact and Networked Cities” policy introduced in the revised National Spatial Planning (2015).

**Kobe** and **Kyoto** formed the Kansai Innovation International Strategic Zone in 2011 to attract domestic and foreign healthcare industries and the new energy sector. This zone pursues the all-Kansai approach, by consolidating the effort by Kyoto Prefecture, Kyoto City, Osaka Prefecture, Osaka City, Hyogo Prefecture and Kobe City, as well as local business consortiums and universities. The area overlaps with the majority of the OECD Osaka metropolitan area, which is the fourth-largest metropolitan area of the OECD regions. The impact of the all-Kansai approach is worthwhile close assessment, as

it is a good example of the metropolitan scale collaboration (Kansai International Strategic Zone, n.d.).

## Policy approaches for specific shocks and stresses

### *Approaches for shocks and stresses for energy management*

This section discusses policy approaches for cities to respond to shocks and stresses in the energy sector by sharing key issues from the OECD working paper “Energy and resilient cities” (forthcoming 2016). Since energy demand in cities is projected to grow by 57% between 2006 and 2030, about 2.7 times more than the growth forecast for areas outside cities, energy is one of the crucial elements in building resilience in cities.

#### *Adaptive energy management*

Mainstreaming energy management in urban policy is the key for achieving this objective. A long-term perspective for energy management is needed in urban policy, since the physical environment of cities develops over an extended timeframe. **Kyoto**’s “Strategy for promoting energy policy (2013)” is a good example, because it is reflected in other programmes and policies, including the city’s action against global warming. Cities are also expected to incorporate national policies and international frameworks into local action, since building resilience requires action on a global level. Measuring energy data at the city level helps cities to understand the current state of their resources, to set targets and analyse policy impacts.

#### *Robust energy management*

Improvement of energy infrastructure is fundamental in meeting this goal. Appropriate maintenance, disaster management and updating are fundamental means for reducing energy disruptions, but there are cost issues. Urban redevelopment projects are one strategy, offering an opportunity to update and introduce the latest technology. Developing energy self-sufficient housing, buildings and urban blocks can help stabilise energy supply for vital urban facilities in times of emergency. For example, **Barcelona** aims to increase self-sufficiency through energy planning, to decrease energy demand, produce renewable energy locally and optimise infrastructure.

#### *Redundant energy management*

Diversity in energy management, including sources, methods and source areas, can equip cities to respond to risks, including energy price fluctuations, disasters and accidents. A decentralised energy system has the advantage of ensuring energy supply during major energy disruptions and reducing energy losses in delivery. This strategy has its challenges, including economies of scale and stability of supply. Cities’ energy strategies should thus judiciously balance centralised and decentralised energy systems. Finance schemes for smart energy management need to be effective to encourage investment from the parties involved, and take into consideration what renewable energy projects will entail, including high transaction costs and the expectation of future savings. For example, issuing green bonds for energy efficiency by **Ontario** province in Canada resulted in some projects including light-rail transport (LRT), with high environmental-performance facilities.

*Flexible energy management*

A long-term vision, combined with a mid-term strategic implementation plan, is important for flexible energy management. This can help reach goals despite unexpected circumstances, including fluctuations in demand arising from social and economic changes, as well as changes in energy demand and supply structure. **Toronto's** "Climate Change, Clean Air and Sustainable Energy Action Plan (2007)" is one good example. Pilot projects covering a limited area and period can help boost flexible energy management by identifying problems.

*Resourceful energy management*

Increasing renewable energy production in cities can help manage energy demand effectively. Enhancing the energy efficiency of housing and buildings can reduce pressure on resources. Effective urban transport policies, including high-efficiency transport and better co-ordination of urban development and transport planning, are also key elements in resourceful energy management. **Barcelona's** "Urban Mobility Plan (2014)" is a good example.

*Inclusive energy management*

Collaboration among industries, academia and governments is necessary to achieve this objective. Governments need to keep abreast of the latest technologies and approaches. Raising awareness of energy efficiency among citizens can enlist their participation in the effort to reduce energy consumption. Municipal authorities, which are more closely in touch with citizens' daily lives, can give them more precise guidance by considering local conditions. **Kyoto's** "eco-school district" project is one good example, encouraging communities to participate in energy management by providing communities with the materials, lecture classes and consultation with experts.

*Integrated energy management*

Alliances between cities are a key tool for developing an effective and efficient energy supply and demand structure at the regional level. Networking with cities with similar visions can also help knowledge sharing and lobbying on energy issues. **Perpignan's** strategic vision in 2008 to become a positive energy territory is a good example.

***Policy approaches for shocks and stresses against disaster****Adaptive capacity for disaster risk management*

A forward-looking approach to risk governance is required to achieve adaptive capacity in risk management. Hazard patterns are continuously evolving, resulting in new and poorly understood vulnerabilities. Cities need to build generic capabilities for the potential impact of, for example, climate risks when designing disaster risk-reduction policies. Co-ordinating resources across different municipal departments and broader networks to support decision making, communication and emergency response helps to identify risks, agree on the levels of risk that are tolerable, those that should be reduced and those for which emergency preparedness capacities are needed. The consultative forum in **Belo Horizonte** called "Executive Group of Risk Areas" (GEAR) is a good example of a co-ordination platform that supports such decision making. It brings

together public managers and private companies to allocate responsibility for the prevention of and response to disasters. Participants discuss the recovery needs of disasters, the weather forecast for the next week and the demands of preventive action for adverse future events. This systematic approach to discussing disaster risks makes it possible to develop solutions and identify responsibilities for protecting citizens and assets.

**Cities should conduct a comprehensive risk assessment** that compares different types of risks according to their relative potential consequences and likelihood. The city of **London**'s Risk Register is a good example, since it is designed to provide a summary of the main risks faced by Greater London. Each risk is assigned a score both for impact and for likelihood, ranging in regard to impact from limited (1) to catastrophic (5), and on likelihood of how likely a risk is to happen over the next five years. The likelihood of risk and associated impacts are calculated using historical and scientific data, modelling and professional expert judgement, both for the likelihood and for the impact of a risk. Finally, these scores are combined to give an overall risk rating. Moreover, the Risk Register is made publicly available to help communities and businesses develop their own emergency and business continuity arrangements (London Resilience Partnership, 2015).

**A systematic, regular assessment of vulnerabilities is also needed** to co-ordinate and strengthen risk-reduction and business continuity measures. The business vulnerability reduction programme in the Loire river basin in France is a good example of a regional initiative encouraging businesses in known flood zones to take risk-reduction measures to limit the potential impact of flooding on economic activity. A risk communication campaign and risk awareness survey of businesses in the flood plain revealed that a high percentage were not aware they were located in a flood plain (OECD, 2014b). The vulnerability reduction programme allows businesses to benefit from a subsidised diagnosis of their vulnerability to floods underwritten by local authorities and collaborating partners.

#### *Robustness in disaster risk reduction*

**Encouraging investment in risk prevention and mitigation efforts** is crucial to reducing risk over the longer term. Cities should implement a mix of structural protection and non-structural measures to reduce their risks. Structural measures for disaster risk reduction include those that protect existing settlements and assets by reducing the intensity of a hazard, shielding an asset or reinforcing its capacity to withstand exposure. **Belo Horizonte**, for example, invests both in prevention and mitigation measures through the "Structural Programme in Risk Areas" (PEAR). Its main goal is to prevent major accidents through structural improvements for residents in areas at risk of landslides and floods. Belo Horizonte has also implemented hazard surveillance and monitoring systems and connected them to alert networks to reduce risks associated with floods. Nonstructural measures, such as enforcing land-use prescriptions and seismic-resistant designs enshrined in building codes, are another key element of risk prevention. Strategic risk-reduction planning should be co-ordinated with urban planning and territorial management policies, to reduce the concentration of people and assets in areas where known exposure has increased over time.

#### *Redundancy in disaster risk reduction*

**Business continuity plans with a focus on critical infrastructure operators** can equip cities to cope with disasters and accidents. Making sure critical infrastructure, information systems and networks can function after a disaster can help avoid indirect

economic and social costs. For example, the city of **Concepción** in Chile sees the emergency communications network as one of the key elements for making sure services function in times of crisis (Box 3.6). The **Tokyo** metropolitan government offers an instructive example of a business continuity plan (BCP) designed to prevent the interruption of business in a disaster and to restore critical businesses in a timely fashion, as well as to avoid a drain of clients, declining market share and a drop in business. The BCP is designed to guide individual firms in three key respects: 1) how to designate priority operations; 2) how to determine a timeframe for restoring priority operations; 3) how to substitute business operation procedures. In addition, a webpage dedicated to the BCP was set up to raise awareness in the private sector and organise seminars and workshops. In 2013, 120 firms participated in a three-month project organised by the Tokyo metropolitan government to set up their own BCPs.

**Box 3.6. The importance of ensuring connectivity in times of crisis:  
Concepción, Chile**

Chile is recognised for enforcing strict seismic building codes. These played a significant role in the 8.8 earthquake that struck the metropolitan area of **Concepción** in 2010, in which buildings sustained only moderate damage and there was limited loss of life. However, critical public services, such as electricity, water and sewage networks, were severely affected, and services disrupted. In addition, communication networks (i.e. Internet, telephone and radio) unexpectedly also failed. This prevented officials from communicating with each other and with citizens and disaster management authorities in Santiago, to keep them informed of events. After the earthquake, reports of food shortages, looting and arson turned a high sense of insecurity into panic. Radio Bio-Bio, the regional radio station, was the only functioning communication network, as a result of the continuity planning and back-up systems it had in place. The radio station was able to provide residents with up-to-date information and a means to communicate with one another. This helped to begin restoring public order, which was fully reinstated with the support of the military. The inadequacy of emergency communications networks was a key lesson learnt for Concepción officials, as the lack of communication contributed to high levels of social distress after the disaster.

Source: ARUP and Rockefeller Foundation (2014), *City Resilience Framework*, [http://publications.arup.com/Publications/C/City\\_Resilience\\_Framework.aspx](http://publications.arup.com/Publications/C/City_Resilience_Framework.aspx).

*Flexible capacity for disaster risk reduction*

**Cities should develop flexible capacities to prepare for natural hazards.** For example, in England, agricultural fields have been used to mitigate flood risk in northwestern **Hull**. By converting amenity grasslands into semi-natural grasslands and more varied woodlands during a flood, the river is allowed to flow naturally into the surrounding areas. This provides space for the river and lowers the high-water level. This approach benefits society by using natural processes of the wetland ecosystem, and makes multifunctional use of space (OECD, 2015c).

Another good example of an innovative approach to flooding is the resilient city project in **Mainz**, Germany. This demonstrates one city's strategy for living with floods, rather than trying to reduce the flood risk to zero by controlling water flows. Incentivising innovative approaches, the main objective of this public policy is to convert the flood-prone area in the customs harbour of Mainz into an attractive quarter for living, working and leisure activities, and to promote it as a model project for flood-adapted

development along the River Rhine. Flood-resilient buildings are being constructed using cutting-edge designs and advanced building methods for flood prevention. Every infrastructure unit, from roads to buildings, must be vetted to withstand 100-year floods (OECD, n.d. b).

#### *Resource management for efficient disaster risk management*

**Monitoring and strengthening risk management capacities is fundamental to improving resource efficiency.** Cities should build partnerships and alliances with the private sector, academia, the voluntary sector or non-governmental organisations to ensure that sufficient resources are brought to bear to manage civil contingencies. **Belo Horizonte**, for example, has established good partnerships in the formulation and execution of disaster mitigation and response policies. Active volunteer groups trained in guiding residents in times of crisis are involved in a special partnership between municipal civil protection and local universities, for engineering students to volunteer in preventive inspections. Moreover, the municipality of Belo Horizonte has put in place an interagency approach, with all municipal departments involved in civil defence.

**Financing of maintenance**, repair and improvements of emergency management infrastructure, equipment and supplies is often a challenge, and fire services in many countries are chronically under-resourced. The city and county of **San Francisco** is exposed to high seismic risk, and, in response, initiated the Earthquake Safety and Emergency Response Bond Programme (ESER). This implements a series of bond measures to finance seismic retrofitting of deteriorating infrastructure and enhances emergency response capabilities. In the first phase, starting in 2010, a USD 420 million disaster prevention bond was used to finance a wide range of projects with improvements in neighbourhood fire stations, replacement of public safety buildings and the construction of emergency firefighting water systems, such as water cisterns. In 2014, the ESER programme was renewed to keep upgrading the city's deteriorating infrastructure and enhance emergency response (City and County of San Francisco, 2014).

Housing in urban areas is often not built to withstand the forces of nature. Incentivising and financing **the retrofitting of housing stock** has proven to reduce disaster risks. In Japan, the national government supports a programme in **Kobe** providing financial assistance to residents who wish to retrofit their homes with better anti-seismic protection, if they meet certain conditions. The municipality provides expert consultations free of charge to diagnose a housing's capacity to withstand an earthquake. Later, depending on the diagnosis, earthquake-resistant retrofitting design may be provided (City of Kobe, 2015b).

The OECD adopted the *Recommendation of the Council on Good Practices for Mitigating and Financing Catastrophic Risks* in 2010, and the updated *Recommendation of the Council on Disaster Risk Financing Strategies* is currently under development. They provide cities and national governments international guidance on developing strategies for the financial management of disaster risks.

#### *Inclusiveness in disaster risk management*

**A whole-of-society approach** to disaster risk management helps to ensure that the public knows what measures are in place to manage disaster risk and supports them. Local municipalities need to actively engage a range of stakeholders in discussions on a range of policy options, to discern not only what is efficient but also what is optimal. The municipality of **Belo Horizonte** provides a good example of community engagement.

The people most exposed to natural hazards are enlisted to help address risks, using their knowledge of local conditions. For example, the reference centres in risk areas (CREAR) help draw up participatory plans with local residents for preventive action. **Kobe** supports the work of local communities to raise awareness of natural disasters in the future. In particular, Kobe City's voluntary disaster prevention organisation plays a major role in increasing public awareness among the local communities. BOKOMI, the abbreviation for its Japanese title *Bosai Hukushi* (disaster preventive welfare community), was created in every district of the city. One hundred ninety-one BOKOMIs are working on disaster prevention and reduction activities such as evacuation drills and fire drills. The city of Kobe provides subsidies to the organisation to purchase the necessary equipment.

Providing **access to information to all stakeholders** is key for responding to crisis. The Disaster Co-ordination Centre of the **Antalya** Metropolitan Municipality was built to inform stakeholders, and to co-ordinate and determine working procedures. Public and private institutions are involved in the event of disaster in participating in the preparatory work for the recovery and use of aid equipment. In case of emergencies, volunteer organisations and private entities provide assistance, delivering services where they are needed. Moreover, Antalya has established an emergency call centre that can be reached 24 hours a day from anywhere in the city (BAKA, 2016).

**Ensuring workforce development** is an integral part to enhance inclusiveness. **New York City** established a resilience capital investment programme of more than USD 20 billion, which offers citizens affected by Hurricane Sandy the opportunity to access employment and the training necessary to become eligible for construction jobs created by programme funds. The city pledged to ensure that all of its investments intended to strengthen the city's resilience will create job opportunities for residents and low-income applicants (New York City, n.d.).

#### *Integrated approaches to the governance of disaster risk management*

**Inter-institutional collaboration** is key for developing effective risk management at the local level. The London Resilience Partnership is a coalition of organisations charged with preparing, responding to and recovering from emergencies in **London**. The partnership is made up of more than 170 organisations, including emergency services, the Greater London Authority, health agencies, government agencies, as well as utilities and transport companies. Meanwhile, the London Resilience Forum is responsible for ensuring effective performance of duties under the Civil Contingencies Act (2004), which is required to be developed in a multi-agency environment. The London Resilience Forum is not a legal entity and does not have powers to direct its members. However, it provides a means for responders with duties under the act and its associated regulations to collaboratively discharge their responsibilities to plan and prepare for emergencies (London Resilience Partnership, 2013).

**Inter-agency collaboration** is also important in risk reduction. **Belo Horizonte** has an interagency approach enlisting all municipal departments to ensure collaboration on disaster risk-reduction policies. The city's Master Plan of Civil Defence establishes guidelines for planning, co-ordinating and executing civil defence activities to be addressed by all 27 municipal departments according to their capacities.

**Cities also need models for public-private partnerships (PPPs)** to develop trusted information-sharing networks. One good example of a PPP raising awareness of risk is a partnership between the insurance sector and the local government of **Saxony** in Germany. Established in 2001, ZÜRS public, a geographic information system (GIS),

grew out of a public-private partnership between the Ministry of Saxony and the German Insurance Association (GDV). This GIS is an online platform providing easy access to homeowners, tenants and individual businesses for calculating the risk of floods, backwaters, torrential rains and earthquakes in precise geographical locations. The triangulation of data on hazard exposure is collected by the government, with information coming from some 200 water management agencies across the *Länder*, and by the insurers (OECD, n.d. b).

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### *Annex 3.A1.*

## National policy frameworks on resilience in OECD countries

Table 3.A1.1. National policy frameworks on resilience in OECD countries

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Australia	National Strategy for Disaster Resilience	2011-N/A	The plan supports the development of disaster-resilient communities by building a whole-of-nation strategy to withstand and recover from the frequent natural events the country faces.					XX	This policy recognises that disaster resilience is the collective responsibility of all sectors of society, including all levels of government. It specifies that local governments are better suited for disaster management.
	Industry Innovation and Competitiveness Agenda: An Action Plan for a Stronger Australia	2014-N/A	This plan focuses on competitiveness to ensure future prosperity in a highly competitive economy and global challenges.	XX	X	XX			This plan encourages deregulation at local levels to undertake more effective actions and encourage economic activities of local businesses.
Canada	An Emergency Management Framework for Canada (second edition)	2011-N/A	The aim of this strategic framework is to build a sustainable, prosperous and disaster-resilient society and economy. It emphasises the importance for communities to be adaptive, flexible and redundant in order to be resilient.	X	X			XX	This policy framework promotes strong and seamless relationships across the different levels of governments.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Canada ( <i>continued</i> )	Action Plan for Critical Infrastructure	2014-17	This action plan, together with the National Strategy for Critical Infrastructure, aims to enhance the resilience of critical infrastructure (from energy to finance) by building partnerships, sharing and protecting information, and implementing an all-hazards risk management approach.		X			XX	This action plan co-ordinates activities for resilience building of critical infrastructure with municipalities, other levels of government and the private sector, notably through the establishment of two committees: the National Cross Sector Forum and the Federal Provincial Territorial Critical Infrastructure Working Group, which gather representatives of each type of stakeholder.
	National Disaster Mitigation Program (NDMP)	2015-N/A	This nation-wide programme is designed to contribute to the goal of building safer and more resilient communities by filling the gap in the country's ability to mitigate and recover from flood-related events.		X			XX	N/A
Czech Republic	Social Inclusion Strategy	2014-20	The aim of the strategy is to contribute to the national goal of reducing poverty and social exclusion. It introduces specific measures and builds a social discourse to strengthen social cohesion.	XX	XX	X			The strategy includes detailed measures to enhance co-operation among particular institutions (regional labour office, social services, etc.) to design specific projects to serve local needs.
	National Action Plan for Positive Ageing for the Period 2013-2017	2013-17	This strategic policy addresses the issues of working-age population decline and population ageing. The priorities are to ensure employment to older people, intergenerational dialogue and welfare for seniors, with a goal of strengthening economic growth and social cohesion.	X	XX	X			The action plan includes the recommendation to involve cities and regions in specific programmes and projects at the local scale, and to enhance co-operation among relevant institutions at different levels of government.
	National Research and Innovation Strategy for Smart Specialisation of the Czech Republic (National RIS3 Strategy)	2014-20 (and beyond)	This policy framework is aligned with the EU 2020 objectives for recovering from the economic crisis. The strategy is to increase the country's research and innovation capacity, to promote sustainable and inclusive employment and enhance competitiveness.	XX	XX				The policy statement provides for implementation at both national and regional levels. Specific bodies, such as regional councils for innovation, are to be created at the local level to support regions and city authorities.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Denmark	“How to manage cloudburst and rain water”: Action Plan for a Climate-Proof Denmark	2012-2020/50	This strategy provides an improved framework for climate change adaptation after the recent heavy rainfalls in Denmark.	X	X			XX	In this programme, municipalities are requested to prepare risk assessments and design climate change adaptation plans, as well as increase their investment in this field.
Estonia	National Reform Programme Estonia 2020	2011-20	This programme focuses on restoring the high employment rate that prevailed before the financial crisis and on promoting competitiveness. It thus aims to increase the percentage of people with a high level of education and of those in lifelong learning, to reduce poverty, and promote long-term and youth employment.	XX	X	X	X		This programme recommends strengthening institutional co-operation among central and local governments and to define more explicitly their respective roles in the fight against youth and long-term unemployment, notably in the activation measures. It plans measures to develop local government infrastructure, and to improve the capability of county development centres and local governments to attract and manage investments.
Finland	Action Plan for Disaster Risk Reduction	2012 Revised each year	In the context of the Hyogo Framework for Action, this plan aims to encourage early warning systems and to promote a culture of safety and preparedness among the population facing natural hazards.					XX	This plan considers local authorities as key stakeholders in resilience building for natural disasters, since they are the most relevant institutions to secure fragile population groups in case of emergency. It emphasises that collaboration among municipalities and rescue services should be enhanced.
France	Which France in 10 years? What has to be done during the coming decade	2014-25	This strategy enables the country to bounce back after the financial crisis and realise sustainable growth, develop an inclusive social model under austerity measures at the national level while protecting the natural environment.	X	X	X	X		This strategic policy sees institutional reform of all levels of government as a key to achieve sustainable development. Regional authorities are given extensive mandate to be more effective in their tasks. Inter-communal bodies will gain importance compared with local authorities.
	New National Programme of Urban Renewal (NPNRU)	2014-24	This programme promotes the development of sustainable cities, prioritises economic development and employment and enhances the accessibility of public services for 200 urban districts across France that face particular difficulties of social cohesion.	X	X	X	XX		Urban policy is implemented locally, through agreements signed by both the central government and local authorities. This framework defines new types of contracts that are based on collegiality and focus on social cohesion issues, economic development and urban renewal. Citizens are to be the major actors of urban change in their districts.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
France ( <i>continued</i> )	Adaptation of society to ageing	2015-N/A	This plan aims to negotiate the new demographic transition in France by giving stronger rights and autonomy to older people and by unlocking economic and employment opportunities arising from the ageing of the population, by developing the “silver economy.”	X	XX				This framework highlights the need to get all stakeholders involved in the adaptation strategy for the ageing of the population, at all levels: no-nprofit organisations, local authorities, local firms, citizens, etc.
Hungary	Convergence Programme of Hungary	2015-18	The programme’s main objective is to stabilise the country’s fiscal situation, set it on a growth path and reduce its economic vulnerability.	XX					This policy framework restructures local governments’ tasks. It changes the state financing system of local authorities to a task-based system, to avoid excessive municipal debts.
Iceland	Iceland 2020: Governmental Policy Statement for the Economy and Community	2011-20	In the wake of the financial crisis, this programme provides measures to ensure inclusion, boost welfare infrastructure and strengthen the education system.	XX	XX				The policy statement requires the governments of regional districts to design plans for prioritising specific projects and tailoring them to local needs.
Ireland	Our Sustainable Future: A Framework for Sustainable Development for Ireland	2012-20	This programme addresses pressures on the sustainable economy after the financial crisis, and proposes a series of steps for recovery, through measures ensuring well-being and the development of a green economy.	XX	XX	X	XX		The programme states that individual government policies must take other policies into consideration to avoid redundancy.
	A Strategy for Growth	2014-20	This is a medium-term strategy to rebuild the Irish economy, achieve sustainable growth, ensure strong public finances and encourage job creation.	XX	X	X			The programme introduces local property tax, and encourages reforms of local governments to support enterprise and job creation.
Israel	Sustainability Outlook 2030 for Israel	2012-30	This policy outlook provides a long-term strategy for a sustainable future by enhancing social resilience, well-being, inclusion and growth without degrading the environment. Innovation and resilience building are key elements.	XX	XX		XX		This strategy emphasises co-ordinated governance among the different levels of administration. Environmental management is the responsibility of local levels.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Japan	Fundamental Plan for National Resilience: Creating a Strong and Resilient Country	2014 Revised every four years	This plan was published after the Great East Japan earthquake. It promotes initiatives for building national resilience to create safe national regions and ensure continuity and strength of the social economy even in the event of disaster.	X	X	X	X	XX	This framework strengthens the role of local authorities in resilience building through designing regional plans and appropriate assistance from the national government, as well as government-wide information sharing.
	Disaster Management Basic Plan	1963-N/A (amendment 2015)	This action plan provides countermeasures against disasters, including disaster prevention, emergency response, and disaster recovery and reconstruction.			X		XX	The plan promotes disaster-resistant urban development, raising public awareness, emergency response measures and disaster recovery and reconstruction.
Netherlands	Climate Agenda: Resilient, Prosperous and Green	2013-50	This strategy is designed to mitigate the impact of climate change for long-run economic growth.	X	X		XX		This strategic framework recognises cities and subnational governments as major players of the climate strategy through their local programmes and initiatives (e.g. Local Climate Agenda and the “Think Global, Act Local” principle of the C40 Cities Initiative).
New Zealand	National Civil Defence Emergency Management Plan	2015-N/A	This action plan enhances the country’s capacity to recover from emergencies. It aims to reduce the social impact on people and communities.		X			XX	In this policy framework, local governments are referred to as being primarily responsible for responding to and recovering from emergencies, with the support of the central government.
Norway	Adapting to a Changing Climate	2010-N/A	This programme provides effective adaptation strategies for climate change and aims to strengthen knowledge and co-ordination to reduce Norway’s vulnerability in the future.	XX	XX	X	XX	XX	The programme notes that municipalities must design a 10- to 12-year master plan integrating land-use planning and global warming adaptation, in order to build social resilience to climate change.
Poland	National Development Strategy	2010-20	This strategic framework, aligned with the EU 2020 objectives, is Poland’s main development strategy. It includes nine sectoral subframeworks. It aims to eliminate barriers and vulnerabilities and strengthen the economy. It focuses on economic competitiveness, social and territorial cohesion, and government efficiency.	X	X	X	X		Cities are specifically targeted and involved in the following initiatives: improving the quality of transport, creating urban integrated functional areas, supporting medium cities and small towns as poles of growth for the hinterland, strengthening rural-urban linkages and revitalising low-income urban areas.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Poland ( <i>continued</i> )	National Strategy for Regional Development – Regions, Cities, Rural Areas	2010-20	This policy framework identifies each region's potential for enhanced growth, employment and social cohesion. It aims at increased competitiveness, lowered development gaps between regions and effective management of development policy. Subsidiary objectives directly related to resilience are diversification of the economy and sustainable use of energy sources.	X	X	X	X	X	This strategy defines specific objectives for <i>voivodship</i> governments (provinces), enlarging the scope of influence of cities in the capital region. A new partnership and co-ordination instrument, the territorial contracts, embeds cities in the scope of investments planned at the regional level.
	National Urban Policy	2015-23	The strategic planning aims to strengthen the ability of urban areas to create jobs and improve their residents' quality of life by promoting efficient, compact, sustainable, coherent, competitive and strong cities. All of the specific objectives incorporate various elements of resilience.	X	X	X	X	X	This policy specifies how the national government can support local governments and other urban stakeholders. It emphasises the need for multi-level co-operation in the management of urban areas. It provides a wide range of different solutions, tools and instruments, which can be flexibly used by cities of various sizes to enhance resilience. It introduces "knowledge centres" that carry out pilot projects and share best practices among cities.
Portugal	The Road to Growth: A Medium-Term Reform Strategy for Portugal	2014-20	This strategic policy sets out the conditions for future growth and increasing employment by maintaining reform momentum after the exit from the Adjustment Programme (2011-14).	XX	X	X	X		This strategic policy establishes a Municipal Fund by the central government to provide financial support to municipalities, to supervise fiscal adjustments and to increase transparency at local levels.
Spain	Agreement on Proposals for Tripartite Negotiations to Strengthen Economic Growth and Create Jobs	2014-N/A	This agreement encourages social dialogue to increase quality jobs, and to improve welfare and competitiveness, considering that the financial crisis still poses major challenges.	XX	XX	X			N/A

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
Spain ( <i>continued</i> )	Infrastructure, Transport and Housing Plan	2012-24	This plan promotes balanced economic development as a tool to overcome the crisis by strengthening territorial cohesion and addressing new urban needs.	X	X		XX		This programme promotes local and regional authorities as the most competent bodies to pursue urban integration. It encourages the establishment of sustainable mobility plans by local and regional authorities to encourage co-operation among administrations.
Sweden	Action Plan for the Protection of Vital Social Functions and Critical Infrastructure	2014-20	This action plan complements the country's emergency preparedness structure by planning for a resilient society capable of recovering from serious social and economic disruption.	X	X	XX		XX	The policy mandates national, regional, as well as local governments to pursue business and social continuity management. Municipalities are required to identify risks facing their own critical functions and infrastructure.
	Making Cities Resilient in Sweden	2015-N/A	This is a document to share best practices among Swedish cities regarding disaster risk-reduction and resilience-building policies.					XX	The document presents six case study cities.
Switzerland	Principles for a New Growth Strategy	2015-N/A	This strategic plan identifies economic measures to mitigate economic shocks and improve economic resilience.	XX	X	X	X		N/A
Turkey	The Tenth Development Plan	2014-18	This plan was to respond to a global economic environment with protracted risks, uncertainties, changes and transformations, with emerging and reshaping power balances among developed and developing economies	X X	X	X	X	X	This plan set the objectives and targets of local administrations to deliver more efficient, fast and qualified services; be participatory, transparent and environment friendly; care for the needs of the disadvantaged and be financially sustainable.
United Kingdom	Resilience in Society: Infrastructure, Communities and Business-Integrated Energy Management	2011-N/A	This policy responds to the needs of a more comprehensive framework regarding disasters, in order to improve business continuity, infrastructure and community resilience.	X	X		X	XX	N/A

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
United Kingdom ( <i>continued</i> )	Strategic National Framework on Community Resilience	2011-N/A	This national framework encourages and enables people and their communities to become resilient in natural disasters.					XX	The programme is specifically designed to help local communities prepare and recover from shocks, by removing barriers that inhibit participation at local level and by sharing best practices of resilience community-based models.
	Climate Resilient Infrastructure: Preparing for a Changing Climate	2011-N/A	This plan ensures resilience of infrastructure in extreme weather events, climate change and demographic changes, in order to maintain economic growth.	X	X		XX	XX	This policy framework encourages local authorities and local enterprise partnerships to co-ordinate actions to adapt infrastructure to climate change, boost local resilience and minimise economic risks.
	Sector resilience plans	2014 Revised each year	Sector resilience plans address the UK's most important infrastructure's resilience to the relevant risks identified in the National Risk Assessment. These plans are revised annually for ministers, to alert them of any perceived vulnerabilities, with a programme of measures to improve resistance, reliability, redundancy, response and recovery.					XX	These sector programmes are designed to raise awareness and to increase funding to local authorities regarding improvement of their resilience. National entities must work with local emergency planners and local infrastructure owners to put in place efficient measures.
United States	Resilience in Economic Development Planning	2014-N/A	Following the Colorado flooding in 2013, this programme aims to provide best practices for economic resilience, to ensure economic and socially healthier states in the face of disasters.	XX	X	X	X	XX	This programme instructs local communities and authorities to incorporate resilience concepts in their own economic planning. It also establishes "Buy Local" programmes to engage local resources in disaster preparedness and response.
	Strong Cities, Strong Communities	2011-N/A	This programme adopts a bottom-up approach to revitalise the national economy through the strengthening of local communities and a more effective use and distribution of federal resources.	XX	X	X			This programme emphasises that the federal government supports local efforts by providing financial resources and expertise to cities, and developing a new approach of federal-local collaboration. Thirteen cities were involved in this programme as of 2014.
	Crisis Response and Disaster Resilience 2030: Forging Strategic Action in an Age of Uncertainty	2012-30	Shifting demographics, constraints on spending and more intense natural disasters produce uncertainty about the future. This programme provides measures to improve national resilience by enhancing capabilities and partnerships.	X	X	X		XX	The programme recognises cities and subnational governments as the core of the resilience strategy, because they are the first witnesses of social, population and economic changes.

Table 3.A1.1. National policy frameworks on resilience in OECD countries (*continued*)

Country	Framework	Issued year-targeted year	Motivations/outline /objectives	Resilience drivers and agenda					Role of cities and subnational governments
				Economies	Societies	Institutions	Environment	Natural disaster	
United States ( <i>continued</i> )	National Disaster Recovery Framework	2011-N/A	This framework focuses on how best to restore, redevelop and revitalise the health, social, economic, natural and environmental fabric of the community and build a more resilient nation.	X	X	X		XX	This plan recognises that local governments have primary responsibility in planning for and managing all aspects of community recovery. It enables effective recovery for states, tribes, territorial and local jurisdictions thanks to a flexible structure where the federal government provides support in large-scale disasters. "State and tribal disaster recovery co-ordinators" and "local disaster recovery managers" are new concepts introduced by the framework.
	Housing and Urban Development Strategic Plan	2014-18	This is a strategic framework to build strong, resilient and inclusive communities, using housing to improve the quality of life and to bolster economic growth.	X	XX		X	X	This policy framework aims to increase the capacity of local governments to plan for long-term recovery and encourages private and community investment and research in disaster recovery capacities. It promotes data sharing across federal, state and local entities. It specifies that the private sector, civic institutions, states and municipalities are the main actors and that federal levels should not supplant local efforts.

Notes: X: relevant; XX: more relevant.

## ***Chapter 4.***

### **Antalya, Turkey**

*This chapter provides an overview of Antalya, followed by an assessment of the current challenges for Antalya's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by the suggestions for future action.*

## Overview of Antalya

Antalya is the fifth-largest city in Turkey and located on the Mediterranean coast of the southwestern part of the country (Figure 4.1 and 4.2). With an area of 21 109 square kilometres, Antalya province has a population of 2 288 456 as of 2015 (Turkish Statistical Institute).

Figure 4.1. **Antalya, Turkey**



Figure 4.2. **Antalya**



Source: R.Saygılı (2015), [http://cografyaharita.com/haritalarim/41\\_antalya\\_ili\\_haritasi.png](http://cografyaharita.com/haritalarim/41_antalya_ili_haritasi.png).

The city is a well-known international tourist resort, whose tourism sector has grown during the last 30 years. In 2015, 11.3 million people visited Antalya, 10.8 million of whom were foreign tourists. In 2014, Turkey hosted 39.8 million tourists, and one in every three tourists entering the country visited Antalya. One-quarter of the incoming tourists came from the Russian Federation, followed by Germany (Antalya Chamber of Commerce and Industry, 2015). The city has grown as a mass tourism destination, with a tourist season running from June through the end of October. The city has more than 2 000 tourism facilities, including five-star hotels and holiday villages, with a capacity of 650 000 beds (BAKA, 2016).

Antalya is one of the leading suppliers of agricultural products for domestic and international markets. It produces 38% of Turkey's total greenhouse fruit and vegetable production. Turkey is the third-largest producer of tomatoes in the world, with a production of more than 10 million tonnes, and Antalya is Turkey's leading city in tomato production. The city produces 30% of the orange and 40% of the pomegranate production

in Turkey. In previous years, 49 countries have imported fresh fruits and vegetables from Antalya. The city produces approximately 40% of all fruits produced in Turkey. According to data provided by the West Mediterranean Exporters Union, which represents the regions of Antalya, Isparta and Burdur, the Russian Federation is the major export partner for the region, accounting for 25% of total exports.

With the exception of 2009, Antalya has demonstrated strong economic growth (Table 4.1). As of 2013, its unemployment rate was around 7.9% (BAKA, 2016, Table 4.2).

Table 4.1. **Growth of regional gross value added, Antalya (TR61 NUTS 2 Region [TL]) and Turkey, 2005-11**

	2005	2006	2007	2008	2009	2010	2011
Antalya	17.3%	16.5%	13.0%	9.8%	3.8%	17.0%	14.4%
Turkey	15.5%	16.9%	12.8%	13.2%	1.1%	13.4%	17.3%

Source: Turkish Statistical Institute, <http://www.turkstat.gov.tr/UstMenu.do?metod=kategorist> (accessed March 2016).

Table 4.2. **Unemployment rate, Antalya and Turkey, 2008-13**

	2008	2009	2010	2011	2012	2013
Antalya	9.7%	12.7%	11.1%	9.3%	8.5%	7.9%
Turkey	10.0%	13.1%	11.1%	9.1%	8.4%	9.0%

Source: Turkish Statistical Institute, <http://www.turkstat.gov.tr/UstMenu.do?metod=kategorist> (accessed March 2016).

## Challenges for Antalya's resilience

While tourism and agriculture bring a number of economic benefits to the city, they also create challenges. Antalya faces two interrelated challenges to its resilience: 1) market diversification; and 2) management of population growth triggered by internal migration.

### *Diversification of its industry mix and markets in the leading sectors*

The city has a limited number of industries, namely tourism and agriculture, as the main sources of revenue and employment, whose market is focused on relatively small numbers of foreign countries (Tables 4.3 and 4.4). The data on the Antalya subregion (TR61 NUTS2) show that agriculture consists of approximately 17% of the total gross value added (GVA), higher than the national average of 9%. The agriculture sector accounts for 31.6% of total employment, which is also higher than the national average of 12% (2012).

Antalya has a limited number of partners for its tourism and agriculture markets. Half of its exports are shipped to five countries: the Russian Federation (25%), the People's Republic of China (7.2%), Germany (6.8%), Ukraine (6.4%) and Kazakhstan (4.3%) (West Mediterranean Exporters Union, 2015), while visitors from the Russian Federation and Germany account for a majority of tourists. As a result, any changes in these countries could have a major impact on Antalya's tourism and agriculture industries. This could also affect employment in other sectors directly, since more than 50 other subsectors, such as food, furniture and housekeeping, depend on the tourism sector (BAKA, 2016).

Table 4.3. Regional gross value added, Antalya (TR61 NUTS2), 2007-11

Year	Services (including tourism)	Agriculture	Industry	Total
2007	70.0%	15.1%	14.9%	100%
2008	70.9%	14.4%	14.7%	100%
2009	72.2%	15.2%	12.6%	100%
2010	68.6%	18.7%	12.7%	100%
2011	70.2%	16.6%	13.3%	100%

Source: Turkish Statistical Institute, “Regional accounts”, *Central Dissemination System*, <https://biruni.tuik.gov.tr/medas/?kn=116&locale=en> (accessed March 2016).

Table 4.4. Numbers in workforce, Antalya (TR61 NUTS2), 2010-14

Year	Services (including tourism)	Agriculture	Industry	Total
2010	523 000 (53.3%)	329 000 (33.4%)	131 000 (13.3%)	984 000
2011	560 000 (54.3%)	347 000 (33.6%)	125 000 (12.1%)	1 032 000
2012	590 000 (54.9%)	339 000 (31.6%)	145 000 (13.5%)	1 074 000
2013	606 000 (54.3%)	358 000 (32.1%)	151 000 (13.5%)	1 115 000
2014	647 000 (57.7%)	311 000 (27.7%)	163 000 (14.5%)	1 122 000

Source: Turkish Statistical Institute, Employment, Unemployment and Wages Statistics, <http://www.turkstat.gov.tr/UstMenu.do?metod=temelist> (accessed March 2016).

### *Responding to population growth triggered by internal migration*

The population of the city is growing rapidly (Table 4.5), mostly due to increasing internal migration (Table 4.6). The population of Antalya increased by 27.9% between 2007 and 2015, and more than 40% of the net population increase was caused by net migration. Antalya is among the most popular locations for migration in Turkey because of its “climate, tourism and economic vitality” (Demirkaya and Artvinli, 2011).

Table 4.5. Population of Antalya and Turkey, 2007-15

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Antalya	1 789 295	1 859 275	1 919 729	1 978 333	2 043 482	2 092 537	2 158 265	2 222 562	2 288 456
Turkey	70 586 256	71 517 100	72 561 312	73 722 988	74 724 269	75 627 384	76 667 864	77 695 904	78 741 053

Source: Turkish Statistical Institute, *Address Based Population Registration System*, [www.turkstat.gov.tr/PreTablo.do?alt\\_id=1059](http://www.turkstat.gov.tr/PreTablo.do?alt_id=1059) (accessed March 2016).

Table 4.6. Net migration and its contribution to the net population increase in Antalya, 2007-15

2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
36 225	17 064	25 245	26 856	20 703	24 530	28 426	28 067
51.8%	28.2%	43.1%	41.2%	42.2%	37.3%	44.2%	42.6%

Source: Turkish Statistical Institute, *Migration Statistics*, [www.turkstat.gov.tr/VeriBilgi.do?alt\\_id=1067](http://www.turkstat.gov.tr/VeriBilgi.do?alt_id=1067) (accessed April 2016).

There are two types of migration to Antalya, one seasonal and the other permanent. During the peak tourism period in the summer, people come to Antalya to work in tourism jobs. The need for extra workforce in agriculture also attracts workers from neighbouring cities from season to season. These migrants tend to go back to their home

villages after their work is over. Permanent migration happens regardless of the season. Antalya is the home of diverse ethnic groups from the east and southeast Anatolian regions in Turkey. The migrants, usually from low socio-economic groups, tend to settle in low-income neighbourhoods. One common consequence of internal migration is the migrants' difficulty in adapting to city culture (BAKA, 2016). These groups are generally considered disadvantaged because they tend to take low-paid jobs and live in unfavourable conditions. The neighbourhoods they live in are usually disadvantaged areas lacking the opportunities of the city, making social cohesion difficult.

The city's transport, water and sewage system, electricity and other infrastructure have not kept pace with the population growth. The availability of social services, health services and education has also been affected by the rapid increase in population. Another challenge is to develop capacity to accommodate the expanded population, while ensuring residents' well-being.

## Elements for building resilience in Antalya

### *Economy*

#### *Antalya has potential for alternative tourism*

Unfortunately, 2 000 tourism facilities in Antalya are vacant during the off-season. Alternative forms of tourism need to be developed to increase the diversification of options in the tourism industry. One of Antalya's most promising types of tourism sector is medical tourism. Antalya's 26 private hospitals and 13 state hospitals have a capacity of 5 000 beds. Responses to the OECD questionnaire show that hospitals in Antalya offer affordable prices with high-quality healthcare services. The city hosts approximately 6 000 foreign patients every year for a variety of treatments, including oncology, plastic surgery and transplants. In 2015, 125 000 foreign patients were treated, including 5 000 medical patients; the rest include treatments of tourists. Akdeniz University Hospital is well-known for its successful organ transplants, including the world's first uterus transplant and Turkey's first face transplant (BAKA, 2016).

An alternative tourism option is sports tourism. Golf is the leading attraction for the city. Every year, more than 100 000 professional golf players pass through Antalya. The International Association of Golf Tour Operators selected Antalya as the "Best Golf Area in Europe" in 2008. More than 1 000 soccer teams use the city for their training camp every year, an important tourist segment for the off-season. Antalya also offers wedding tourism, ecotourism, cultural tourism and religious tourism (to the St. Nicholas and St. Paul trails).

#### *Meetings, incentives, conferences and exhibitions (MICE) tourism is also promoted by the city*

With its all-inclusive five-star convention hotels, Antalya has 175 000 seat capacities and good potential for MICE tourism. The Antalya Convention Bureau (ACB) was established in 1995 as an independent, non-profit organisation, with the support of municipalities, hotels, travel agencies, tour operators and congress centres. The aim of the Antalya Convention Bureau is to promote the congress potential and facilities of Antalya as an ideal convention destination, both for national and international visitors. The ACB facilitates the co-ordination of appropriate professional bodies required for the organisation of a successful convention.

The Ministry of Culture and Tourism has also chosen Antalya as one of seven cities for conference tourism. With its national “Tourism Strategy of Turkey 2023”, adopted in 2007, the ministry is also involved in overseeing the organisation of large meetings and ready to provide necessary assistance for the development of congress tourism in the city.

In 2015, 98 international and 113 national conferences were held in the city, and more than 97 000 MICE tourists visited Antalya (BAKA, 2016). These included the EXPO 2016 Horticultural Exposition, the G20 Leaders’ Summit in November 2015, the NATO Foreign Ministers Meeting in May 2015 and many large golf tournaments.

### *Emerging sectors were identified for diversifying the industrial mix*

In 2010, the United Nations Joint Programme<sup>1</sup> conducted a strategic scan to identify emerging sectors and their potential to diversify economic activity in Antalya. Its assessment was based on a sector’s potential (business investment and job creation opportunities, lowest risk to implement, at the lowest cost, with the greatest job creation quality and economic benefits, in the shortest time). Air-conditioning equipment manufacturing, manufacture of building materials and hardware, processed food manufacturing and manufacture of luxury yachts were found to have potential for sustainable economic growth and for decent job opportunities, particularly for young workers (Toksöz, 2011). The city acknowledged that all four sectors could offer opportunities for small local companies and entrepreneurs, and for services associated with these sectors, such as maintenance, material processing, transport, cleaning and catering. The assessment also noted that only processed-food manufacturing could offer good employment prospects for the female workforce, but promoting new industries could strengthen the city’s economic activity.

Based on the assessment, a training course was organised in 2011 on “Seed Quality and Technology” by the United Nations Joint Programme, in co-operation with the Western Mediterranean Agricultural Research Institute (BATEM) and Ege University Seed Technology Research and Implementation Centre. The course covered theoretical and applied aspects, and was attended by about 60 young trainees (United Nations Joint Programme, 2012a).

### **Society**

The National Youth Employment Programme was piloted to increase access to job opportunities for youth, females and migrants.

The United Nations Joint Programme “Growth with Decent Work for All: A National Youth Employment Programme and Pilot Implementation in Antalya” was launched in December 2009 to reduce unemployment among youth and to promote the labour force participation of young women in particular (Table 4.7). It continued until December 2012. Since migration is one of the major factors affecting the younger population, Antalya was chosen as a pilot region for the programme.

A number of training activities were conducted in Antalya under the programme. The first phase for the age group 15-24 included such topics as elderly care, office work and “job as a cashier”. In 2012, 654 people took part in these courses in 14 different areas in Antalya (United Nations Joint Programme, 2012b). Many other training sessions conducted under the programme concerned agriculture. Growing ornamental plants is another potential area that could diversify the city’s agricultural market. Vocational training in this field was delivered in co-operation with the Agricultural Vocational

Training Centre of Antalya Stock Exchange (TUMEM) and volunteering firms. The Turkish Employment Organisation Antalya Directorate covered such costs as the trainees' daily allowances, health insurance, and insurance for occupational disease and work accidents. The training had positive results, and 80% of the participants who completed training were employed by firms involved in the course (United Nations Joint Programme, 2012b). The United Nations Joint Programme also offered a training course entitled "Basic Life Skills (BLS) for Migrant Youth". Its topics included "life in the city", "job seeking and employment", "strengthening interpersonal communication skills", "health care and nutrition", "gender equality" and "women's rights and domestic violence". With the participation of the Antalya Governorate and the Antalya Community Centre, the first pilot training took place in 2011, and 48 training sessions were conducted for 1 200 young people in need, most of whom were migrants (United Nations Joint Programme, 2012b).

Table 4.7. Unemployment rate by age group and gender in Antalya (TR61 NUTS2), 2004 and 2009

Age group	2004			2009		
	Total	Male	Female	Total	Male	Female
15-19	16.7%	16.2%	17.4%	19.3%	21.6%	13.7%
20-24	16.9%	15.9%	18.6%	24.5%	22.9%	27.1%
25-34	8.0%	7.2%	9.9%	12.3%	9.4%	18.3%
35-54	4.0%	4.1%	3.7%	8.6%	8.5%	8.7%
55+	1.5%	1.9%	0.6%	5.3%	7.1%	1.6%

Source: Toksöz, G. (2011), "Growth with decent work for all: National Youth Employment Program and pilot implementation in Antalya: Antalya province labour market analysis".

## ***Environment***

### *Improving water supply and sewerage treatment to keep pace with population growth and tourism*

Antalya has several times more inhabitants in the high season than in the low season, and maintaining adequate water supply and sewage disposal facilities during the peak season has become a priority. The rapid population increase as a result of migration has also increased demand for such services. The "Antalya water and wastewater project: Additional financing project environmental management report", published in 2010, noted that investment would be essential to meet future demands. In light of this finding, the Antalya Metropolitan Municipality Water and Wastewater Administration (ASAT) is in the process of replacing the existing water supply network, repairing old pipes, constructing new water pipes and new sewer systems.

### *Antalya has shifted to natural gas as the main source of heating, to accommodate population growth*

Another trend in the city is conversion of residential and commercial buildings from coal-based heating and air conditioners to natural gas. Heating with electricity costs two to three times more than heating with natural gas, and coal generates pollution, especially in the winter. The risk of air pollution has increased in areas where coal or wood are used to heat residential buildings to cover the expanding tourism industry and the growing population. To reduce air pollution and save electricity costs, many buildings are switching to natural gas as the main source of heating (BAKA, 2016). This is in line with

the national trend. The share of natural gas has increased by 10% in the last decade and now accounts for 48% of total energy generation (Turkish Statistical Institute, 2014). Antalya promotes natural gas as a clean and more efficient source of heating.

### *Institutions*

#### *The regional development agency plays a leading role in developing Antalya*

The West Mediterranean Development Agency (BAKA) is a government organisation founded in 2010 as one of the 26 development agencies in Turkey (see Box 3.4 in Chapter 3). The goal of the agencies is to accelerate socio-economic development and increase local capacity in three provinces: Antalya, Burdur and Isparta. Its main responsibilities include promoting, soliciting and facilitating international investments and business development in the West Mediterranean Region. The agency's board of directors includes the governors of the three provinces that make up the region, the mayors of the provinces and the chairmen of the chambers of commerce and industry of the three provinces (European Association of Development Agencies, n.d.).

BAKA has provided financial assistance to both the private and public sector since 2010. The agency provides grants to selected projects that are important investments for the city (Table 4.8), and announces grant programmes every year for both the public and the private sector. Any company planning to expand its business or invest in another area can benefit from the grants as long as their investment areas are consistent with the grant programmes' aim to enhance the city's economic vitality. Both public and private institutions whose projects are selected can benefit from the grants, which aim to enhance their financial stability. Another selection criterion for the projects is the level of jobs they are likely to provide. If they offer more employment opportunities for the unemployed, their chances of being selected increase (BAKA, 2016). Through such financial programmes, BAKA supports the diversification of Antalya's economic activities.

Table 4.8. **Financial assistance provided by the BAKA, 2010-15**

	Direct financial support		Direct activity support		Technical support	
	Number of projects	Amount TRY	Number of projects	Amount TRY	Number of projects	Amount TRY
2010	14	3 426 000	..	..	..	..
2011	29	6 164 000	9	278 000	..	..
2012	32	7 128 000	7	288 000	1	10 000
2013	..	..	9	509 000	3	36 000
2014	33	8 026 000	4	192 000	4	41 000
2015	21	7 534 000	5	236 000	..	..

Note: TRY 1 (Turkish lira) = EUR 0.310448 (exchange rate as of 25 February 2016).

Source: BAKA (2016), Response to the OECD questionnaire, <http://www.investinwmmr.org.tr/>, (accessed June 2016).

#### *ICT increases the capacities of the public sector for appropriate service delivery*

Rapid population growth has put pressure on the city to develop its infrastructure and public services. In 2015, the Antalya Metropolitan Municipality launched the "Vision 81 Smart Cities" Project in co-operation with Turkish Telekom (Antalya Metropolitan Municipality, n.d.). Its aim is to introduce a number of ICT measures to improve services in tourism, transport, health and security. Measures proposed include introduction of free Wi-Fi in selected areas, an electronic traffic control system, remote monitoring of

medical patients and SMS services for those with hearing difficulties. The project aims to increase tourism and citizens' well-being.

*Citizen participation is solicited for large municipal projects*

The Antalya metropolitan municipality is eager to involve residents in its decision-making process before undertaking any big projects to enhance stakeholder engagement. In August 2014, the municipality conducted a referendum for the EXPO Rail Line System Project, in which 8 777 people from 20 neighbourhoods participated, 98.34% of them supporting the project. In October 2015, another referendum was held on the Şarampol Street Project to redevelop one Antalya's oldest and most famous streets, and 90.19% of voters supported the project (Antalya Metropolitan Municipality, 2015).

## Conclusions

- Expanding the market for alternative tourism such as medical, MICE and sports tourism has enabled the city to take advantage of its current strength in the core industry and provided a smart alternative to support industrial diversification. In addition to diversification of tourism alternatives, import countries for agricultural produce need to be diversified as well. This strengthens the city's economic robustness against future shocks.
- Close co-operation with the West Mediterranean Development Agency is a critical factor in strengthening the city's capacity in line with national priorities, such as the Tourism Strategy of Turkey 2023. This sets a good example of integrated multi-level governance approach.
- Growing population triggered by internal migration continues to put pressure on the city to update its infrastructure, in particular the sewage disposal system. The city could develop long-term land-use and infrastructure strategies in order to accommodate the population growth and infrastructure needs. Compact city policies featuring dense and proximate development patterns, areas linked by public transport systems, and high accessibility to local services and jobs could also provide a good solution to this challenge.
- Policies need to be developed to promote the employment of the youth, women and migrants, such as providing job training and enhancing business start-ups, since their inclusion in the job market is important to maintain social cohesion and sustainable economic growth. Policies also need to be put into practice in order to overcome the seasonal character of jobs in tourism and agriculture.

## Note

1. The programme was implemented jointly by the Food and Agriculture Organization of the United Nations (FAO), the International Labour Organization (ILO), the International Organization for Migration (IOM), the United Nations Development Programme (UNDP) and the Turkish Employment Organisation (İŞKUR) as the

national implementing agency of the Joint Programme. The programme was financially supported by Millennium Development Goals Fund (MDG-F) provided by the Spanish government.

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## *Chapter 5.*

### **Belo Horizonte, Brazil**

*This chapter provides an overview of Belo Horizonte, followed by an assessment of the current challenges for Belo Horizonte's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

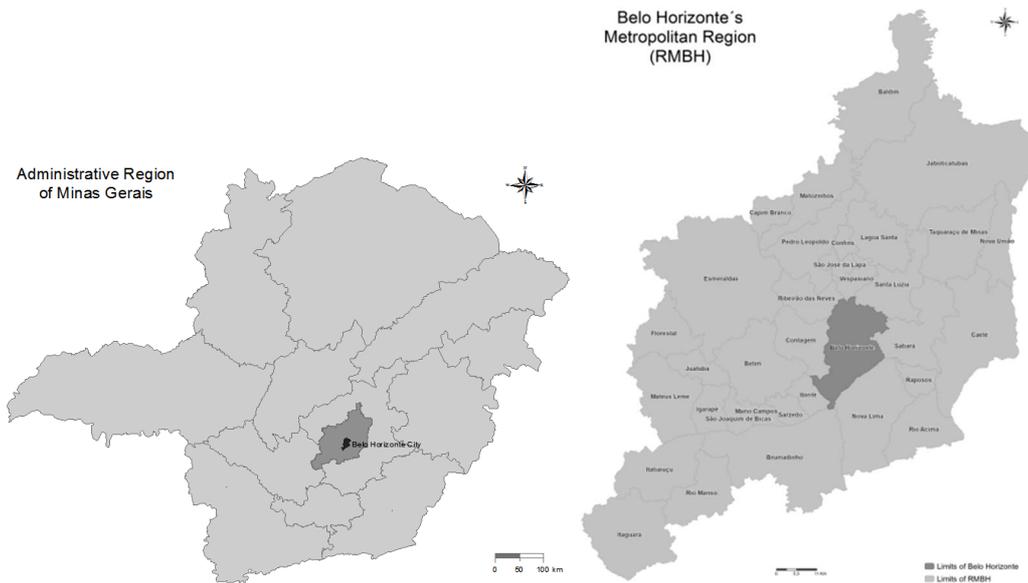
## Overview of Belo Horizonte

Belo Horizonte is the political, economic and demographic centre of the state of Minas Gerais in southeast Brazil (Figure 5.1). The municipality is at the core of a metropolitan area of the same name Região Metropolitana de Belo Horizonte (RMBH), located in the São Francisco River Basin and characterised by its mountainous topography, rainy summers and dry winters. The metropolitan area comprises a total of 34 municipalities and is the third-most populated urban agglomeration in Brazil with almost 5 million inhabitants in 2010 (Figure 5.2). With a 3.9% contribution to Brazilian aggregate growth in the period 1996-2007, Belo Horizonte and its metropolitan area are among the most important economic hubs of Brazil (OECD, 2013).

Figure 5.1. **Belo Horizonte, Brazil**



Figure 5.2. **Belo Horizonte, the metropolitan area (RMBH) and Minas Gerais**

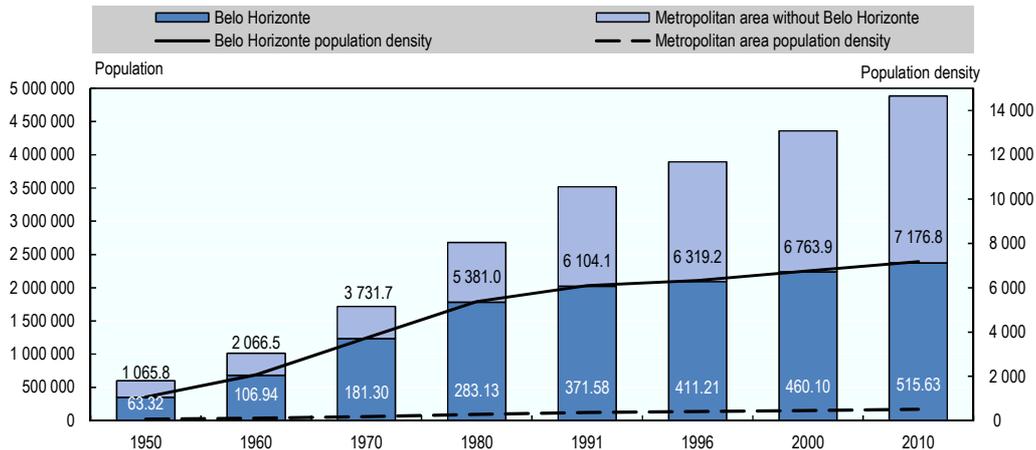


Source: Municipality of Belo Horizonte, created in April 2016 by GGEO/SMAPU/SMDE.

Belo Horizonte grew rapidly between the 1950s and the 1970s, as the result of strong industrial expansion and crisis in agricultural production. The regional capital

experienced an intense rural to urban migration, with high population growth (Figure 5.3). Between 1960 and 1970, the population in Belo Horizonte almost doubled, increasing from 683 908 to 1 235 030 individuals. This was accompanied by an increase in population density that rose from 2 066.5 (individuals per square kilometre) to 3 731.7, rising to 7 176.8 in 2010.

Figure 5.3. **Population and population density in Belo Horizonte and its metropolitan area without Belo Horizonte, 1950-2010**

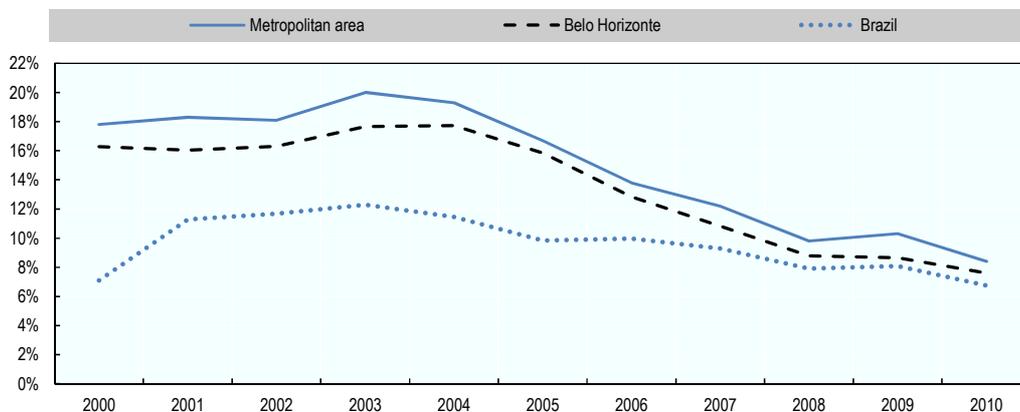


Note: Municipal areas refer to the municipal structure as of 2001.

Source: IBGE (2011a), *Censo Demográfico 2010*, [www.ibge.gov.br/home/estatistica/populacao/censo2010](http://www.ibge.gov.br/home/estatistica/populacao/censo2010); Diário Oficial da União No 198 Seção 1, 11/10/2002.

Most of the economic activities in the state of Minas Gerais are concentrated in Belo Horizonte and the adjacent municipalities: Betim, Contagem and Nova Lima. Viewed on its own, Belo Horizonte's gross domestic product (GDP) corresponds to almost 17% (2013) of the state's GDP and 43% (2012) of the metropolitan area's GDP. Adding these additional municipalities accounts for almost 30% of the state's GDP and about 83%<sup>1</sup> of the total metropolitan GDP. In the last decade, the metropolitan area has experienced a large drop in unemployment (Figure 5.4), mostly driven by the expansion in the service sector in Belo Horizonte (Observatório das Metrôpoles, 2015).

Figure 5.4. **Unemployment rate in Belo Horizonte, its metropolitan area and Brazil, 2000-10**



Source: Fundação João Pinheiro, Centro de Estatística e Informações (CEI), *Pesquisa de Emprego e Desemprego na RMBH (PED/RMBH)*, [www.fjp.mg.gov.br/index.php/produtos-e-servicos/2773-pesquisa-de-emprego-e-desemprego-na-regiao-metropolitana-de-belo-horizonte-ped-rmbh-resultados-anteriores](http://www.fjp.mg.gov.br/index.php/produtos-e-servicos/2773-pesquisa-de-emprego-e-desemprego-na-regiao-metropolitana-de-belo-horizonte-ped-rmbh-resultados-anteriores); national data from IMF, *World Economic Outlook Database* April 2015, retrieved from IBGE.

## Challenges for Belo Horizonte's resilience

Historically, the incidence of floods and landslides has been high in the territory of Belo Horizonte and its neighbouring municipalities. Between 1991 and 2010, landslides or floods impacted more than 500 000 residents. The city was hit worst by flash floods and flooding in hilly urban areas for a total of five major events, which resulted in 7 fatalities and 2 99 200 inhabitants affected. One landslide in January 2003 and two in October 2010 affected 200 000 people and killed 17. Adjacent municipalities highly affected by flash floods between 1991 and 2010 were Contagem, with 12 events, and Ibrité, with 8 events (Atlas Brasileiro dos Desastres Naturais, 2011). However, as the most densely populated municipality of the metropolitan area, Belo Horizonte has the highest number of affected people.

Landslides and floods have also affected the urbanised metropolitan area. Areas of informal settlements have suffered extensively from the erosion of land due to its geomorphological characteristics. Informal settlements are often built on steep slopes, in embedded valleys and concave surfaces, where the risk of landslides is higher. Informal settlements are the result of the high population growth experienced in the 1960s, which led to rapid urban growth and polarised the wealthy and poor areas (Observatório das Metrôpoles, 2015). Many residences were established in hazard-prone areas; 3 451 households were classified in either high risk or very high risk according to the Master Plan of Civil Defence 2014.<sup>2</sup> “High risk” areas are considered to be those that with structural work could be safely inhabited, whereas “very high” risk areas are those areas that need to be evacuated.<sup>3</sup> Together, these areas correspond to 0.45% of all municipal households, 24.5% of which were in low-income neighbourhoods.<sup>4</sup> Considering that 17% (2007) of all the households are located in low-income neighbourhoods, the strongest impact was felt by low-income segments of the population, who lived on hills, river shores and other vulnerable areas.

Belo Horizonte's exposure to natural disasters might be exacerbated as a consequence of global and regional climate change, and its vulnerability is likely to increase due to urbanisation as well as deforestation in the area. The scale, intensity and frequency of rainfall in urban areas are expected to increase, resulting in periodic flooding of flood-prone areas and in landslides in unstable slopes (Bigio, 2003). These factors taken together suggest a need for disaster risk reduction measures to build Belo Horizonte's future resilience to cope with natural hazards.

## Elements for building resilience in Belo Horizonte

### *Economy*

#### *Belo Horizonte has a diversified economy based on services*

The economies of the municipality and metropolitan areas were historically based on extractive activities, but over the last 40 years they have successfully diversified. Between 1970 and 1975, the metropolitan area benefited from high investment by the federal government, which led to specialisation in the production of intermediate goods such as metallurgical, metal-mining and, later on, mechanical-automated goods. These economic activities are mostly concentrated in the industrial areas of Betim and Contagem. Belo Horizonte has invested in innovative industries since the 1980s, and has instead developed a service-oriented economy. It has more recently shifted towards the knowledge economy, developing research centres specialised in information technology,

informatics and biotechnology. Its service sector accounts for almost 85% of the city's gross value added (GVA).<sup>5</sup> Table 5.1 shows that the distribution of the working population in services accounts for the highest share of employment in Belo Horizonte. This has been growing, with the decrease in the share of industry and commerce. This diversification in economic activity from an extractive industry to a knowledge economy has decreased economic vulnerability to natural hazards. However, to reduce the impact on economic activities and losses, as suggested by the OECD *Recommendation of the Council on the Governance of Critical Risks*, Belo Horizonte needs to ensure that business continuity plans are in place for the operators of critical infrastructure and basic services.

Table 5.1. Share of working population by sector in Belo Horizonte and Brazil, 1996-2011

Years	Industry (including civil construction)	Services (including commerce)	Agriculture	Others
1996	20.1%	70.5%	..	9.4%
2000	20%	70.3%	..	9.7%
2005	16.6%	74.6%	..	8.8%
2010	17.3%	76.4%	..	6.3%
2011 Brazil	21.7%	62.4%	15.7%	..

Notes: .. : not available. All years refer to January.

Source: Dieese/Seade/MTE/FAT/Fundação João Pinheiro/Sine-MG, Pesquisa de Emprego e Desemprego (PED-RMBH); national data from World Bank, World Development Indicators, accessible at: <http://databank.worldbank.org/data/reports.aspx?source=2&country=BRA&series=&period=#> (accessed 18<sup>th</sup> May 2016).

## Society

### *Belo Horizonte has invested in social inclusion*

Population growth in Belo Horizonte during the high periods of urbanisation led to noticeable differences in living conditions between different neighbourhoods. Table 5.2 shows variance across the nine different administrative regions in terms of income per capita. Norte and Barreiro are the areas with the lowest average income per capita, whereas Centro-Sul has the highest average income. Although the percentage of households exposed to geological risk is also higher in Centro-Sul, half of these (555 of 1 112) are located in two low-income neighbourhoods named “Aglomerado da Serra” and “Aglomerado Santa Lucia”.

The municipality of Belo Horizonte has been investing in policies to reduce the number of low-income neighbourhoods. The *Vila Viva* programme, for example, involves structural interventions in areas defined as “inadequate settlements”, such as sanitation improvements, the construction of housing units, the reduction of high geological risk and the maintenance of the reinforcement of the road infrastructure. Through this programme many families zoned out of the formal land and housing market in the municipality were offered formal settlements. The construction of 3 811 houses promoted social inclusion through better housing quality and the reduction of informal settlements, which in turn led to decreased exposure to natural hazards.

The municipality has improved access to safe drinking water,<sup>6</sup> reaching almost 100% of the population (Instituto Trata Brasil, 2013). 84% of sewage water is treated (Mayer of Belo Horizonte's website), which is higher than then national average of 39% (Instituto Trata Brasil, 2013). This has helped pave the way for improvements in living conditions

that are depicted by higher life expectancy at birth and lower child mortality than the national average. Safe drinking water as well as sewage collection and proper disposal of sewage or waste water directly impacts upon quality of life because it reduces human exposure to water borne diseases in surface water, soil and plants. It is important to note that during and following flooding events, preventive measures, and proper clean-up procedures are essential in mitigating the risk of infection due to potential sewage system failure causing hazardous material being directly in contact with the population.

Table 5.2. Socioeconomic situation and environmental risk by administrative area of Belo Horizonte, 2010

Administrative area	Average per capita income (BRL)	Population density	Number of households	Number of households in vilas/favelas	Number of households at risk	Percent of households at risk	Percent of households in vilas/favelas at risk
Barreiro	593.6	5 269.6	85 617	16 363	300	0.35%	
Centro-Sul	3 016.3	8 971.7	102 346	19 196	1 112	1.09%	2.89%
Leste	1 090.8	8 317.6	76 728	18 411	613	0.80%	
Nordeste	952.5	7 315.9	91 572	10 454	314	0.34%	1.50%
Noroeste	1 019.3	6 998.3	87 741	12 730	185	0.21%	
Norte	614.6	6 363.0	64 062	16 319	191	0.30%	
Oeste	1 357.6	9 218.6	101 260	22 799	606	0.60%	0.46%
Pampulha	1 317.9	4 752.5	71 795	3 823	13	0.02%	
Venda Nova	612.7	9 516.2	80 954	9 607	117	0.14%	

Sources: Plano Diretor de Defesa Civil (2014); IBGE (2011b), *Censo 2010: Resultados do universo por setor censitário*, [www.ibge.gov.br/home/estatistica/populacao/censo2010/default\\_resultados\\_universo.shtm](http://www.ibge.gov.br/home/estatistica/populacao/censo2010/default_resultados_universo.shtm) (accessed March 2016).

### *Belo Horizonte has active citizens' networks in disaster risk reduction*

Citizens' networks are active in planning, monitoring, alerting and establishing collaborative structures for disaster risk reduction. These networks have established direct contact with the most vulnerable communities, and make information more readily accessible. Citizens exposed to natural hazards have actively engaged in addressing risks and sharing knowledge of local hazards, cultivating a whole-of-society approach to risk management:

- The community is organised into 60 geological risk and flood risk volunteer groups, with 700 volunteers who live in risk areas (Response to OECD questionnaire). These volunteer groups guide residents in self-protection measures during times of intense and prolonged rainfall.
- A partnership between the municipal civil protection service and local universities allows engineering students to volunteer in preventive inspections. This partnership improves the operational capacity of civil protection services and develops the interest of students in conducting research on themes related to local challenges in disaster risk reduction.

### **Environment**

#### *Belo Horizonte has implemented a mix of measures for the mitigation of geological risks*

Rapid urban growth in Belo Horizonte in the 1960s and the intensity of land occupation increased land and asphalt pavement, compromising the capacity of the urban

drainage system. This, in turn, has led to more urban flood events (Response to the OECD questionnaire, 2015). For more than 20 years, the municipality has organised programmes for flood mitigation, which are supported and partially funded by the Inter-American Development Bank (IDB). Since 2001, a creek restoration programme called “DRENURBS” has organised stream cleaning, waste removal and small preventive works. A flood mitigation programme implements a hydrological monitoring system through 56 hydro meteorological stations, which monitor the rainfall levels and the oscillations on the water volume of more than 73 rivers and streams in the city of Belo Horizonte, which enables early warning alerts. The municipality has also managed to signal 80 points in the city susceptible to flooding. These flood risk areas are classified in Belo Horizonte’s flood chart and are monitored by committees of residents and those who live and work in the areas.

Since 1993, the municipality has promoted a programme designed to provide a service for the population living in risk areas called the “Structural Programme in Risk Areas (PEAR)”. Its goal is to prevent major accidents, through projects for structural improvement protecting families who live at risk of landslides and floods. Throughout the year, inspections are carried on in risk areas to conceive appropriate mitigation measures that residents or the municipality can take. The sites under analysis are assigned different levels of risk. If the risk is either “high” or “very high”, the family needs to be evacuated and accommodated in a municipal shelter. Evacuated families are offered housing grants, under a programme for resettling families in a housing unit built by the city. PEAR also serves families living in areas of medium or low geological risk, where small projects, carried out by the residents themselves, can eliminate risks. Experts provide construction material and technical guidance. PEAR interventions reduced the number of dwellings in high geological risk areas from 15 650 in 2001 to 2 661 in 2011.

Territorial planning policies have been used in Belo Horizonte for more than 20 years that incorporate risk management decisions. The policies enacted further to the Master Plan and the Law of Instalment Occupation and Land Use classify the city in 13 “macro zones” and define occupancy conditions according to: permeability rate, occupation rate and utilisation coefficients. The city’s Master Plan has identified some villages and low-income neighbourhoods as “special zones of social interests”, where public authorities decide on intervention under global specific plans for urban restructuring, as well as new urban developments (reduction of risk areas). Despite being legally protected, areas more prone to inundations and geological risk are often occupied with poor and unregulated constructions. The price for housing in the city is relatively high, and low-income families often build their homes in these hazardous areas (Response to OECD questionnaire, 2015).

### ***Institutions***

#### ***Belo Horizonte has developed a whole-of-society approach for disaster risk management***

The municipality has established an interagency approach, with all departments of Belo Horizonte participating in the municipal civil defence system. This co-ordination is defined in the Master Plan of Civil Defence, which establishes the guidelines for planning, co-ordinating and executing civil defence activities. Its guidelines are also designed to involve the participation of all the 27 departments of the municipality of Belo Horizonte, private entities and the community.

As part of this systemic approach, a consultative forum, the “Executive Group of Risk Areas” (GEAR), was set up to discuss disaster risks and explore solutions, identifying those responsible for taking actions to protect citizens and assets. GEAR brings together public managers and private companies whose activities relate to risk prevention and emergency response. Gathering regularly every Monday, in the rainy season, participants discuss plans for recovery in case of disasters, the weather forecast for the next week and preventive interventions for future adverse events. At the meeting, all 27 departments of the municipality discuss any occurrences of disasters and vulnerabilities in the city. The solutions are formulated collaboratively, with technical, logistical and material contribution of those who have the capacity to act. Actions and deadlines are established and, at the next meeting, the ongoing actions and agreed practical results are checked. The forum brings added value to risk management, thanks to the contributions of all the participants. Reports of the meeting are prepared and distributed to provide a historical record, so that its decisions can be monitored.

The municipality of Belo Horizonte has also assigned responsibilities for leadership pertaining to crisis management and early detection thanks to the civil defence body (COMDEC), which conducts risk inspections and co-ordinates other agencies’ actions. The municipality also maintains an emergency fund to finance response actions and recovery in affected areas, including aid to families and tax exemption for those affected.

#### *Collaboration with different levels of government*

The federal and regional governments disburse resources for housing, health, slope containments and recovery funds for areas hit by disasters. One example of a programme financed with federal funding is the *Minha Casa Minha Vida* programme. This is a national housing programme that reallocates low-income families living in risk-prone areas to apartments built by the municipality (Response to OECD questionnaire).

#### *Citizens participate in disaster risk reduction policy making*

Belo Horizonte shows a high level of citizen engagement and well-developed processes for citizens to express themselves and influence governing processes and outputs. Regional participatory budgeting, for example, was designed to define investments in each of the nine administrative regions of the city. Every two years, citizens gather in the neighbourhoods and in regional assemblies to choose, by direct vote, the works that are directly related to their interests and conducted by the municipality. These have included extensive landslide prevention projects in the past. Belo Horizonte’s citizen’s engagement is complemented by the regionalized participatory planning. Since its implementation in 2011, the programme has incorporated a new concept of planning that allows people to give suggestions, clarify their doubts and track the progress of their proposals.

Reference centres in risk areas (CREAR) have established participatory plans with the local population in order to identify the specificities of each of the nine administrative regions of Belo Horizonte. The CREAR are also used to help expand residents’ participation in prevention activities. Residents are welcomed to propose suggestions and solutions to problems caused by geological risks. This facilitates the process for residents to request inspections, and intensifies the hazard monitoring. The technical team that makes up each CREAR includes a geologist, an engineer and an intern resident in the community. The centres are also equipped to serve as a temporary refuge for families at high risk in emergencies.

Programmes for citizens' engagement in Belo Horizonte have increased provisions to schools, health centres, cultural centres, recreation areas, houses and especially infrastructure contributing to the reduction of social inequalities (Prefeitura Municipal de Belo Horizonte and Universidade Federal de Minas Gerais, 2006). This demonstrates that different socio-economic groups can influence urban development, and can have an impact on policies and activities that aim to protect vulnerable groups (Andrews and Shah, 2002). This tool can be important in designing risk-reduction policies in vulnerable areas where residents have specific concerns. It is crucial for building a culture of resilience, to ensure information is made accessible for vulnerable communities.

## Conclusions

- The municipality has established a mix of structural and non-structural measures for the prevention and mitigation of natural hazards. The efforts to reinforce structures in informal settlements as well as removal of the population in cases of extreme risk are particularly noteworthy. The municipality has incorporated safety and security of the residents into regulations for land use with a view to reduce the number and population of informal settlements in hazard-prone areas, and going forward the challenge will be to implement these measures.
- The municipality has developed a strong network of citizens, which works in partnerships with local universities to contribute to the management of disaster risks. Citizens exposed to natural hazards are actively engaged, and this direct contact improves knowledge sharing about local hazards and contributes to a whole-of-society approach to risk management.
- The municipality has successfully shifted from an extractive-based economy to a service-based one. While these activities may be less directly exposed to natural hazards, they are heavily dependent on utilities and core services such as electricity, gas, telecommunications and water. Lead municipal departments responsible for each infrastructure sector should produce sector resilience plans such as business continuity plans on an annual basis, alerting the city to any perceived vulnerabilities and setting out an action plan where necessary.
- Belo Horizonte has achieved an interagency approach to civil defence, which includes participation from all departments. There is a shared responsibility for risk prevention and mitigation across different departments. To strengthen policy coherence, Belo Horizonte should establish a risk registry that compares the relative likelihood and impacts of different types of risks, and use this as a planning tool to set priorities for risk prevention and mitigation across departments.

## Notes

1. The calculation refers to 2012 and uses data from the Instituto Brasileiro de Geografia e Estatística, Diretoria de Pesquisas, Coordenação de Contas Nacionais.

2. Plano Diretor de Defesa Civil (2014).
3. Very high risk refers to areas where there is a process of instability that shows evident signs of collapse. High risk refers to areas where the process of instability has been noticed by the municipality; however, it doesn't have the same level of emergency as very high risk area (Municipality of Belo Horizonte).
4. This calculation uses Census data from 2010, assuming that between 2009 and 2010 the total number of households was constant. Households at risk or really high risk are taken from the Plano Diretor de Defesa Civil (2014).
5. Author's calculation using data from the Instituto Brasileiro de Geografia e Estatística, Diretoria de Pesquisas, Coordenação de Contas Nacionais.
6. According to the World Health Organization (WHO), access to safe drinking water is "the proportion of people using improved drinking water sources: household connection; public standpipe; borehole; protected dug well; protected spring; rainwater" (WHO, n.d.).

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## ***Chapter 6.***

### **Bursa, Turkey**

*This chapter provides an overview of Bursa, followed by an assessment of the current challenges for Bursa's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

## Overview of Bursa

Bursa is the fourth-largest city in Turkey, located in the northwestern area of Anatolia (Figure 6.1 and 6.2). In 2014, the city's population was 1 957 247, with a population density of 1 508 inhabitants per square kilometre (Turkish Statistical Institute, 2015). The Bursa province is subdivided into 17 districts, with each district including a corresponding district municipality, while the city of Bursa provides the administrative functions of the Bursa province.

Figure 6.1. Bursa, Turkey

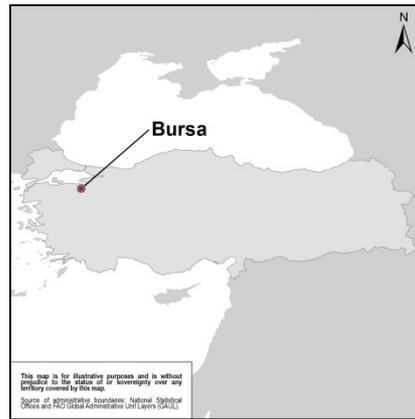


Figure 6.2. Bursa province and its 17 districts



Source: BEBKA.

Over the past 35 years, the population in Bursa has rapidly increased. Strong internal migration was driven by the region's fast-evolving industrial development. Population growth in Bursa exceeded the national average in the period from 2007 to 2014, thanks to employment opportunities in the manufacturing sector and its "long tail" of services. Net migration grew at 7.0% in 2015 (Table 6.1). The 2015-23 population projections expect a 12.2% population increase, outpacing the expected national population growth of 9.8% (Turkish Statistical Institute, 2015).

Table 6.1. **Population of Bursa and Turkey, 2014**

	Population in 2014	Immigration	Emigration	Net immigration	Net immigration growth rate(%)
Bursa province	2 842 547	84 253	64 558	19 695	5.64
Turkey	78 741 053	2 720 438	2 720 438	..	..

Source: Turkish Statistical Institute (2014), Household Labour Force Survey.

Note: This table represents the number of domestic migrants and immigrants within Turkey.

Economic growth and gross value added (GVA) in Bursa were above the national average between 2004 and 2011 (Table 6.2), except between 2007 and 2010.

Table 6.2. **Growth of regional gross value added in Bursa and Turkey, 2004-11**

Years	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
Bursa province	19%	20%	15%	11%	-2%	11%	20%
Turkey	16%	17%	13%	13%	1%	13%	17%

Source: Turkish Statistical Institute, Household Labour Force Survey.

After the 2008 financial crisis, the unemployment rate exceeded 10%, almost reaching 15% in 2009. Employment recovery, however, occurred more rapidly than at the national level, decreasing to 6.6% in 2013 (Table 6.3), slightly below the regional level of 7.4%. Unemployment among females is higher than among the male labour force, which is commensurate with Turkey's overall labour market situation. Bursa's labour market is characterised by shortages in skilled labour, a phenomenon that can be observed throughout the Bursa region. Both large specialised firms in the automotive sector and small and medium-sized enterprises (SMEs) have a higher demand for skilled labour than the local area can supply, with consequences for the region's productivity and economic growth (BEBKA, 2016).

Table 6.3. **Unemployment rate in Bursa and Turkey, 2008-13**

	2008	2009	2010	2011	2012	2013
Bursa province	10.8%	14.7%	10.5%	7.5%	7.1%	6.6%
Turkey	10.0%	13.1%	11.1%	9.1%	8.4%	9.0%

Source: Turkish Statistical Institute, Household Labour Force Survey.

The primary sector decreased its employment share from 21% to 15% between 2004 and 2013 (Table 6.4). Over the same period, the tertiary sector gained in dynamism, as evident in employment shares that increased by 7 percentage points, to 45%. The secondary sector levelled off at around 40%, after strong growth between 2005 and 2008 (Turkish Statistical Institute, 2015).

Table 6.4. **Employment by sector in Bursa and Turkey, 2004-13**

	Primary	Secondary	Tertiary
2004	221 000 (21%)	436 000 (41%)	395 000 (38%)
2007	181 000 (16%)	528 000 (46%)	433 000 (38%)
2013	202 000 (15%)	561 000 (40%)	623 000 (45%)
2013 Turkey	5 204 000 (21.2%)	6 869 000 (27.9%)	12 528 000 (50.9%)

Source: Turkish Statistical Institute, Household Labour Force Survey.

## Challenges for Bursa's resilience

### ***An export-driven automobile industry is influenced by fluctuation in the foreign market and the need for high-skilled labour force is critical***

Bursa's economy has a strong concentration of automotive manufacturing, textile and furniture production, and an increasing service sector that supports production and development activities in the secondary sector. The importance of the automotive industry for Bursa's economy is reflected in its national share of 46% of Turkey's total motor vehicle production (2015). The export of motor vehicles, trailers and semi-trailers totalled USD 3.8 billion in 2014. Bursa's automotive supply industry has reached the manufacturing level for original equipment manufacturer (OEM) companies, indicating a high degree of specialisation and advanced manufacturing activities (BEBKA, 2016). Its emergence as a centre of production since the 1980s has resulted in a strong cluster across all segments of automotive manufacturing. This includes SMEs in parts supply, which is increasing activity in the design and development of original parts.

Bursa's position as a leading region for automotive production is partly due to the availability of a young, qualified labour force that complies with the requirements to work in production activities, and the development of local infrastructure that supports the industry's needs. As the local economy shifts towards specialised and advanced production, shortages in skilled labour have become an increasing challenge (BEBKA, 2016). Bursa's rapid economic development and increasing specialisation of production demand a large number of skilled workers for the design and development of products, as well as to provide business services to local firms and SMEs. Labour supply is increasingly falling short of meeting the demand, with adverse effects on economic growth. The shortage of highly skilled labour has emerged more recently, with increasing pressure on suppliers to design and develop more advanced products, a process that car manufacturers shouldered in the past. Failure to supply the labour market with the appropriate level of highly skilled workers will limit not only the growth of the local economy, but also the ability of local firms to compete globally.

Bursa's export-driven manufacturing industry has meant that reduced demand for its products in foreign markets adversely impacts its economic growth, innovation capacities and employment development. In 2008, exports diminished rapidly as a consequence of the economic recession and declining orders from European markets, leading to decreased GVA growth (-2%) in Bursa. Unemployment initially soared as workers in manufacturing were laid off, forcing workers into part-time employment or unpaid time off. Similarly, short-term credit to the textile sector was reduced, with negative effects for employment in 2008 and 2009.

### ***Population growth is putting pressure on the city's infrastructure and public services***

Bursa is experiencing strong migration from Turkey's east and southeastern regions attracted by the city's growing economy. Young people are migrating from the Bursa region to the city in search of better job opportunities and higher living standards. Particularly in the eastern part of the city, the influx of new residents is changing local communities and putting pressure on infrastructure and public services (BEBKA, 2012). Bursa's regional plan for 2014-23 notes that the city has the highest potential for industrial development in Turkey, consolidating its position as a regional centre. This implies increasing demand for the provision of public services not only to the city, but to rural areas.

As a consequence of the rapid population inflow over the past decades, uncontrolled land development for industrial use has become a challenge for Bursa's outskirts and hinterland. The rapid industrialisation process and reasonable land costs have resulted in the emergence of unplanned industrial sites in areas under natural protection. Industrial developments have occupied fertile agricultural land, causing a loss in the quality of agricultural land, and contamination and the degradation of groundwater levels. Informal settlements have increased the use and conversion of agricultural land to built environment (BEBKA, 2012). Unplanned development of industrial and residential areas that does not account for the risk of natural disaster, in particular to seismic activity, is also a liability for urban development.

## Elements for building resilience in Bursa

### *Economy*

#### *Workforce development is enhanced to increase high-skilled labour*

To attract a talented workforce, Bursa uses financial and technical programmes provided by several institutions, including the Small and Medium Enterprises Development Organisation; the Ministry of Economy; the Ministry of Science, Industry and Technology; and the Bursa Eskişehir Bilecik Development Agency (BEBKA). BEBKA supports the development of human capital in existing firms but also in creating and enhancing SMEs. This form of support facilitates the hiring of new employees to satisfy the demand for specialised skills, such as engineers, managers and intermediate staff if necessary. Organisations such as the Chamber of Commerce and Industry, business associations and vocational high schools that provide business services in Bursa are able to receive support to train the existing workforce.

Bursa also makes effective use of support for cluster development in high-growth sectors, and to promote the training of a well-qualified workforce to meet the demand for labour in specialised industries. Programmes to improve the technical infrastructure, such as access for freight transport and digital infrastructure, support the environment necessary for clusters to evolve. This is expected to have multiplier effects on Bursa's economic development. Since 2010, focus has been specifically on attracting qualified workers in many value-adding sectors (BEBKA, 2016).

#### *Development in competitive clusters has been enhanced*

The Ministry of the Economy and BEBKA have identified areas of potential growth, particularly in railway systems, aerospace, baby and children's clothing, and raw vegetables and fruit, and also in mature clusters such as automotive, textile and furniture (BEBKA, 2016). Ongoing projects to stimulate activity in these industries are carried out by Bursa's Chamber of Commerce and Industry partners, and support for the development of technology clusters are financed by the Ministry of the Economy and the Ministry of Science, Industry and Technology.

### *Society*

#### *Programmes on social challenges are taking place with the national and regional governments*

Human development and social inclusion are part of BEBKA's core strategies in Bursa. A situation analysis was conducted for Bursa that directs the formulation of plans and strategies to improve human development and social inclusion. The analysis

identified six priorities and related measures that were implemented in the Bursa regional plan. These priorities include cultivating the city's socio-cultural background and identity; improving the quality and accessibility of educational services; improving policies for social inclusion and strengthening the social service infrastructure; improving the quality of medical services; enhancing youth and sports services; as well as improving the infrastructure for services in these areas (BEBKA, 2016). BEBKA has also supported the improvement of social cohesion in Bursa through programmes totalling TRY 12 million in 2011 and 2014 (Table 6.5).

Table 6.5. **BEBKA's programme to support social cohesion projects in the Bursa region**

Year	Programme	Budget financed by BEBKA	Eligible applicants	Scope of the programme	Target group
2011	Social development	TRY2 million	Non-profit organisations (public institutions, local municipalities, trade bodies, non-governmental organisations, associations, universities, etc.)	Improving the disabled's, women's and the elderly's life quality and accessibility in Bursa	Disadvantaged groups (disabled, women, the elderly)
2014	Small-scale infrastructure for social development	TRY10 million	Non-profit organisations (public institutions, local municipalities, trade bodies, non-governmental organisations, associations, universities, etc.)	Raising the quality of life and participation in social life of the disabled by developing service quality and accessibility infrastructure in Bursa	Disadvantaged groups (disabled, children, women, the elderly, homeless people, immigrants, the poor, drug addicted, etc.)

Source: BEBKA (2016), Response to the OECD Questionnaire, [http://www.bebka.org.tr/site-anasayfa-0-home\\_page.html](http://www.bebka.org.tr/site-anasayfa-0-home_page.html) (accessed June 2016).

Under the co-ordination of the Ministry of Development, a social analysis was carried out to identify and prioritise social challenges. Within this framework, the Bursa region was assessed on a number of levels, including the level of education, health, family, demography, security and justice, employment, social security, income distribution and equal access to opportunity, housing, poverty, social aid, social services, civil society, and social movements and culture. For each indicator, the current situation and the trend over time, as well as spatial disparities, were identified. The study is under way, and the results will influence the second phase, which includes the design of corresponding policy measures. The ministries in the central government are also providing financial support to address social challenges.

In particular, promotion of gender equality is high on Bursa's agenda and the city was one of six cities to implement the UN Joint Programme to Protect and Promote The Human Rights of Women and Girls. The main aim of the project is to foster an environment to create women friendly cities by incorporating gender equality in the planning processes of the local administrations, based on the activities carried out with women NGOs, grassroots organisations, governmental institutions both on national and local levels (BEBKA, 2016).

### ***Environment***

A set of spatial policies aims at sustainable urban development, including Bursa's Master Plan (2012) and the 2014-2023 Regional Development Plan. Taking into account Bursa's need for land to develop new housing, Bursa's Master Plan defined a number of

areas of focus, such as the preservation of ecosystems and the sustainable use of natural resources. Priorities include balanced development between urban areas and conserving land, and ensuring high-quality public services. Rather than turn to new development sites, given the rich natural environment and the hazardous geological structure, the plan lays out a strategy for efficient use of the existing developed areas, mainly through a denser built-up area, and investment in modernising the existing housing stock (BEBKA, 2016). The Regional Development Plan also includes the phased development of areas for new housing in accordance with population projections. The Regional Development Plan suggests the construction of new housing units to be carried out in stages, according to demographic projections. Industrial sites located in the urban core are destined to be moved in due course to existing industrial zones and newly planned industrial sites.

Bursa's Master Plan also sets out the improvement of public space, such as the walkability of the city and better access to green space. The plan additionally aims to create social facilities and define strategies for the preservation of Bursa's historical identity and landmarks, managing balanced growth by distributing excess demand on the housing market more evenly (BEBKA, 2014).

Minimising natural and technological hazards and reducing the risks of natural disasters such as earthquakes are also outlined in the plan. As for the risk of climate change, the City Council has undertaken a pilot project to build capacity to prepare city-level climate change adaptation plans. The objective is to provide support to the Bursa metropolitan region in understanding the strategic risks of climate change and to develop a co-ordinated response that can assist the decision-making process for urban development. As a pilot city, the lessons learnt are helping to develop a Cities Adaptation Support Package to guide other municipalities through the city-level climate change adaptation plans, building a roadmap for a national urban adaptation programme.

### ***Institutions***

*The Regional Development Agency plays an important role in enhancing overall development in Bursa's public and private sectors*

BEBKA was created by the Council of Ministers on 14 July 2009, to co-ordinate and implement policies and programmes for the development of the Bursa region (see Box 3.4). Its role in directing development is to enhance co-operation between the public and private sectors and non-governmental organisations. BEBKA facilitates the development of local solutions for local problems and promotes sustainable development by means of proper and effective use of resources. The organisational structure of the development agency includes a development committee, an administrative board and a general secretary. The administrative board is represented by public sector officials and by the region's Chamber of Commerce and Industry. This encourages co-operation, participation and consultation with a broad range of stakeholders, involving the region's universities, public institutions, the private sector and non-governmental organisations.

BEBKA's main objective is the reduction of regional development disparities, by providing assistance to all local administrations in the Bursa region. The agency offers financial and technical support, provided as direct financial contributions and loans to fund the development of economic activities in the region. BEBKA's supports include:

- direct financial support includes projects proposed by various organisations, as well as research and planning to fund growth in the private sector

- large-scale projects are reinforced through guided project assistance, to accelerate regional development
- technical support to engage the participation of civil society in regional development and to build local and rural capacity (City of Bursa, 2014)
- BEBKA's leadership to co-ordinate policies among different sectors and different organisations, in particular in the area of the development of infrastructure, effective forms of inner-city and local connections, environmental sensitivity, intelligent and cost-effective transport.

*Long-term vision provides Bursa's future framework for sustainable development*

The 2014-2023 Regional Development Plan for the Bursa region outlines a vision for an international and competitive production centre that leads in innovation, while providing a high quality of life for its citizens. Strategies to improve and make the city more sustainable in its economic, social and urban development have been based on scientific research and public participation. Economic and sectoral diversity, disaster and urban transformation, as well as social cohesion, are central elements of the plan, supporting the overall adaptability of the metropolitan area in a changing economic environment (BEBKA, 2014). Within the scope of the regional plans, development strategies specify the conditions of financial support for projects, improving the skills of the labour force, investments in infrastructure and the promotion of economic opportunities.

*Local Agenda 21 established the Bursa City Council to promote policy coordination among stakeholders*

The Local Agenda 21 (LA21) Program, a comprehensive national action plan related to sustainable development, was launched in 1997 in Turkey. The programme pursues a decentralized approach, depending on networking and collaboration among a number of stakeholders. To this end, it provided a unique opportunity for community participation, local stakeholder involvement, establishment of local partnerships and decentralization of the local decision-making process in Turkey with a special focus on the two concepts 'sustainable development' and 'good governance'. One of the main outcomes of the programme was to create city councils to implement LA21 policy measures. Bursa City Council was established as a part of the project. Bursa City Council, which is the association of local stakeholder including the public sector, private sector, NGOs and citizens, conducts many projects that could affect the city's governance, leadership, citizens' participation and public sector. These projects cover a number of issues such as citizen participation to environmental problems of Bursa, improving public sector-NGOs dialogue in decision making process, and impact of climate change upon energy, water and food in the city (BEBKA, 2016).

## Conclusions

- Bursa recognised the potential in its evolving economy that transitions from automobile to advanced manufacturing. This development lays the foundation to support the growth of a more diversified and advanced economy through strategic policies that aim at skills development on the one hand, and the attractiveness of the city to high-skilled workers on the other.

- Beyond the support for organisations providing business services that nurture the evolution of SMEs and a start-up scene, the Bursa region is looking to balance urban development throughout the region, by co-ordinating urban development plans to steer new housing and industrial developments and ensure the preservation of natural land.
- Exploring compact city possibilities could help address Bursa's central challenges regarding population growth and the pressure on developing new housing, as well as diminish the development of illegal dwellings outside designated areas. While Bursa is already pursuing a polycentric urban development in its future development plan, further integrating land-use and transportation policies would support the city's fast economic development to happen in a low-carbon and climate-resilient way.

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## *Chapter 7.*

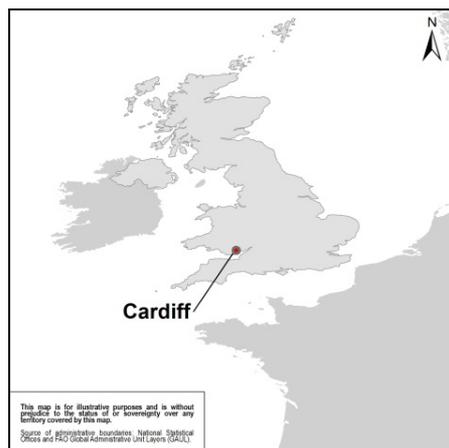
### **Cardiff, United Kingdom**

*This chapter provides an overview of Cardiff, followed by an assessment of the current challenges for Cardiff's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

## Overview of Cardiff

The city of Cardiff is the capital of Wales and the tenth-largest city in the United Kingdom, with a population of 346 100 (2011 Census) (Figure 7.1). As the capital of Wales, the metropolitan area of Cardiff is part of the Cardiff Capital Region, an entity that facilitates the regional integration of public transport systems in the area.

Figure 7.1. Cardiff, United Kingdom



The metropolitan area of Cardiff had a total population of 954 181 in 2014 (OECD, 2016) with an almost equal split of the population between core and hinterland. The unemployment rate in the metropolitan area was at 9.5% in 2013 (OECD, 2016) and the gross domestic product (GDP) per capita in 2013 was USD 31 470, 14% under the national average of USD 36 582 (OECD, 2016). Cardiff metropolitan area consists of five local governments, with the city of Cardiff functioning as the core area (Figure 7.2). Cardiff has a diverse ethnic population, with a large percentage of Pakistani, Greek and Somali residents, and a large young population, partly due to the city's four universities.

Figure 7.2. Cardiff Metropolitan Area



Source: Based on the OECD definition of functional urban areas. Own illustration.

Cardiff's population is growing at an unprecedented pace. Population projections expect it to grow by 26% between 2012 and 2030, a growth rate higher than any other city in the United Kingdom (Centre for Cities, 2013). The growth rate projected in the city is expected to be substantially higher than in its neighbouring municipalities, which are nevertheless expected to grow at a moderate pace (City of Cardiff, 2014a).

Cardiff's economy has a high share of jobs in financial and business services (Business Wales, 2015) (Table 7.1). Other major economic sectors include tourism and retail, which together have driven Cardiff's rapid economic growth in the last 15 years. This can be seen in the growth of the city's gross value added (GVA), which has outperformed the national economy in the same period. After the 2008 economic crisis, Cardiff's GVA fell between 2008 and 2010, but a rapid recovery started in 2011 (Table 7.2).

Table 7.1. **Employment by sector in Cardiff, Wales and the United Kingdom, 2009-14**

Sector	Cardiff						Wales	United Kingdom
	2009	2010	2011	2012	2013	2014	2014	2014
Agriculture, forestry & fishing	0.01%	0.00%	0.01%	0.01%	0.01%	0.03%	2.62%	1.21%
Mining, quarrying & utilities	1.57%	1.72%	1.84%	1.88%	2.38%	2.16%	1.38%	1.19%
Manufacturing	4.91%	4.15%	4.50%	4.12%	4.41%	4.77%	11.03%	7.85%
Construction	4.78%	4.80%	4.55%	3.99%	3.78%	3.75%	7.37%	6.62%
Wholesale And Retail Trade; Repair Of Vehicles	14.66%	15.11%	14.75%	15.58%	14.91%	14.31%	13.23%	14.66%
Transport & storage	3.35%	3.26%	2.77%	2.69%	2.78%	2.98%	3.58%	4.58%
Accommodation & food services	6.45%	7.12%	6.32%	7.05%	7.24%	6.94%	7.37%	6.71%
Information & communication	2.93%	2.85%	2.53%	2.72%	2.50%	3.19%	2.00%	3.95%
Financial & insurance	6.69%	5.67%	6.48%	6.73%	6.53%	7.11%	2.27%	3.38%
Property	1.42%	1.35%	1.45%	1.56%	1.40%	1.65%	1.45%	1.59%
Professional, scientific & technical	6.93%	6.83%	6.91%	5.96%	7.46%	6.66%	6.27%	8.66%
Business administration & support services	9.78%	9.62%	9.49%	9.66%	8.51%	10.17%	6.55%	8.42%
Public administration & defence	8.24%	8.41%	8.40%	7.91%	8.02%	7.63%	6.06%	4.39%
Education	10.44%	10.40%	10.51%	10.25%	10.36%	9.81%	8.96%	8.69%
Health	13.07%	13.77%	14.29%	14.35%	14.75%	14.02%	13.92%	12.43%
Arts, entertainment, recreation & other services	4.77%	4.95%	5.22%	5.53%	4.96%	4.82%	5.93%	5.66%

Source: NOMIS (2015), "Labour market profile: Cardiff", [www.nomisweb.co.uk/reports/lmp/la/1946157397/report.aspx](http://www.nomisweb.co.uk/reports/lmp/la/1946157397/report.aspx) (accessed March 2016).

Table 7.2. **GVA growth rate in Cardiff (NUTS 3), Wales and the United Kingdom, 2003-13**

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Cardiff	10.50%	6.20%	4.10%	4.80%	11.50%	-1.40%	-1.90%	-0.50%	6.50%	1.10%	4.10%
Wales	7.11%	7.24%	6.96%	5.30%	5.34%	-0.13%	2.40%	3.38%	7.89%	2.36%	5.23%
United Kingdom	6.28%	5.38%	6.21%	5.79%	5.49%	2.88%	-1.53%	3.65%	3.26%	2.94%	4.11%

Source: NOMIS (2015), "Labour market profile: Cardiff", [www.nomisweb.co.uk/reports/lmp/la/1946157397/report.aspx](http://www.nomisweb.co.uk/reports/lmp/la/1946157397/report.aspx) (accessed March 2016).

## Challenges for Cardiff's resilience

In the past two centuries, Cardiff's economy has experienced multiple transitions. In the 19th century, it made the transition from an agricultural to an industrial economy, increasing its linkages to the surrounding region. Its importance as a coal producer and its economic dynamism waned after World War II, followed by decades of stagnation in many of the region's communities (City of Cardiff, 2013a). To counter the decline of Cardiff's port and its trade in commodities, a major regeneration initiative was launched to establish a mixed-use, consumption-based environment driving economic activity around the port. The Cardiff Bay Development co-operation, established in 1987, promoted market-friendly redevelopment of the port area. This eventually shifted the city's economic fabric toward the tertiary sector in the 1990s (CBD, 2013). Cardiff's economy is well-integrated in the global value chain and sensitive to volatility in global markets. Its semiconductor industry includes IEQ, with a global market share of over 50% in wafer products for wireless components. A cluster of bioscience firms is based in the city, part of a wider medical devices cluster. The city also receives significant international investment, ranging from the CELSA steelworks to GE Healthcare, an anchor of the bioscience cluster in Wales. Cardiff's industry is not reliant on a specific local commodity, and is thus exposed to the same competitive pressures as most growing cities.

Cardiff has a higher share of employment in the tertiary sector compared to Wales and the United Kingdom. This includes representation in sectors such as financial services, call centres, TV and film, and the manufacture of pharmaceuticals (City of Cardiff, 2013b). Strong economic growth in Cardiff has increased the need for a highly skilled workforce. The availability of a highly skilled workforce supported economic development in the high value-adding tertiary sector. Investment in road transport helped manage the transition to manufacturing in the surrounding region, bringing in relatively cheap but skilled labour from the de-industrialising South Wales area (City of Cardiff, 2013a). On the other hand, the rapid inflow of population requires more housing and public services. The city also needs to consider providing employment opportunities for marginalised groups with low skills and educational background in the services sector, for example in accommodation and retail, as well as in labour-intensive jobs such as construction.

### ***Global competition in need of skilled workers while integration of lower skilled labour is critical***

The challenges of sustaining its current growth include ensuring the availability of skilled workers and ensuring quality of life that will attract and retain them. Wages below the UK average in Cardiff in general are a drag on the attraction and retention of skilled labour. Despite strong growth in jobs in financial and business services, attracting high-wage service jobs has been a challenge. Cardiff is competing with other economic centres for high-paying service jobs, first and foremost London, Manchester and Birmingham (City of Cardiff, 2013b). The city needs to retain the graduates of Cardiff's universities and discourage young people from following job opportunities elsewhere.

The need to integrate low-skilled workers into the economy is growing, since demand for unskilled employees is falling except in the retail and hospitality sectors. Employment growth in Cardiff has been particularly high in construction, distribution, hotels and restaurants, transport and communications, banking, finance and insurance, and public administration, education and health. This will encourage social inclusion and lower social disparities (Cardiff University, 2015).

### ***Building a compact city with a growing inflow of population***

Strong employment growth has increased the need for housing, particularly in the city, given the disparities in economic performance in the Cardiff region (Centre for Cities, 2015). Most job growth in the region has been in the city of Cardiff, increasing the demand for new housing there. Cardiff's Local Development Plan (LDP) proposes to create 41 415 new housing units by 2026. This calls for infrastructure and access to services. To support this level of growth in the housing market, the council has set out plans for public transport and highways, schools, health, green infrastructure, community facilities, environmental management and utility services.

Cardiff has only limited space for new housing. Approximately 41% of the city's area is protected from urban development to preserve green spaces. More than 90% of housing completions in recent years were on brownfield sites. Given the demand for housing, the city may experience a shortage in housing (City of Cardiff, 2014a), since most brownfield land in the city has already been developed or earmarked for development. Meanwhile, the River Taff and the coastal plain is subject to the risk of flooding, and tidal and fluvial land limits the space available for housing. New construction in the city needs to take into account the impact of climate change and compact city development. To accommodate this demand, more compact forms of urban development are called for.

### ***Social disparity in a growing city***

While economy in Cardiff grows, socio-economic disparities among citizens have increased in recent decades. The generalised deprivation index, assessing health, crime and access to services, shows that 7 of the 10 lowest-ranking “super output” areas in Wales are located in Cardiff (Statistics for Wales, 2014). Providing public services in a context of financial austerity has exacerbated this issue.

Earnings and population growth are distributed across local authorities, in the city of Cardiff as well as in surrounding municipalities (Cardiff University, 2015). The coastal zone of Cardiff and the Vale of Glamorgan attract prosperous population, and the more disadvantaged valleys of South Wales. The demand for housing alters the social composition of established neighbourhoods. With the construction of new flats and office buildings, low-income housing areas are gentrifying, driving up property prices and forcing lower income groups out of the city. Local authorities surrounding the city of Cardiff are increasingly functioning as commuter settlements requiring more public transport between residential neighbourhoods and workplaces (Government of Wales, 2013).

## **Elements for building resilience in Cardiff**

### ***Economy***

#### ***The city attracts investment in its key business sectors and workforce***

The Cardiff City Council and the Welsh government have assisted in the growth of Cardiff's key clusters, including financial and business services, the creative industries, life sciences and advanced manufacturing. These most promising business clusters would benefit from broader access to skilled workers. These four key sectors alone account for 70 000 jobs in the city and over 200 000 in the city region. To support a larger percentage of high-skilled service jobs, an “enterprise zone” in central Cardiff offers relief on business taxes and capital allowances. The aim is to attract further job growth through investments from firms in the financial and business service sectors (Business Wales,

2015). This is also part of a strategy to expand Cardiff's position as the region's major provider of financial and business services.

The city and the Welsh government support investments in workforce education and business infrastructure to increase the skilled labour force. Growth in the number of the city's graduates in higher education has helped increase the supply of skilled workers, while infrastructure investment in areas such as superfast broadband and refurbished property have helped retain and attract competitive businesses. Addressing the perceived lack of Grade A office space has been a policy priority, to attract foreign investment.

Skilled labour and jobs are also provided through the city's academic sector. The university is a critical partner in addressing the double challenge of economic development and social inclusion. Cardiff University is not only closely engaged in the city's development, but a major employer itself. It also provides valuable knowledge and innovation expertise for businesses and it develops research and analysis to inform policy decisions of Cardiff's city government (Cardiff University, 2015).

Investment in tourism and the city's amenities has put Cardiff on the map internationally. After 20 years of investment in culture and leisure activities, the city has become one of Europe's major event cities, hosting the Rugby World Cup, the Artes Mundi prize, the NATO summit meeting and the Union of European Football Associations Super Cup. Investment in other amenities, such as the city's parks, has also added to residents' overall quality of life. This has helped to attract a talented workforce, and many of the students who come to study in Cardiff end up staying and working in the city (City of Cardiff, 2016).

## ***Society***

### *Meeting the demand for affordable housing*

The city of Cardiff plans to provide affordable social housing in well-designed, connected and sustainable communities, as outlined in the city's Corporate Development Plan (2014). Cardiff's LDP sets out how to respond to rapid population growth by providing land for 41 415 units on 7 strategic housing sites across the city through 2026. The LDP creates the conditions to help provide housing through public and private stakeholders. The city of Cardiff has identified housing as a central factor in residents' well-being (City of Cardiff, 2014a). The city has committed to provide about 1 600 new homes through the Housing Partnering Scheme, as part of a phased approach through 2024, 40% of which will be affordable housing (City of Cardiff, 2014a). Delivering sustainable and affordable homes is particularly important for those excluded from the recent economic growth. Private sector participation has helped to build homes to meet the needs of Cardiff's residents. The city ensures that privately rented housing meets legal standards of affordable housing to protect residents' health through prioritised investigation of complaints (City of Cardiff, 2014a).

## ***Environment***

### *A public transport network has been developed to increase access to jobs*

Improving the connectivity of the Cardiff region has increased access to jobs. The so-called Metro project has involved a series of public transport investments to shape the regional labour market and commuting flows to Cardiff. It also aims to improve regional linkages, to develop sustainable communities in the region. The Metro project aims not

only to improve cross-regional connectivity but provide better-quality transport (Government of Wales, 2013), connecting over 70% of the region's population. The transport component of the Metro project will support more frequent service and more stations on the rail network. It also adds new routes and stations that serve the most disconnected and densely populated communities, and connects the region's strategic development sites, as well as integrating rail and bus services (Government of Wales, 2013). It has also helped build a multimodal transport network that reduces car dependency within the city region (Government of Wales, 2013).

### ***Institutions***

#### *The city's mid-term vision shows the targets of Cardiff*

In its 2015-17 Corporate Plan, the city of Cardiff announced its aspiration to become "Europe's most liveable capital city" (City of Cardiff, 2014a) and provides guidance for adapting to new socio-economic realities. Seven key outcomes have been established by public and private stakeholders. These focus on the regional economy and residents' quality of life, promoting the right opportunities in the region's labour market, a thriving economy and a city where people can achieve their full potential. Further, the goals include providing a clean, attractive, safe and sustainable environment, and promoting a fair, just and inclusive society.

#### *Policy co-ordination for more efficient land-use planning in the Cardiff metro region has been explored*

Cardiff's Local Development Plan, developed with other local authorities in the region, was formulated to co-ordinate the development of housing and public infrastructure. This allowed the municipalities to discuss strategies. However, no overall development plan for the Cardiff Capital Region is in place. To a certain extent, this gap is filled by Cardiff Metro, which co-ordinates transport services, integrating heavy rail and the development of light rail and bus-based transport.

The Cardiff Capital Region Board was set up in November 2013, bringing together representatives from the public and private sectors on an advisory board. The Cardiff Capital Region Board has as its main goal improving the economic performance of the region by providing leadership, vision and strategic direction. The board provides advice on the region's development and growth and has published its strategic vision for the region, "Powering the Welsh Economy". This focuses on improved regional alignment and collaboration around four key themes: connectivity, skills, innovation and growth identity.

A new project, City Region Exchange, aims to bundle the region's capacities and promote engagement between the city and region. It is intended to both study and participate in the ongoing integration of city and region, by engaging with communities that are a critical part of the local economy and also with those helping to shape development in the region. These include communities of policy makers such as the various local governments and the new Cardiff Capital Region Board, as well as businesses and employers and their representative groups (Cardiff University, 2014).

## Conclusions

- Cardiff has put forward a strategy to improve the horizontal co-ordination of policies with adjacent municipalities in the Cardiff Capital Region. In particular concerning housing and transportation services, this strategy facilitates better access to public transit and jobs, and helps to mitigate the pressure on the housing market within the city of Cardiff as people living in neighbouring communities can access jobs within the city more easily.
- The closer integration of policies across the Cardiff Capital Region also improves the attractiveness of the region for business and for younger people to remain in the area, but also to address some of the social inequalities in the area. The better integration of transportation options helps lower income groups to have access to jobs across a larger area as well as younger people to settle in affordable areas and commute to their job location.
- Further encouraging the capacity building of marginalised groups through close co-operation with the local community to improve access to employment opportunities could be pursued.

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## ***Chapter 8.***

### **Kobe, Japan**

*This chapter provides an overview of Kobe, followed by an assessment of the current challenges for Kobe's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by the suggestions for future action.*

## Overview of Kobe

Kobe is the sixth-largest city in Japan and the capital city of Hyogo Prefecture. Together with Osaka and Kyoto, Kobe is part of the Osaka Metropolitan Area, which has the fourth-largest population of 17 247 940 (OECD, 2010) in the 281 OECD metropolitan areas (Figure 8.1 and 8.2).

Figure 8.1. **Kobe, Japan**

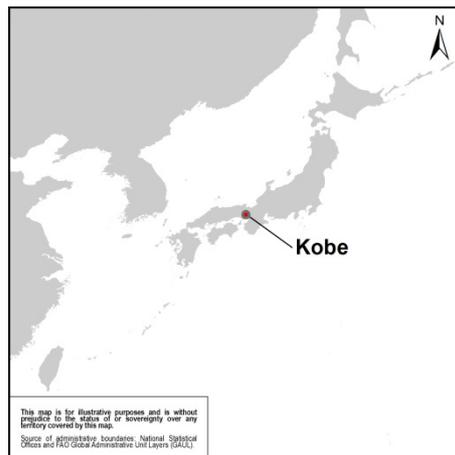
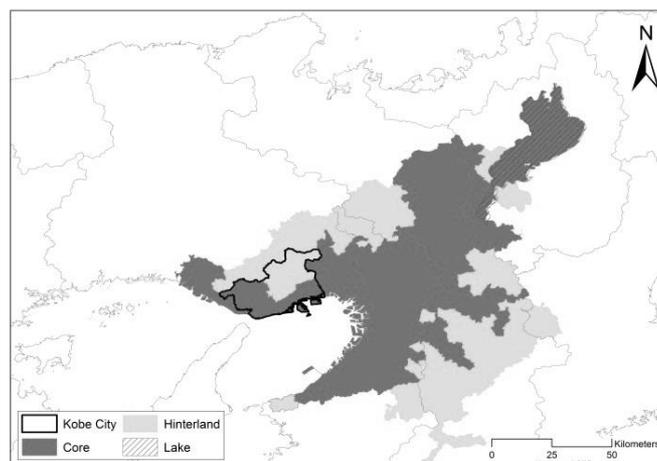


Figure 8.2. **Kobe and the Osaka Metropolitan Area**



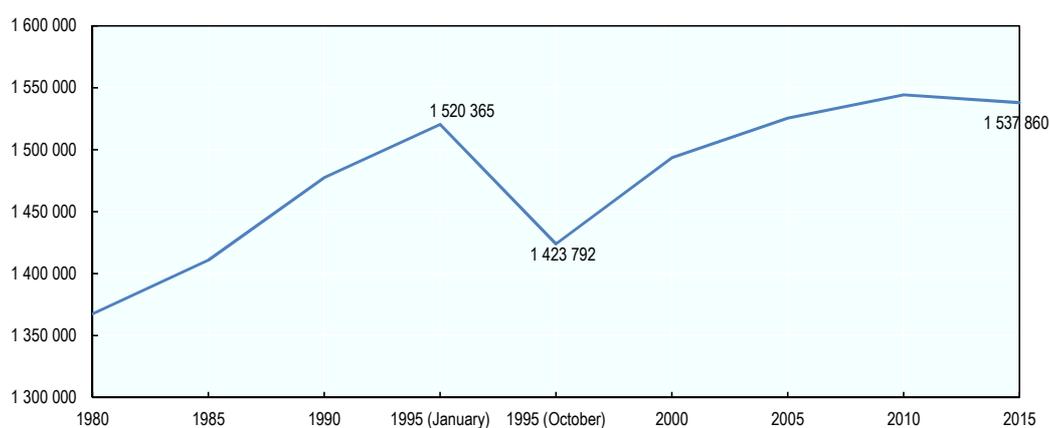
Source: Based on the OECD definition of functional urban areas. Own illustration OECD (2010), *OECD Metropolitan Database*.

With a population of 1 537 860 (October 2015) and an area of 557 square kilometres, the city of Kobe consists of 9 wards (Higashi Nada, Nada, Chuo, Hyogo, Kita, Nagata, Suma, Tarumi and Nishi). Located in the foothills of the range of Mount Rokkō, it has a limited amount of flat land, and artificial islands were built to create Port Island, Rokko Island and an island for Kobe Airport. Geographically, the city is divided into two parts: a narrow, densely populated southern band lying along the coastline (2-4 kilometres wide and about 30 kilometres long); and a sparsely inhabited, hilly area in the northwest.

Nearly 80% of the city's population is concentrated in the southern area, which accounts for only 30% of the city's total land area.

The population of Kobe has steadily increased since 1980, and has stood at around 1.5 million for the last 10 years (Figure 8.3). The population decreased after the Great Hanshin-Awaji earthquake (17 January 1995), but had made a full recovery by 2001. However, the population in the city is ageing rapidly. The proportion of the population 65 years and over is likely to increase from 23% in 2010 to 31% in 2025. At the same time, fertility rates are falling (City of Kobe, 2013). As a result, the working-age population (15-64 years old) continues to fall.

Figure 8.3. Population trend in Kobe, 1980-2015



Source: Kobe City (n.d), [www.city.kobe.lg.jp/information/data/statistics/toukei/jinkou/index.html](http://www.city.kobe.lg.jp/information/data/statistics/toukei/jinkou/index.html).

Kobe was one of the cities to open for trade with the West in 1853 following the end of the policy of Japan's seclusion, and has since been known as a cosmopolitan port city. While the 1995 Great Hanshin-Awaji earthquake reduced its prominence as a port city, it remains Japan's fourth-busiest container port (Ports and Harbours Association of Japan, 2015). Industrial development in Kobe began with industries closely linked to the city's port, such as shipping, port operations, shipbuilding and steel. These industries led to the development of related industries, such as railway rolling stock, machinery and manufacturing plants, electrical equipment, and the rubber industry. Companies headquartered in Kobe include ASICS, Kawasaki Heavy Industries and Kobe Steel, as well as over 100 international corporations with Asian or Japanese headquarters in the city, such as Procter & Gamble and Nestlé. Industries related to public health, welfare and medical care have also grown rapidly, with the development of the Kobe Biomedical Innovation Cluster (KBIC).

## Challenges for Kobe's resilience

On 17 January, 1995, Kobe and the surrounding area were struck by the Great Hanshin-Awaji earthquake, causing 4 571 deaths in the city and destroying or damaging much of the city's infrastructure (Table 8.1).

It was the first earthquake in Japan's modern history whose epicentre was in a metropolitan area. The majority of the damage fell within the city limits and significantly affected industry and commerce. The damage to physical capital stock in Kobe was

USD 114 billion, 2.3% of Japan's gross domestic product (GDP) and around 0.8% of Japan's physical capital stock at the time (Drysdale, 2011).

Table 8.1. **Earthquake victims in Kobe**

	Higashi Nada	Nada	Chuo	Hyogo	Nagata	Suma	Tarumi	Nishi	Kita	Total
Dead	1 470	934	243	556	921	399	26	9	13	4 571
Number of shelters	120	74	90	96	79	69	41	16	29	599
Evacuees										
Overnight	60 700	35 000	35 172	26 300	35 347	21 067	6 926	1 777	2 348	222 127
Daytime (peak time)	65 859	40 394	39 090	26 300	55 641	21 728	4 747	1 787	2 360	236 899

Source: City of Kobe (2015), *The Great-Awaji Earthquake Statistics and Restoration Progress*.

In addition to the direct damage, the city's residents also suffered a great degree of indirect damage. The unemployment rate rose dramatically after the quake. Kobe's gross industrial activity fell because many companies shifted their operations to facilities in other regions or decreased their production. Many container cargoes were diverted to other ports, due to the severe damage sustained by the Port of Kobe. The disruption to expressways affected not only Kobe's own economy, but the Japanese economy as a whole. Kobe is located on the main route between the western and eastern parts of Japan's main island, and the earthquake severely damaged the country's transport links. Some of the major expressways collapsed, blocking an artery that carried 40% of Osaka-Kobe road traffic.

While Kobe City had recovered from the earthquake by 2005 in terms of population, major infrastructure projects and quality of life, its economy has not fully reached pre-earthquake levels. The most significant challenges have been: 1) urban redevelopment and improving the city's resilience against natural disasters; and 2) the revitalisation of the economy.

### ***Urban redevelopment and improving resilience against natural disasters***

The earthquake destroyed large parts of the city, and an area of 819 108 square metres was burned. Railways were damaged in many places, the traffic network was interrupted due to sinking ground, cracks and collapsed buildings, and 85% of schools were damaged. Kobe had to restore areas that experienced widespread damage due to fire and collapsed buildings. Restoring the infrastructure and urban redevelopment while increasing the city's overall resilience against future natural disasters was the most pressing issue in the initial phase of the period after the earthquake.

To continue improving the city's preparedness for future natural disaster in a cost-effective manner, the city needs to work closely with residents and other stakeholders. One of the challenges for Kobe is how to develop communities that are safe, comfortable and disaster-proof while drawing on the lessons learnt from the post-earthquake restoration and reconstruction.

### ***Revitalisation of the economy and creating new Kobe's industrial base***

The total economic damage (structural damage to the buildings, utilities, traffic network and port facilities, fire damage and liquefaction) caused by the earthquake was estimated at JPY 6.9 trillion (City of Kobe, 2015), approximately equal to Kobe's annual gross product. Many large manufacturers suffered damage to their main factories, and

their production lines were interrupted. Kobe is also known for its shoe manufacturing. About 80% of non-leather shoe factories owned by small and medium-sized enterprises (SMEs) were completely or partially destroyed or burned.

Kobe had already had some success in shifting from port-related heavy industry towards tourism and service sector employment in the early 1990s. After the quake, the city was faced with the problem of how to continue that trajectory, because the effects of the earthquake and of Japan's ongoing economic slump have rapidly intensified Kobe's pre-existing systemic problems, such as the relocation of manufacturing plants to outlying areas and the decline of inner-city industry. As a result, the economic recovery has come to a temporary standstill, with only 80% of pre-disaster levels reached since 1997. It has been a challenge for Kobe to resume the reform of its industrial structure in the economic reconstruction phase after the earthquake.

## Elements for building resilience in Kobe

### *Economy*

#### *Innovation in the biomedical industry drove economic growth in Kobe*

The city of Kobe started to promote numerous policy measures, create new businesses, and strengthen and improve its industrial base. Among them was the development of business using the Port Island (completed in 1981) and Rokko Island (completed in 1983), including Kobe Airport (started operations in 2003), as well as plans to make robotics technology and the medical and pharmaceutical industry part of Kobe's economic base. The innovation capacity of these industries to generate a more active and diverse economy is considered a key driver for economic revitalisation.

The city targeted the rapidly growing medical and pharmaceutical industries, hoping that there would also be spin-off benefits for many SMEs in Kobe facing a bleak business outlook in their traditional markets (Edgington, 2011). The Kobe Medical Industry Development Project, launched in 1998, has been instrumental in developing Kobe's innovation capacity. Under the project, in co-operation with industrial and academic organisations, a new research and development complex on the Kobe Port Island was created for the advancement of medical technology, which is considered a growth industry in the 21st century. The Kobe Biomedical Innovation Cluster (KBIC) is designed to revitalise the area's economy, to promote the health and welfare of the citizens, and to make international contributions to medical science.

The KBIC established a system to enable research, development and medical treatment by integrating three fields: biology, medicine and simulation. The medical cluster integrates highly specialised hospitals on Port Island and promotes the commercialisation of medical devices, medicines and regenerative medical products. The biotechnology cluster focuses on regenerative medicine, such as iPS cells and development of pre-emptive medicine initiative, to address the ageing of society. The plan to build Kobe Eye Centre is currently under development to advance research on the application of induced pluripotent stem cells in ophthalmology. The simulation cluster features the "K computer", a supercomputer currently installed at the RIKEN Advanced Institute for Computational Science on Port Island and used for a variety of applications, including climate research, disaster prevention and medical research.

The KBIC has become one of the largest biomedical clusters in Japan, consisting of 316 corporations and organisations, including large pharmaceutical firms, SMEs and

venture companies, as of March 2016. With the progress of the cluster, the number of its employees has also increased, to about 7 100 as of December 2015. An estimate shows that this economic growth increased the city of Kobe's tax income to JPY 4.5 billion in 2012 (Kobe Biomedical Innovation Cluster, n.d).

### *Collaboration with the national government and surrounding cities to leverage economic growth*

Kobe is also taking a collaborative approach, working with the national government on preferential treatment measures to attract businesses and investment. These are granted through the Ordinance of Kobe Enterprise Zone, business entry support programmes and by the Act on the Promotion of Establishment of Enterprises. The measures include tax reductions and a variety of subsidies and loan programmes. Kobe became part of the Kansai Innovation International Strategic Zone in 2011, in collaboration with the surrounding cities of Osaka and Kyoto, and with the goal of becoming the global site for Life Innovation. The city has been actively attracting domestic and foreign healthcare industries centred on Port Island. Kobe was designated one of Japan's National Strategic Special Zones in the field of health and medicine in 2014. The city has depended on support from the central government in relaxing regulations to facilitate the environment for international business and to introduce healthcare technology, such as regenerative medicine and innovative medical devices, to other parts of Japan and overseas. For example, the KBIC's Kobe Eye Centre will benefit from the relaxation of regulations set by the National Strategic Special Zone to expand its number of beds and to advance its clinical research. This initiative is expected to accelerate the application of retinal regeneration, using iPS cells and other regenerative medicine.

## **Society**

### *Community development council as the key to successful urban redevelopment*

Kobe initiated a collaborative, co-operative urban redevelopment with citizens to restore the damaged infrastructure and communities after the earthquake. Under the Restoration Land Readjustment Project, community redevelopment councils (*machizukuri* councils) were formed. These included residents as well as land and house owners, to provide a forum where all the stakeholders could discuss and decide on issues relating to the restoration of their community. There were 44 councils in 11 areas in Kobe. Through these accumulated consultations, community development proposals reflected residents' opinions in the material submitted to the city from each area (City of Kobe, 2015). To promote stakeholder engagement and assist the community redevelopment councils, the city also established 44 on-site consultation centres that held over 700 meetings each in the 3 years after the earthquake. These consultation centres worked with the community development councils, facilitating consensual decision making on recovery matters.

To provide professional expertise and assist citizens in their deliberations, the city also assigned urban development specialists to work with the community redevelopment councils. The specialists' role to explain the government's proposals and facilitate understanding between the government and the citizens. This "consultant pool" of urban planning experts was set up in July 1995, as the Kobe Housing and Urbanisation Personnel Centre, located in the Kobe Machizukuri Centre. The citizen groups were invited to work with a consultant of their choice (Kobayashi, 2007). Citizens embarked

on a variety of recovery-related activities, mainly focusing on redefining the streetscape, redesigning neighbourhood spaces, co-operative housing projects and introducing new design and housing types. Overall, local initiatives complemented spatial plans developed by local government (Kobayashi, 2007). This has become a model for neighbourhood planning and management, and interest has increased in *machizukuri* practices in other East Asian countries, such as Korea and Chinese Taipei (Watanabe, 2007).

#### *Risk communication increases the city's preparedness for natural disaster*

The community actively worked with the city to raise awareness of natural disasters in the future. Measures include creation of a Community Tsunami Preparedness Plan (since 2002), installing tsunami refuge information signboards across the city, and distribution of a hazard map relating to various natural disasters to all households in the city.

In particular, Kobe's voluntary disaster prevention organisation plays a major role in increasing public awareness. BOKOMI, the abbreviation for its Japanese title *Bosai Hukushi* (disaster preventive welfare community), was created in every district of the city. There are now 191 BOKOMI, organising disaster prevention and reduction activities such as evacuation drills and fire drills (City of Kobe, n.d.). The city of Kobe provides subsidies to the organisation to purchase the necessary equipment.

Disaster prevention education is also emphasised in Kobe. For example, to pass on the lessons from the earthquake and learn about disasters, the Hyogo Prefectural Board of Education prepared supplementary reading materials for students for classroom use. Supplementary reading materials have been prepared for both lower and higher grades of elementary schools, junior and senior high school students.

#### *Kobe has an active volunteerism in communities*

The earthquake created a surge of volunteerism around the nation, and 1995 is now known as “the year when volunteerism began in Japan”. As of June 2015, Kobe had 759 registered non-profit organisations working on a number of issues, including support for the disabled, urban planning, elderly care and environmental protection. Many also promote disaster prevention awareness. For example, the Kobe-based non-profit organisation, Plus Arts, aims to raise disaster awareness by developing disaster education programmes that incorporate attractive designs and games to make them accessible to everyone. Based on its success in Kobe, Plus Arts has expanded its training outside Kobe and abroad.

### **Environment**

#### *Kobe's investment in infrastructure to prepare for natural disasters*

Kobe's Restoration Plan was set up in June 1995 to update the urban functions of buildings, sites and public facilities to reduce the chances of fire in the city, while utilising the land reasonably and soundly. It secured open spaces such as plazas and parks, improving public facilities such as roads, supplying good-quality urban housing, and reducing disaster risk and developing 25 parks. Parks and green areas play an important role in the plan, designed to serve as local emergency operation centres for evacuation and restoration activities in natural disasters. Parks and open spaces function as disaster prevention centres by providing fire breaks and emergency routes. Similarly, the city developed 28 “pocket parks” in 11 areas, small open spaces considered as part of

a road. Their aim is to enhance the city environment and offer safe and accessible spaces in case of emergency (City of Kobe, 2015).

#### *Kobe's innovative water reservoir and water pipes to ensure emergency water supply*

One of the lessons learnt from the earthquake was the importance of securing emergency water supply. After it struck, many complaints about inadequate drinking water were registered. Approximately 1 million houses were left without water as a result of leakage from 4 200 pipeline failures. The emergency water retention system is configured with emergency shut-off valve systems and earthquake-resistant cisterns installed in the serving reservoirs. In the event of a disaster, the emergency valves close and retain fresh water within the reservoirs. The city of Kobe has developed almost 50 reservoirs across the city, ensuring a water supply of 3 litres per every resident for 7 days (City of Kobe, n.d.). In addition to the water reservoirs, the city completed a project in 2015 to install large-capacity water pipes in the city centre, to function as an alternative source for emergency water providing every resident 3 litres of water for 12 days (City of Kobe, n.d.).

#### *A new public transport system could increase access to services and jobs*

Kobe's urban transport system is rail-intensive, partly because of its proximity to Osaka, the country's second-largest city, where an extensive rail network was developed earlier than in other major Japanese cities. The urban route bus system is operated both publicly and privately, primarily as a mode to complement the rail network and to provide feeder services for rail riders. After the construction of Port Island, the Kobe municipal government built a new transport system called Portliner, as a major transport mode linking the Port Island to the city centre in 1981, because the government concluded that buses could not provide sufficient capacity for the peak-hour traffic demand. To further enhance the public transport network, Kobe is currently assessing whether bus rapid transit (BRT) or light rail transit (LRT) could also be used as a feeder mode for urban rail.

### ***Institutions***

#### *Kobe's long-term vision and mid-term action plan*

Kobe established its Fifth Master Plan in 2010, covering the period to 2025. Its aim is to revitalise the city in harmony with nature. It envisages preserving the abundant natural environment, while striving for sustainable community development, and taking major steps towards a low-carbon society. Specific plans for the first five-year period to 2015 emphasised creativity and innovation, local economic development, population and livelihoods. The Fifth Master Plan was drafted with the participation of many residents and experts, to promote the development of Kobe based on the concept of collaborative creation. To underpin the initiatives set forth in the Master Plan, Kobe has also adopted the Kobe City Administrative and Fiscal Reform Plan 2015.

#### *Kobe's integrated approach to planning and programming with the national government*

In 2012, the city also launched the Kobe Environmental Future City Initiative under the framework of the national government. This initiative focuses on policy measures for the environment, an ageing society and other challenges. The aim is to create a human-centric city where citizens can live healthy lives with disaster-resistant

infrastructure. These initiatives are expected to provide a major platform supporting both local and national economic development. Primary elements of the future city vision include:

- Environment. Producing and efficiently consuming through renewable energy sources and smart energy savings. Targets include a 25% reduction in greenhouse gas emissions below the 1990 level by 2020, with renewable energy satisfying 10% of the city's demand and commercial and public offices using 30% renewable energy.
- Ageing populations. Promoting healthy lifestyles for older people and a safety net to support those who are ill or need long-term care.
- Disaster prevention and resilience. Networking key infrastructure systems and setting up local voluntary disaster prevention organisations to make the city more resilient in future disasters.
- Knowledge networks. Promoting innovations in green industries. This includes initiatives such as the Kobe Biomedical Innovation Cluster, which is creating the largest biomedical cluster in Japan, and further applications of the “K Computer” supercomputer.

### *Kobe is undergoing a major administrative reform*

The cost of the subsequent restoration and reconstruction plunged the city into financial crisis. Between 1995 and 2005, approximately JPY 2.7 trillion was spent on reconstruction, 48% of which came from the city bond (City of Kobe, 2013). The national government has also financially supported Kobe's reconstruction. Between 1994 and 2004, 32.8% of the total reconstruction-related cost in Kobe was covered by the central government (Japan Research Institute, 2005). The city launched the administrative and fiscal reforms, and has reduced the total fixed number of city employees by about 7 200, and the outstanding balance of city bonds by about JPY 600 billion since fiscal year 2004. Moreover, the city has checked and overhauled all administrative operations, and actively used private sector skills to install efficient, effective management. Meanwhile, Kobe has worked to secure new financial resources by such means as marketing naming rights (the rights to name sport facilities). These administrative and fiscal reforms have produced financial resources of approximately JPY 290 billion, helping to grow out of the financial crisis. The funds generated as a result of administrative and fiscal reforms have been used not only to maintain resident services, but also to improve other services. For example, Kobe has increased the capacity of children's day nurseries and special nursing homes for the elderly, and has made elementary and junior high school buildings earthquake-resilient.

## **Conclusions**

- Based on the lessons learnt from the Great Hanshin-Awaji earthquake in 1995, Kobe has successfully developed a long-term restoration and disaster management strategy such as the Restoration Plan in Kobe and Fifth Master Plan, under which a number of preventive measures and risk communication activities are installed, supporting the city with better redundancy. Kobe has become the leading model in disaster risk management.
- Kobe's innovation policies such as the Kobe Medical Industry Development Project have set a very good target to lead the development of biomedical and pharmaceutical

industries. These industries have become a major economic lever to improve the city's adaptive capacity.

- While the Kansai Innovation Comprehensive Global Strategic Special Zone provides a good backdrop for Kobe to develop an integrated innovation policy with the surrounding cities of Osaka and Kyoto, further efforts could be made to take full advantage of the expertise of universities, research institutions and the private sector in the Kansai region.
- After over 20 years since the earthquake, the city is encouraged to continue its effort for disaster risk reduction, in particular, raising people's awareness and developing urban infrastructure to mitigate damages. Kobe is expected to share its recovery experiences with other international communities.

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## ***Chapter 9.***

### **Kyoto, Japan**

*This chapter provides an overview of Kyoto, followed by an assessment of the current challenges for Kyoto's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

## Overview of Kyoto

Kyoto Prefecture is located in the Osaka Metropolitan Area (Figure 9.1 and 9.2), whose population in 2010 was 17 247 940 (OECD, 2010), the fourth largest of the 281 OECD metropolitan areas. Kyoto Prefecture is one of 47 Japanese prefectures, with 26 municipalities (Figure 9.3). Kyoto Prefecture contributes approximately 2% and the Kansai Metropolitan Area 10% to the national economy, in terms of the number of offices, employment and gross domestic product (GDP).

Figure 9.1. **Kyoto, Japan**



Figure 9.2. **Osaka Metropolitan Area**

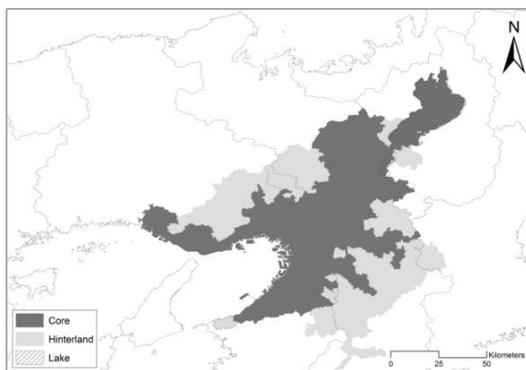


Figure 9.3. **Kyoto Prefecture: Districts and cities**



Source: OECD (2012), *Redefining “Urban”: A New Way to Measure Metropolitan Areas*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264174108-en>.

Kyoto's regional economy is often discussed using districts of regional offices and Kyoto City as a unit of assessment. They are, from north to south, Tango, Chutan, Nantan, Kyoto City (the prefecture capital) and Yamashiro, with a total of 26 local administrative units (Figure 9.3).

From the 1970s to 2010,<sup>1</sup> population trends in Kyoto varied by district (Table 9.1). The population increased in the prefecture's southern district, Yamashiro, and remained essentially constant in Kyoto City, while population in the northern districts declined, sometimes significantly, as in Tango.

Table 9.1. Population trend in Kyoto, by district, and Japan, 1970-2010

District	1970	1980	1990	2000	2010	% change 2000-10	% change 1980-2011
Tango	140 186	133 929	125 492	117 559	104 850	-10.8%	-21.7%
Chutan	198 052	203 918	203 434	201 029	204 157	1.6%	0.1%
Nantan	106 530	127 302	140 672	150 101	143 345	-4.5%	12.6%
Kyoto City	1 427 376	1 480 377	1 468 190	1 474 471	1 474 015	0.0%	-0.4%
Yamashiro	388 180	596 441	676 679	704 478	721 659	2.4%	21.0%
Japan	104 665 000	117 060 000	123 611 000	126 962 000	128 060 000	0.0%	9.3%

Source: Statistics Bureau, Ministry of Internal Affairs and Communication (2010), "Statistical tables of the 2010 Population Census", [www.stat.go.jp/english/data/kokusei/2010/final\\_en/final\\_en.htm](http://www.stat.go.jp/english/data/kokusei/2010/final_en/final_en.htm) (accessed February 2016).

Annual GDP growth is generally positive for the prefecture as a whole (Table 9.2). The exceptions were periods of negative growth in 2005, 2008 and 2009, with sharp declines in the northern districts, especially in Chutan and Nantan. This also masks year-to-year volatility at the district level. Tango's GDP growth has generally been negative, although this was reversed in 2009 and 2010 before declining again.

Table 9.2. Average GDP growth rate in Kyoto Prefecture, by district, and Japan, 2002-11

District	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Kyoto average	0.8%	0.9%	2.0%	-0.2%	0.4%	2.7%	-3.7%	-3.0%	1.1%	1.2%
Tango	-3.0%	-2.7%	1.1%	-6.2%	-0.5%	-2.5%	-4.8%	0.6%	0.5%	-0.4%
Chutan	1.4%	1.5%	6.2%	1.4%	-4.4%	1.7%	-5.8%	-3.4%	2.9%	-3.9%
Nantan	3.4%	-1.1%	0.9%	1.3%	-0.5%	-4.5%	-1.5%	-7.7%	5.4%	3.2%
Kyoto City	0.8%	1.3%	1.0%	-1.6%	0.1%	5.4%	-4.5%	-2.7%	1.4%	2.5%
Yamashiro	1.9%	-2.4%	1.4%	-0.2%	1.9%	-1.7%	-2.7%	-1.2%	-1.9%	1.3%
Japan	-0.7%	0.8%	0.2%	0.5%	0.7%	0.8%	-4.6%	-3.2%	1.3%	-1.4%

Note: Data for 2011 are the most recent available.

Source: Kyoto Prefecture (2015b), "Results of the prefectural economic calculation estimations for the fiscal year 2012" [in Japanese], [www.pref.kyoto.jp/tokei/yearly/fumin/fumintop.html](http://www.pref.kyoto.jp/tokei/yearly/fumin/fumintop.html) (accessed February 2016).

## Challenges for Kyoto's resilience

Kyoto Prefecture has faced chronic and persistent economic pressures. Its intrinsic challenges include low economic growth, energy shortages, high unemployment and financial depression. The 2008 global financial crisis exacerbated existing economic and socio-economic pressures on the city by depressing export levels (due to the appreciation

of the Japanese yen), increasing unemployment and lowering the consumer price index, as well as the consumption of consumer durables and automobiles (Kyoto Prefecture, 2011a).

Kyoto Prefecture's interest in resilience is based on the chronic challenges of: 1) population decline, primarily because of migration to the prefecture's southern districts or other areas of Japan; and 2) the small and medium-sized enterprises (SME) sector, whose numbers are declining, and whose performance is sluggish at best. These two issues mutually reinforce one another, as population shifts in the north impact economic growth and service capacity, encouraging more people to move. Meanwhile, low economic performance, particularly in SMEs, has reduced job opportunities in the region, leading to more migration. Meanwhile, public authorities have faced budget constraints and households face financial uncertainty when employment and income levels are significantly affected.

### ***Economic and demographic strain in the north***

Migration towards a dynamic urban centre is common in many OECD regions. Kyoto Prefecture has been experiencing a similar demographic phenomenon. This is the main cause of the population decline in northern Kyoto, as it is in Tango. As the population declines, so does an area's appeal for businesses and residents, eventually impacting commerce, municipal fiscal capacity and residents' quality of life. This can result either in a reduction of public services – with either fewer hours available, or fewer locations – or at worst, it can mean an elimination of service.

As for population flows for the younger generation (and with the exception of Kyoto City), four regions are consistently losing residents in the 15-19 year-old age range. In the age groups of 20-24 and 25-29, or what might be considered first job seekers, Nantan and Chutan have been gaining population, while Kyoto City and Tango have been losing population. This suggests that Nantan and Chutan have benefited from new job opportunities, while the other two regions have not. The population trend in Yamashiro has shifted; before 2000 its younger population was growing; it has not been since then. Population decline increased the number of unoccupied housing. Housing vacancy rates in Kyoto Prefecture have been on the rise since the late 1990s, increasing by almost 30% between 1998 and 2013 (Kyoto Prefecture, 2015c). This can affect a community's sense of safety and its property values, and can negatively impact an urban area, especially if the trend is not managed or reversed over time.

The increase in the population 65 years and older is also critical, along with the population decline. This tranche grew steadily after 2000, and in 2010, accounted for 23% of the total population in the prefecture, in line with the rest of Japan. Figures ranged from 21.3% in Yamashiro to 31.7% in Tango. This can put additional fiscal pressure on municipal capacity, change the labour force profile and strain public services. Not only is there greater demand for social services, but specialised providers are needed to work with the older population. Infrastructure is also a concern, as ageing residents with reduced mobility require accommodations in housing stock, transport services and vehicles, public buildings and sidewalks (OECD, 2015a). Demand for services shifts from schools to specialised healthcare facilities, home visits, community centres, etc. Inclusion is another challenge for ageing societies, particularly with respect to poverty rates and social isolation, which are often higher among the elderly (OECD, 2015a).

### *Sluggish SME activity despite apparent innovative capacity*

Kyoto Prefecture has identified its declining SME sector as a second challenge to its resilience. In the manufacturing sector, the number of SMEs has declined by more than two-thirds since 1975 (Table 9.3). Since SMEs<sup>2</sup> represent over 90% of the prefecture’s business sector, this concern is understandable. SMEs in Kyoto specialise in techniques including optical and imaging technology, instrument and measurement technology, liquid crystal and plasma technology, semiconductor technology, electronic technology, material technology, information system technology, communications technology, environmental technology, medical technology and biotechnology (RIETI, 2007, Table 17). Banking and financial services also assist high-tech enterprises.

Table 9.3. **Company size in the manufacturing industry in Kyoto Prefecture, 1975-2010**

	1975	1980	1985	1990	1995	2000	2005	2010
Enterprises (total)	33 623	31 760	30 213	26 885	22 581	18 153	14 055	11 548
SMEs*	32 534	30 750	29 220	25 825	21 571	17 208	13 209	10 723
Others	1 089	1 010	993	1 060	1 010	945	846	825

Note: SMEs are defined as companies with 29 or fewer employees; “others” are those with 30 employees or more.

Source: Kyoto Prefecture (2011b), “Economic Census in Kyoto Prefecture” [in Japanese], [www.pref.kyoto.jp/tokei/yearly/tokeisyo/tsname/tsg0510.html](http://www.pref.kyoto.jp/tokei/yearly/tokeisyo/tsname/tsg0510.html) (accessed February 2016).

Depopulation and ageing are considered to be behind this decline. A survey commissioned by the Small and Medium Enterprise Agency of the Ministry of Economy, Trade and Industry shows that more than a quarter of SMEs identify depopulation and ageing as the most difficult challenges, because they entail a drop in the number of consumers and the potential market (Small and Medium Enterprise Agency of the METI, 2014). According to a survey conducted by the Kyoto Prefectural Technology Center for Small and Medium Enterprises, 58.1% of manufacturing SMEs in Kyoto Prefecture identify the lack of workers under 40 years of age as a problem, while the corresponding figure in Tokyo Prefecture is 41.5% (Kyoto Prefecture Technology Center for Small and Medium Enterprises, 2015).

In 2012, the percentage of small firms with between 4 and 29 workers was highest in Tango (89%) and Kyoto City (88%), and lowest in Chutan (73%) (Table 9.4). Given that a high number of Kyoto’s businesses are SMEs, the innovation capacity of SMEs may need to be evaluated to understand the level of creative destruction in the business sector.

Table 9.4. **Percentage of offices and workers by company size in Kyoto’s manufacturing industry, 2012**

Company size	Tango		Chutan		Nantan		Kyoto City		Yamashiro	
	Offices	Workers	Offices	Workers	Offices	Workers	Offices	Workers	Offices	Workers
4-29	89%	48%	73%	21%	80%	30%	88%	35%	80%	27%
30-299	10%	39%	25%	63%	19%	49%	11%	35%	19%	49%
300+	1%	13%	2%	16%	1%	21%	1%	31%	1%	24%

Source: Kyoto Prefecture (2012), “Economic Census in Kyoto Prefecture 2012” [in Japanese], [www.pref.kyoto.jp/tokei/cycle/keicen/keicen24/kogyo/kogyotop.html](http://www.pref.kyoto.jp/tokei/cycle/keicen/keicen24/kogyo/kogyotop.html) (accessed February 2016).

Kyoto Prefecture officials stress that the city is a university town and the “home of research and development”. Kyoto has the largest percentage of students, with every 1 in 15.7 residents, of any city in Japan (Kyoto Prefecture, 2014). The city has also produced 11 of Japan’s 19 Nobel Prize winners. *Tomorrow’s Kyoto*, a long-term development strategy that runs until 2040, aims to promote industrial innovation, developing new industries, and incorporating the legacy of traditional crafts in new industries. The level of innovation has to be assessed to understand Kyoto’s economic resilience. One possible approach is to measure patent activity. Patent applications generated in Kyoto Prefecture accounted for an average of 2.6% of Japan’s total patent applications between 2006 and 2014, the fifth highest of all the 47 prefectures, after Tokyo, Osaka, Aichi and Kanagawa. This figure increased slightly in the same period, although the number of applications declined in Kyoto Prefecture as well as nationwide (Japan Patent Office, 2015).

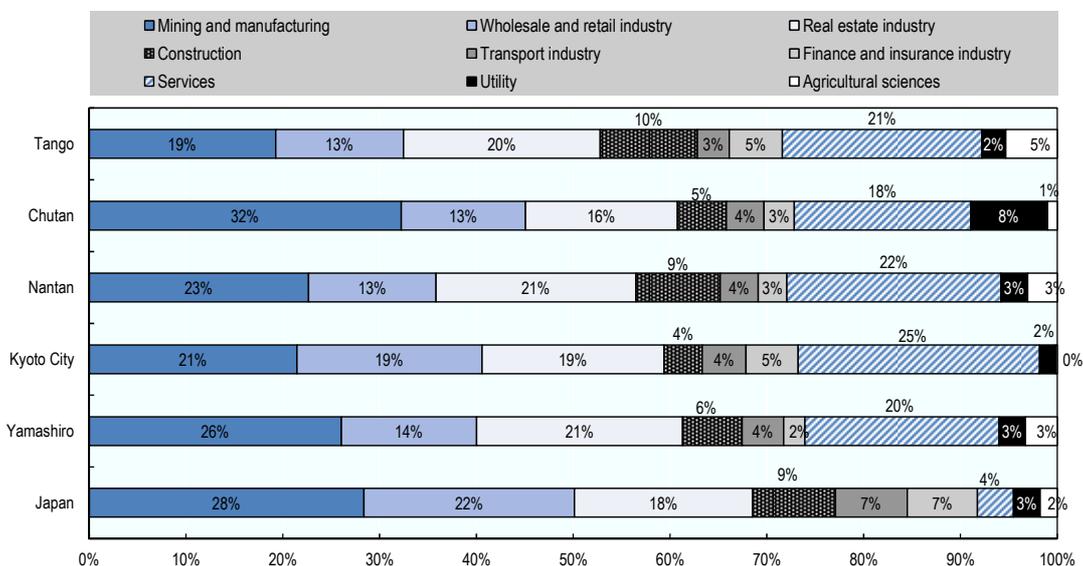
## Elements for building resilience in Kyoto

### *Economy*

#### *Kyoto has a diverse industrial base*

Kyoto Prefecture and its districts are fortunate in that their economies are not based on a mono-industrial structure (Figure 9.4). Two points, however, bear consideration: 1) activity in high value-added sectors, such as finance, could potentially be stronger; 2) heavy dependence on real estate, higher than the national average of approximately 14% in 2011, could leave the city vulnerable to a real estate decline consequent to depopulation and low growth.

Figure 9.4. GDP share by sector, by district, and Japan, 2011



Source: Kyoto Prefecture (2015b), “Results of the prefectural economic calculation estimations for the fiscal year 2012” [in Japanese], [www.pref.kyoto.jp/tokei/yearly/fumin/fumintop.html](http://www.pref.kyoto.jp/tokei/yearly/fumin/fumintop.html) (accessed February 2016).

The type of industrial activity, industries’ competitiveness and their links to global value chains are all material. In Kyoto Prefecture’s northern regions, the productive mix could prove to be a problem, given the population decline, lack of younger workers to

succeed their traditional industries and global competition. This is highlighted by the experience of *tango chirimen* silk producers (Box 9.1) at a time of changing consumer habits (e.g. declining kimono use). This requires flexibility in the short run, for example by changing the industry’s competitive basis (e.g. price vs. quality), and adapting in the medium to long run. New markets or uses for the product could be found, or by existing production techniques applied to the manufacture of items for which there is demand, either directly from consumers or by other businesses. This may be especially important for traditional industries strongly associated with Japan’s cultural heritage.

### Box 9.1. Rebuilding the *tango chirimen* market

Kyoto Prefecture promotes the development of traditional industries as cultural assets. The Kyoto Prefecture Takumi Kai (Association of Craftsmanship in Kyoto Prefecture) was established in 1971 to cultivate skilled crafts with the membership of those designated as “Kyoto Craftsman” by Kyoto’s governor. Currently, it includes 225 craftsmen in more than 13 traditional industry groups (Kyoto Prefecture, n.d.)

*Tango chirimen* has one craftsman in the association. Tango district was a recognised leader in the manufacture of *tango chirimen*, a high-quality crepe silk traditionally used for kimonos. Since the mid-1970s, output has dropped dramatically, from approximately 77.8 million metres of cloth in 1975 to approximately 5.5 million in 2010.<sup>1</sup> This is attributed to several factors, including the decline in the demand for kimonos, as well as strong competition from Brazil and the People’s Republic of China’s silk industries. Tango’s silk producers are responding to this challenge by shifting from price-based competition to quality-based competition. Whether or not this will be successful has yet to be seen.

Note: 1. Most recent year available.

Sources: Interview with Kyoto local team, July 2015; Kyoto Prefecture HP (n.d.), “Kyoto Takumi Board Member List” [in Japanese], [www.pref.kyoto.jp/senshoku/takumikai-kaiinnlist.html#sonotanokogehin](http://www.pref.kyoto.jp/senshoku/takumikai-kaiinnlist.html#sonotanokogehin) (accessed 13 September 2015).

### *Economic dynamism is mixed*

Economic dynamism, measured based on GDP, employment/unemployment and household disposable income, is mixed in Kyoto Prefecture. As illustrated in Table 9.5, growth has been low and often volatile since 2002, but it is not entirely negative. In 2010, Kyoto Prefecture’s unemployment rate averaged 6.3%. Despite some north (Tango and Chutan)/south (Nantan, Kyoto and Yamashiro) disparities, a larger concern is the steady rise in unemployment levels since 1995 (Table 9.5). These are starting to level off in Kyoto, but whether this is an anomaly or the start of a longer term trend is unclear.

Table 9.5. Unemployment rates by districts, and Japan, 1990-2010

By district	1990	1995	2000	2005	2010
Tango	1.9%	2.2%	2.5%	3.8%	4.7%
Chutan	2.6%	3.2%	3.5%	4.7%	5.1%
Nantan	2.6%	3.7%	4.8%	4.7%	5.5%
Kyoto	3.0%	4.7%	5.1%	6.3%	6.4%
Yamashiro	2.6%	3.9%	4.8%	6.0%	7.0%
Japan	2.1%	3.2%	4.7%	4.4%	5.1%

Source: Statistics Bureau, Ministry of Internal Affairs and Communication (2015), “Labour Force Survey by prefecture” (in Japanese), [www.stat.go.jp/data/roudou/pref](http://www.stat.go.jp/data/roudou/pref) (accessed February 2016).

The national government's Comprehensive Strategy for Overcoming Population Decline and Revitalising Local Economies (December 2014, Cabinet Decision) shares the same concerns (Box 9.2). It suggests that depopulation decreases the vitality of the local economy, which might speed up population decline in regions other than in the Tokyo area. Northern Kyoto is a typical instance of a region with an urgent need to maintain its population and to revitalise the local economy.

### Box 9.2. The national approach for Overcoming Population Decline and Revitalising Local Economies

The headquarters for Overcoming Population Decline and Revitalising Local Economies was established in September 2014, led by the Prime Minister and relevant ministers, to address the challenges of rapid population decline and an ageing society.

In November 2014, Japan issued a law requiring all 47 prefectures, as well as the more than 1 700 municipalities, to develop strategies to stave off population decline and boost local economic growth. The objective of the law is threefold: 1) to respond to the country's rapid depopulation and ageing, and reverse the depopulation trend; 2) to take measures to mitigate population migration and concentration in the Tokyo region; 3) to support regional development that: a) promotes a sense of community and quality of life, b) strengthens human capital and its ability to contribute to the community, and c) develops diverse and attractive employment opportunities. This law went into effect in March 2015, at the start of the new fiscal year, and will be reviewed after five years.

The basic concept of the law was stipulated in the Comprehensive Strategy for Overcoming Population Decline and Revitalising Local Economies, which was decided by the Cabinet in December 2014. This will serve as the background for the strategies at the prefecture and municipal level.

*Source:* Cabinet Secretariat (2014), "Overview of the city, population and job creation" (in Japanese) available at: [www.kantei.go.jp/jp/headline/chihou\\_sousei/pdf/siryou1.pdf](http://www.kantei.go.jp/jp/headline/chihou_sousei/pdf/siryou1.pdf)

### *Approaches for enhancing innovation*

Kyoto has implemented various policies to encourage innovation, most recently as part of the national strategy zoning system. The national government designated Kyoto Prefecture as the "Kansai National Strategic Special Zone" on 1 March 2014, together with Osaka and Hyogo Prefecture. This is based on the law on the national strategic special zone, which will offer deregulation. On 22 December 2011, Kyoto was also designated as the Comprehensive Special Zone for innovation, to create a market in the medical industry. The designation recognises Kyoto's capacity for innovation at the national level and its potential to lead the Japanese economy (Kyoto Prefecture, n.d.).

The Kyoto Alliance (see the next section) provided one solution to this issue by setting up the NPO Global Human Resources Development Centre. This centre has endeavoured to cultivate human resources to vitalise local economy from the global perspective, introducing a job-matching system (Box 9.3). This collaborative system is expected to generate innovation.

### Box 9.3. Main players in the Kyoto Alliance

The Kyoto Alliance includes the Community and University Alliance for the Regeneration of the Northern Kyoto Area (CUANKA) and the non-profit Glocal<sup>1</sup> Human Resources Development Centre, which play key roles in expanding the activities and network of the Alliance.

#### **The Community and University Alliance for the Regeneration of the Northern Kyoto Area**

In 2012, the CUANKA was established at the request of northern local authorities, to encourage collaboration among industry, academia, citizens and government. The result has been a series of initiatives designed by students and implemented at the community level. They include promoting tourism, pairing community and student teams to identify and address community needs, such as maintaining traditional techniques for cloth dying and promoting a guest house. It also pairs academia with communities to identify solutions to local issues, including the development of a strategic policy formulation for Kyotango City, and identifying ways to encourage youth to remain in the area.

#### **Glocal Human Resources Development Centre**

In 2013, the Glocal Human Resources Development Centre was set up at the request of local business organisations, to develop “glocal human resources”, or, in other words, personnel capable of helping to revive the local economy from both the global and the local perspective. It has developed project-based learning programmes in collaboration with local enterprises, and provided undergraduate students with opportunities for practical involvement in business in Kyoto. The educational programmes encourage students to explore the advantages of SMEs with long histories. The centre earned a licence for Charged Employment Placement Services from the Ministry of Health, Labour and Welfare in December 2015, and is starting the services both for students and for local enterprises, to match companies and university graduates applying for employment, especially in Kyoto.

*Note:* 1. Glocal: Reflecting or characterised by both local and global considerations, [www.oxforddictionaries.com/definition/english/glocal](http://www.oxforddictionaries.com/definition/english/glocal).

*Sources:* Interviews with Kyoto local team, July and December 2015; Kyoto (2015), Responses to OECD Questionnaire, <http://www.pref.kyoto.jp/en/index.html>, (accessed June 2016).

## ***Society***

### *The Kyoto Alliance takes the initiative to strengthen social ties*

Kyoto Prefecture is aware of the need to strengthen society and social ties, and is seeking to build a sense of community and belonging. Local community members, including not only local government but businesses, non-profit organisations and universities, are encouraged to become more conscious of themselves as stakeholders and to establish frameworks for collaboration. Special attention has been paid to mobilising young people, since local authorities have had problems finding personnel. Specifically, universities, as repositories of intellectual and human resources, are considered to be in an advantageous position to boost the economies of local cities. The amendment of the School Education Act in 2007, which outlined the universities’ mission to contribute to social development, designated university students as an important nexus for social networks (Ministry of Education, Culture, Sports, Technology and Science, 2007).

The Kyoto Alliance is a collaborative platform that was established in 2012, including government, industry, academia and civil society. The core members of the alliance are nine universities (Ryukoku University, Kyoto University, Kyoto Prefectural University, Kyoto Sangyo University, Kyoto Tachibana University, Kyoto Bunkyo University, Fukuchiyama University, Doshisha University and Bukkyo University), two local governments (Kyoto Prefecture and Kyoto City) and seven organisations (Kyoto Centre for Community Collaboration, Kyoto Chamber of Commerce and Industry, Kyoto Employers' Association, Kyoto Association of Corporate Executives, Kyoto Industrial Association, Kyoto NPO Centre, and the Consortium of Universities in Kyoto), as well as the Consortium for Local Public Human Resources Development (COLPU), which was created in 2009 to certify public human resources qualifications. Also invited to participate, in addition to these core members, are the Community and University Alliance for the regeneration of Northern Kyoto Area (CUANKA) and the non-profit Global Human Resources Development Centre, which provides educational programmes for the qualifications certified by COLPU (Box 9.3). The Kyoto Alliance aims to achieve the modernisation of university education and the development of local public human resources. The Kyoto local team explained that the local authorities requested academic representatives to work with northern district communities and support local authorities in their plans to jump-start their economies. Local authorities believe that their personnel are not yet equipped to develop and implement adequate solutions. The universities in the Kyoto Alliance have developed and provided the educational programmes corresponding to Levels 5-7 of EQF (European Qualifications Framework),<sup>3</sup> and local communities have provided students with the opportunity to work with local problems. The educational programmes will offer students the knowledge, skills, attitudes and competences for problem solving and collaborating between different sectors.

Another dimension of community and identity is community engagement and civic participation. This can be expressed through volunteerism by helping neighbours or strangers.

- Citizens' participation rate in community associations<sup>4</sup> is one way of measuring participation. In general, participation rates in community associations are lower in areas with a younger population and single households, as well as in newly developed areas (Ministry of Internal Affairs and Communication, 2014). Cities in northern Kyoto, such as Miyazu and Ayabe, have stronger community ties than in cities in the Yamashiro region.
- In Kyoto Prefecture, average voter turnout in the 2010-13 voting cycle varied significantly by district. Voter turnout levels are higher in Yamashiro (59.2%) than in Kyoto City (36.8%), which, while it has the highest unemployment rate, also has the highest concentration of jobs, productivity, opportunities and amenities. In the relevant election prior to 2011, the national average rate for voter turnout in Japan was 67%. This is significantly higher than in four of five Kyoto districts in the 2010-13 voting cycle.

### *Connecting opportunities in the south through infrastructure*

Opportunities for jobs and education appear to be concentrated in the south. More schools and universities are located there, where jobs are more likely to be found and where the cultural, social, recreational and other amenities associated with an urban environment are more accessible. In 2012, Kyoto City accounted for almost two-thirds of total offices and employment in Kyoto Prefecture (Kyoto Prefecture, 2011a). It has more than 80% of the offices and jobs in the area covering Yamashiro region and Kyoto City. It

has also received national support to develop the national research park of Kansai Science City (“Keihanna”), set up in the Yamashiro region since 1987 (Kansai Science City, n.d.). Kyoto Prefecture has expended considerable effort on building connectivity between districts and municipalities. Kyoto Prefecture helped achieve this by improving north/south road and rail connectivity (with the Kyoto Juukan Highway and the Kitakinki Tango Railway in Miyazu), and by building the adaptive capacity and resourcefulness of its workforce.

## ***Environment***

### *Adequate natural resources are available*

Energy demand and supply has a major influence on urban resilience, in sustaining urban activities and managing environmental impacts. Energy consumption in Kyoto Prefecture has fluctuated since the mid-1990s, after a considerable period of continuous growth, and stood at 152 485 TJ in 2011 (Agency for Natural Resources and Energy, n.d.). Between 1990 and 2011, it decreased by 26% in the industrial sector, but rose by 39% in the residential and commercial sector (Agency for Natural Resources and Energy, n.d.). This was due in part to the expansion of floor area in the commercial and business sectors and an increase in the number of households. Kyoto City, which houses approximately 60% of the population in the prefecture, has had a major impact on resilience, by reducing environmental impact and ensuring a stable energy supply. Electricity consumption rose by 22% in the period from 1990 to 2011 (Agency for Natural Resources and Energy, n.d.). Most of the electricity in the prefecture is provided by the Kansai Electric Power Co. Inc. (KEPCO), and thermal power replaced nuclear power as a source of electricity after the Great East Japan earthquake. KEPCO runs the power plants in the prefecture, including the Maizuru thermal power plant in the northern districts, and hydroelectric power plants. The prefecture has some renewable energy facilities, including solar, wind, waste, biogas and small hydropower plants, and the Eco Energy Centre of Kyotango City in the northern district. Tailoring energy demand and supply to the needs of individual districts has an important role to play in enhancing urban resilience.

## ***Institutions***

### *Kyoto Prefecture’s strategic, integrated approach to planning*

In 2011, Kyoto Prefecture launched *Tomorrow’s Kyoto*, a long-term development strategy that runs until 2040. It is a prefecture-based vision, implemented in conjunction with municipalities. While municipal involvement in the implementation of the plan is voluntary, the prefecture encourages it through subsidies for projects of specific local interest and direct investment by the prefecture government. Ensuring balanced regional development is a key objective, and 15 cross-sectoral but regionally separate initiatives support this. The strategy includes a medium-term plan until 2020, as well as annual action plans and annual evaluation reports for immediate, short-term guidance and evaluation. *Tomorrow’s Kyoto* emphasises the need for Kyoto to develop as a place that: 1) respects human relationships and where individuals support each other to achieve social objectives; 2) is inclusive, with a variety of organisations that contribute to individual and community well-being; 3) that maintains and develops its environment and cultural heritage; 4) ensures that value is created and exchanged by different communities, businesses and generations; 5) has flourishing individual regions (Kyoto Prefecture, 2015a). *Tomorrow’s Kyoto* does not explicitly mention building resilience in

its five objectives. However, these goals can support the four drivers of resilience by helping strengthen a variety of characteristics that encourage resilience. The challenge is to ensure that each objective also strengthens the relevant qualities for resilience (Table 9.6).

Table 9.6. **Linking *Tomorrow's Kyoto* objectives to building blocks of resilience**

Strategic objective	Resilience driver(s) that is supported	Associated resilience sub-drivers	Associated resilience qualities
1. Respect human relationships and build a Kyoto where individuals support each other to achieve society's objectives	– Society	– Active community	– Inclusive – Adaptive – Robust – Integrated
2. Build an inclusive society where a variety of organisations contribute to individual and community well-being	– Society – Institutions	– Inclusive society – Open and transparent government	– Integrated – Inclusive – Flexible – Resourceful – Adaptive
3. Maintain and develop the environment and cultural heritage	– Environment – Society	– Sustainable urban development – Adequate infrastructure for basic needs – Active community	– Resourceful – Robust – Redundant – Adaptive – Inclusive – Integrated
4. Ensure value is created and exchanged by different communities, businesses and generations	– Economy – Society	– Innovative – Active community – Inclusive society	– Adaptive – Resourceful – Flexible – Robust – Inclusive – Integrated
5. Ensure that individual regions flourish	– Economy – Society – Environment – Institutions	– Diverse economy – Innovation takes place – Access to opportunities – Cohesive – Sustainable urban development – Adequate infrastructure for basic needs – Long-term vision – Collaboration with other governments – Proper resources	– Adaptive – Resourceful – Flexible – Robust – Inclusive – Integrated – Redundant

### *Kyoto's universities connect local resources with the public sector*

Some concern has been expressed over human resource capacity in Kyoto municipalities, in terms of numbers, capability and skills. Employment in the public sector has dropped, in some cases significantly, by about 12.7% in Tango, for example (Table 9.7).

Japan's Comprehensive Decentralisation Law, which took effect in April 2000, resulted in transferring some responsibilities of the central government to the prefecture and local authorities. Local administration and management capacity may not be ideally suited to the requirements of these new functions. The Kyoto local team also suggested that without a consistent tradition of consultation and participation in designing policy, this is an area where capacity should be built. It is not surprising that this is difficult for older public employees, but the indications are that such issues also extend to younger people entering the public sector. Subnational governments may not have human

resources with the necessary flexibility, integration and inclusiveness required of a resilient urban government.

Table 9.7. **Public employment in the municipalities of Kyoto Prefecture, 2005-14**

General administration only			
District	2005	2014	% change 2005-14
Tango	817	713	-12.7%
Chutan	1 167	1 246	6.8%
Nantan	1 320	1 086	-17.7%
Kyoto City	8 247	7 467	-9.5%
Yamashiro	4 003	3 746	-6.4%

Source: Ministry of Internal Affairs and Communication (2015), “Local government capacity management relationship” [in Japanese], [www.soumu.go.jp/main\\_sosiki/jichi\\_gyousei/c-gyousei/teim/index.html](http://www.soumu.go.jp/main_sosiki/jichi_gyousei/c-gyousei/teim/index.html) (accessed February 2016).

To respond to such challenges, the Kyoto Alliance has mounted a new collaboration between local governments, universities, local businesses and technologies. The Ministry of Education, Culture, Sports, Technology and Science created the Center of Community (COC) programmes in 2013, and introduced “COC plus” programmes in 2015. The programmes<sup>5</sup> aim to develop human capital to lead local economies and create industries in collaboration with local universities, municipal governments, companies and non-profit organisations. Local universities play an important part. The Kyoto Institute of Technology, Kyoto Prefectural University, Kyoto Gakuen University and the National Institute of Technology and Maizuru College were selected as part of the “COC plus” programmes. Meanwhile, the Kyoto Institute of Technology and the National Institute of Technology and Maizuru College were selected as COC programmes to develop the Centre of Industry and Culture in Kyoto, in collaboration with Kyoto Prefecture, Kyoto City and five other cities in the northern Kyoto. Activities developed so far include producing new fibre-reinforced plastics, developing ICT for teleradiology and developing an education programme in cutting-edge technologies. The Kyoto Institute of Technology received the Special Award for promoting policies in *Tomorrow’s Kyoto* from the governor of the Kyoto Prefecture.

#### *Kyoto’s collaboration with other levels of government*

The Northern Kyoto Regional Alliance is a cross-district approach to collaboration among municipalities. In April 2015, the five cities and two villages<sup>6</sup> in Tango and Chutan signed the Northern Kyoto Regional Alliance, to fulfil its obligations under the 2014 Law on Overcoming Population Decline and Revitalising Local Economies. It also enabled them to join the cities piloting the Compact and Networked Cities Policy introduced in 2014 by the Ministry of Land, Infrastructure, Transport and Tourism (Box 9.4). The agreement commits Alliance participants to work together to maintain population levels and promote economic development. The Northern Kyoto Regional Alliance intends to build a scale of approximately 300 000 inhabitants in the region. This will help to ensure quality service delivery and capitalise on the region’s natural endowments (e.g. rivers, mountains and ocean access) as well as its cultural heritage, promoting the region’s quality of life, and attracting, or at least maintaining, the population. The Northern Kyoto Regional Alliance focuses on five areas of collaboration in different aspects of the region’s economic and social life. These include promoting the metal-pressing and silk industries, particularly in the northwest; building better

connective infrastructure, specifically a highway and transport network, to encourage tourism; ensuring a high-quality medical service centre for the region; attracting employment to an industrial complex; collaborating with universities to identify other projects and provide internships for students in the region. In terms of service delivery, it is working on a plan to concentrate services in specific municipalities, for example at the regional medical service centre mentioned above. This initiative shares the same concerns and objectives as *Tomorrow's Kyoto*.

#### Box 9.4. “Compact and networked”, a national spatial planning policy

In August 2014, Japan’s Ministry of Land, Infrastructure, Transport and Tourism published a long-term National Spatial Strategy (National Plan), endorsed at the Cabinet level. This strategy is based on three principles highlighted in Japan’s Grand Design for National Spatial Development to 2050: diversity, connectivity and resilience to natural disasters.

As part of the National Plan, and as a complement to the Cabinet Secretariat’s 2014 Comprehensive Strategy, the Ministry of Land, Infrastructure, Transport and Tourism has developed a “compact and networked” policy. “Compact” entails concentrating urban functions in city centres or residential areas to prevent further spatial expansion. “Networked” refers to improved connectivity that maximises the economic benefits of agglomeration. The objectives are to: 1) ensure that services are more efficient; 2) attract large, high-quality businesses and facilities; 3) encourage innovation through social networks and information exchange. The policy aims to address population decline by helping regions to become or remain attractive places to live and work. The driving concept is that more diverse individual regions will result in a more active exchange of people, goods and information.

The policy initiative includes promoting “collaborative core urban areas” that encourage co-operation among small, medium and large cities. These will connect compact cities with high-level urban functions and residential areas through a transport network. “Small stations” will act as basic service-delivery hubs to rural communities, more closely connecting hamlets and service hubs. The policy is being implemented incrementally on a voluntary basis through pilot cities. To encourage participation, the national government offers tax incentives to participating cities, as well as additional subsidies.

To build scale, Grand Design establishes a targeted urban population threshold of 300 000 people, identified as the minimum number for efficiently providing large-scale services and amenities (e.g. emergency medical centres, department stores, cafés). This is in addition to the services and amenities offered by smaller cities (with a population of 200 000 or less), including nursing homes, hospitals, universities, museums, banks, shopping centres, law firms, etc. To attain this population catchment, the plan advocates collaboration among smaller core urban areas (with a population of 100 000 or more, plus the functional urban region). The “small stations” focus on basic service delivery (e.g. government administrative services, healthcare, basic shopping, etc.) and are linked by transport networks to build accessibility for the rural population.

*Source:* Ministry of Land, Infrastructure, Transport and Tourism, presentation provided to OECD team.

The Northern Kyoto Regional Alliance can help reinforce the integration of resilient systems. It has already demonstrated its capacity to take an integrated approach to strategic planning and collaborative leadership. By cultivating the habit of working together, the northern authorities are strengthening their ties and laying the foundation for a network that can support the region’s resilience in times of crisis. Inclusiveness,

however, could potentially be stronger. Municipal leaders are working together and with the prefecture government, but input in the development phase from the municipal councils or broader stakeholder groups appears to be low. Authorities may wish to consider steps that ensure a pro-active, and ideally early-stage, approach to multi-stakeholder participation in project or programme design or delivery. This could even extend into co-production with citizens, businesses, academia, civil society organisations, etc. Collaboratively identifying problems and solutions, reinforcing networks, exchanging knowledge, etc., is a recognised way of achieving better outcomes. It can also help strengthen the social dimension of resilience, by generating stronger community ties.

## Conclusion

- The Kyoto Alliance is a very innovative way to lead Kyoto's integrated approach. Universities are playing the key roles in the Alliance, in particular, inviting students and the private sector, as well as the public sector on board for the common goals to revitalise economic development in northern regions.
- *Tomorrow's Kyoto* provided a very clear long-term vision until 2040, a mid-term plan until 2020 and annual action plans which enable stakeholders to take part in the implementation of the vision flexibly.
- The governance scheme of the Kyoto Alliance could be more clearly stated, for example, regarding the decision-making process.
- Kyoto's potential and tradition of innovation could be more enhanced to lead to economic development and increasing employment in Kyoto, in particular, through mobilising SMEs.
- Kyoto could take a metropolitan-scale approach. Kyoto is located in the Osaka Metropolitan Area, which is the fourth-largest metropolitan area among OECD regions. Extending the horizontal collaboration beyond administrative boundaries could give Kyoto more opportunities for further socio-economic growth.

## Notes

1. 2010 is the year of the most recent Census.
2. For the purposes of this study, the definition of an SME will be based on the definition used by Kyoto Prefecture: a company employing 29 people or less.
3. The European Qualifications Framework (EQF) is a translation tool that helps communication and comparison between qualifications systems in Europe. Its eight common European reference levels are described in terms of learning outcomes: knowledge, skills and competences. This allows any national qualifications systems, national qualifications frameworks (NQFs) and qualifications in Europe to relate to the EQF levels. Learners, graduates, providers and employers can use these levels to

- understand and compare qualifications awarded in different countries and by different education and training systems (European Commission, n.d.).
4. Citizens' associations in Japan are often organised at the neighbourhood level, with individual citizens and households volunteering as mutual support groups. Japan has approximately 300 000 such associations of diverse format (Ministry of Internal Affairs and Communication, n.d.). Participation rates are, however, falling in general, but they have been of major importance in natural disasters.
  5. COC refers to Centre of Community, which also implies “knowledge” (in Japanese). The programme was initiated in 2013 as the COC programme and upgraded since 2015 as the COC plus.
  6. Specifically, the cities of Fukuchiyama, Maizuru, Ayabe, Miyazu and Kyotango, and the villages of Ine and Yosano.

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## *Chapter 10.*

### **Lisbon, Portugal**

*This chapter provides an overview of Lisbon, followed by an assessment of the current challenges for Lisbon's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by the suggestions for future action.*

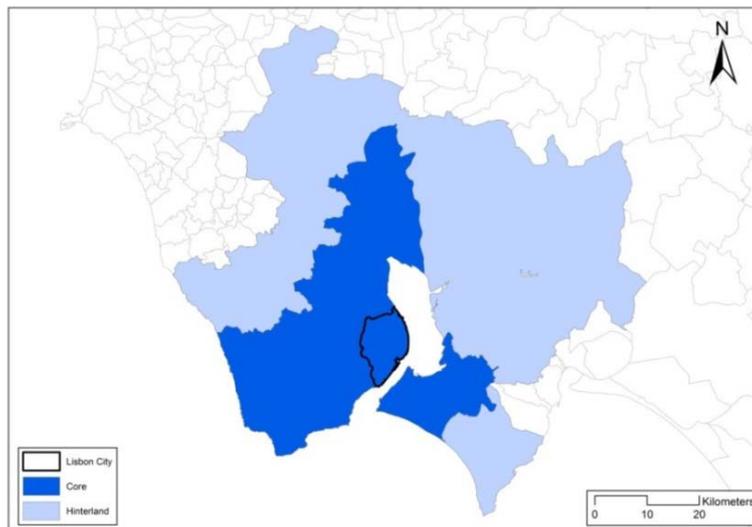
## Overview of Lisbon

Lisbon is Portugal's capital city and its economic engine, making a crucial contribution of 37% to the national gross domestic product (GDP) and accounting for 29% of the country's workforce (Figure 10.1 and 10.2). After a population peak of 810 000 in 1981, Lisbon's population declined to 513 064 in 2014 (City of Lisbon, 2016), which represented an annual decline of 3.7%. Lisbon is run by a Municipal Council led by a Mayor and 16 councillors and an elected Municipal Assembly that monitors the activity of the council, which is also elected. Below the municipal level, Lisbon is divided into 24 *freguesias* (parishes), the lowest tier of local government in Portugal.

Figure 10.1. **Lisbon, Portugal**



Figure 10.2. **Lisbon Metropolitan Area**



Source: Based on the OECD definition of functional urban areas. Own illustration.

Lisbon's economic development in the 1950s and 1960s was characterised by a strong manufacturing sector. Its focus has shifted to the tertiary sector, which contributes to 90% of the city's employment (Statistics Portugal, 2015) (Table 10.1). The 2008 financial crisis triggered a strong downturn in Lisbon's economy, with the city's

gross domestic product (GDP) growth rate falling from 6.0% in 2002 to -5.7% in 2012, recovering to a positive rate in 2013 and 2014 (Statistics Portugal, 2015).

Table 10.1. **Employment by sector in Lisbon, 2013**

Employment sector	Employment share (2013)	Change (2000-13)
Wholesale and retail trade; repair of motor vehicles and motorcycles; transportation and storage; accommodation and food activities	27.2%	1.1%
Public administration and defence, compulsory social security; education; human health and social work activities	24.6%	2.3%
Professional, scientific technical and similar activities, administrative and support service activities	17.9%	3.9%
Mining and quarrying; manufacturing; electricity, gas, steam and air conditioning supply; water abstraction, purification and supply; sewerage, waste management and remediation activities	8.0%	-4.8%
Arts, entertainment and recreation, repair of household goods and other services	7.6%	1.2%
Construction	4.9%	-4.7%
Information and communication activities	3.8%	1.0%
Financial and insurance activities	3.7%	0.0%
Agriculture, livestock production, hunting, forestry and fishing	1.5%	0.1%
Real estate activities	0.8%	-0.1%

Source: Statistics Portugal (2015), [https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn\\_quadros&boui=220637328](https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=cn_quadros&boui=220637328) (accessed May 2016).

## Challenges for Lisbon's resilience

### *The need to foster internationally competitive industries in addition to tourism*

The financial crisis and the subsequent recession was the most significant disruption to economic growth of Lisbon. The crisis has challenged the ability of the public sector to support Lisbon's economic development through sectoral policies and business services programmes. Fiscal austerity imposed after the financial crisis has increased the economic gap between Lisbon and other European regions and stalled government action. The constraints on public expenditure severely reduced public investment in urban development.

The financial and public debt crisis substantially reduced economic activity in Portugal, increasing unemployment in the city and resulting in a general decline in GDP across almost all sectors. Lisbon's unemployment rate soared from 8.5% in the first quarter of 2008 to 19.5% in the first quarter of 2013, declining to 14% in the fourth quarter of 2014 (Statistics Portugal, 2015).

Under such economic circumstances, tourism has helped revitalise Lisbon's economy and seen a rapid expansion in recent years. The tourism industry is expected to increase its GDP at 3.2% through 2017 annually, and its share of the city's labour force is likely to grow from 9.8% in 2014 to 13.7% in 2017 (World Travel and Tourism Council, 2014). However, in the absence of other growing industries in the city, any decline in the demand for tourism would have a severe negative economic impact and tourism has also subjected the city's residents, workers and students to an increase in the cost of living. While continuing to support the development of the tourism industry, Lisbon also needs to foster other competitive industries in order to strengthen its economic base.

### ***Social inclusiveness and gentrification***

Further challenges involve stresses from an ageing and declining population. Population has been constantly decreasing in Lisbon, from 563 312 (2001) to 513 064 (2014) (City of Lisbon, 2016). The recent decline was triggered by the increasing cost of living in the city. Most of the population that left the city in recent decades is middle income, while a significant part of the disadvantaged groups remained with the support of social housing policies. At the same time, new residents to the city are, in general, very qualified with a high income level. This has led to greater socio-economic polarisation within the city. The influx of new highly skilled residents with high income has increased the city's GDP per capita on average. This has led to a disqualification of the city for receiving some European funds to promote socio-economic cohesion, which is crucial since the city still has population groups affected by multiple problems such as unemployment and high school dropout rates. Today in Lisbon, those with the highest incomes per capita, purchasing power and skills coexist with the most disadvantaged.

Consequently, certain areas have high concentrations of unemployment, school dropout rates, benefit dependency, single-parent families, ageing, physical deterioration, vandalism, lack of integration, lack of social and health facilities and local jobs. A high percentage of the younger population faces difficulties entering the labour market, delaying the development of Lisbon's human capital. The city will need to set up programmes offering financial support to those in need, and to support local initiatives to mitigate social inequality.

The combined result of Lisbon's population outflow, and declining birth and mortality rates, has more than doubled the city's elderly share, from 9.3% in 1960 to 24% in 2011, and therewith it is 4% higher than Portugal's national average of 20% (2011), which ranks the sixth worldwide (City of Lisbon, 2016).

## **Elements for building resilience in Lisbon**

### ***Economy***

*Various economic strategies are in place to facilitate growth and the creation of jobs*

To increase employment, policy strategies to restructure the economy were outlined in an initiative led by the City Council. The goal was an integrated economic strategy to promote Lisbon as one of Europe's most competitive, innovative and creative cities. Recognising the need for new and alternative forms of employment for all residents, Lisbon has outlined an economic strategy for 2030 in four key domains: 1) the Atlantic Business Hub, which seeks to promote the city as a competitive place for international investment and trade; 2) Startup Lisboa, promoting the conditions for entrepreneurship and local business opportunities; 3) knowledge and innovation centres, to promote higher education, technology and research; and 4) strategic clusters, to concentrate resources and transfer know-how. The vision for developing Lisbon's economy and supporting innovation has also identified four strategic clusters with the most significant potential for the city. These sectors include the maritime economy, healthcare and well-being, the creative industries, and the digital economy. Furthermore, in order to attract young workers to the city, the personal income tax (IRS) and the property tax (IMI) were reduced to a nominal value in 2013.

### *Attracting investment to develop the city's economy*

Attracting new and competitive industries and modernising the city's economic base have been attempted by both public and private stakeholders. Invest Lisboa is the investment promotion agency of Lisbon, created through a partnership between Lisbon's City Council and the Portuguese Chamber of Commerce and Industry. Its functions are the international promotion of Lisbon; providing personalised, free and confidential support to investors and companies; and promoting projects with a positive impact in the economy. Invest Lisboa positions itself as an investment facilitator. Since 2009, it has supported more than 1 500 investment projects and companies in Lisbon (Invest Lisboa, n.d.).

### *Support to boost the existing local sectors is provided by the City Council*

The Lisbon City Council has supported business services to promote economic activity in retail trade, tourism, consulting, construction and real estate activities. Small business associations and the Chamber of Commerce have been enlisted to help design strategies to support local businesses. The Municipal Directorate for Economic Development and Innovation has engaged a diverse group of stakeholders and industry associations to identify ways to boost established local sectors, such as retail, food and accommodation services.

### *Entrepreneurship is also encouraged through various programmes*

The *Startup Lisboa* initiative (2011) and the *Lisbon Empreende* programme (2013) encourage entrepreneurship for the young and elderly. Those programmes have helped create companies and jobs by providing access to financial support. In particular, *Startup Lisboa* supports the creation of companies and tracks their first years of activity. Founded in 2011 by the city of Lisbon, Bank Montepio and the Portuguese Agency for Competitiveness and Innovation (IAPMEI), it provides entrepreneurs and companies from tech, commerce and tourism with office space as well as a support structure, to maximise their chances for success. Its services include mentoring, providing links to strategic partners, access to angel investors, venture capital or loan funds, help with business basics, networking activities, communication and work spaces.

The United at Work programme (2013) promotes inter-generational entrepreneurship initiatives led by the Santa Casa da Misericórdia de Lisboa, in partnership with the Lisbon City Council. It is one of five selected programmes financed by the European Commission's PROGRESS initiative. The programme seeks to bring together young and older qualified unemployed people, to explore the potential for creating new companies. Other measures to facilitate the creation of start-up businesses include Startup Commerce, a business incubator supporting entrepreneurial projects in the commercial sector. The incubator provides space for new enterprises and facilitates the use of business services that aim to improve the skills necessary to manage and grow new businesses. With a focus on entrepreneurship and the creation of jobs, *Portugal 2020* is also a local initiative to respond to high unemployment and poverty rates by boosting the local economy.

## **Society**

### *The City Council is engaging with local communities to mitigate the social disparities*

Lisbon's City Council supports local initiatives to rebuild social cohesion in the city's neighbourhoods. Direct financial support for locally based activities to build social cohesion is available through the Regulation of Municipal Support Assignment Lisbon

and the BIP/ZIP. Lisbon counts over 60 “priority intervention neighbourhoods” (BIPs) or “zones” (ZIPs); neighbourhoods that need some serious improvement. Since 2007, BIP/ZIP (Local Development Strategy for Neighbourhoods or Areas of Priority Intervention), part of Lisbon’s Local Housing Program, has been supporting local projects and municipal partnerships, improving the social and territorial cohesion in the neighbourhood.

These local partnership programmes encourage small projects at the *freguesias* level improving the urban living space. Beneficiaries include local associations, institutions and organisations other than public authorities that strengthen social and territorial cohesion. The programmes are intended to exclusively support activities and projects in neighbourhoods and priority intervention zones. Moreover, Lisbon’s residents are increasingly taking part in financial decisions on the city’s budget. Participatory budgeting has become one of the main public policy tools for citizen involvement.

Lisbon’s Municipal Council also plays an important role in the consultation process, co-ordinating various associations and community representatives and promoting their active participation in the city’s civic life. The municipal board has helped establish a close dialogue on social and cultural issues, through citizenship platforms. The Municipal Council for Culture and Citizenship (CMIC) and the Municipal Council for Equality (CMI) facilitate civic engagement in the development of the city. Additional initiatives are under way, including the Municipal Council for Inclusion of People with Disabilities (CMIPD), the Youth Municipal Council, the Education Municipal Council and the Municipal Housing Council.

#### *Social policies are developed to support disadvantaged groups and the community*

Supporting households in need can help stem the flight of low-income families and reduce social disparities. The Social Emergency Fund of Lisbon provides households with temporary financial support on an emergency basis. It helped 85-90% of people supported in 2011 and 2012 to remain in their homes, and allocated EUR 400 000 to people in need in 2012. Another example is the Community Extinguishers Mouraria project to engage local residents in emergency response. In the Santa Maria *freguesia*, for example, stairs and narrow alleys make it largely impossible for emergency vehicles to pass. Therefore, raising awareness of local residents for emergency response and providing appropriate training opportunities are important to ensure the safety of the area.

#### *The role of freguesias is important to building citizens’ networks in communities to promote social cohesion*

Local *freguesias* play an integral part in building citizens’ networks, helping to enhance social inclusiveness, lowering social disparities. The *freguesia* assemblies, deliberative bodies in each *freguesias* directly elected by citizens, facilitate the supervision of collaborative activities. This includes decisions on the establishment of delegations, committees or working groups to approach problems related to the population’s welfare. The *freguesias*’ social commissions are the basis of the Social Network of Lisbon in terms of neighbourhood interventions and support. They are supervised by the *freguesias*’ Council of Presidents and bring together public entities and civil society organisations. Currently, 18 of the 24 city *freguesias* have established social commissions.

## ***Environment***

### *Investments to improve the quality of life are in place*

To improve Lisbon's appeal for current and future residents requires investments in the quality of life and the city's neglected housing stock. The city recognises that developing measures to improve the quality of life for socially disadvantaged groups is critical. To this end, the city is promoting affordable housing, the construction of kindergartens and primary schools, improvements in public transport, parking, green spaces and access to commerce in each neighbourhood. This is addressed in a number of development plans, such as the Plano de Desenvolvimento Social de Lisboa and the Agenda Estratégica 2013-2015 (Lisbon Social Development Plan and the Strategic Agenda 2013-2015).

The city also has initiatives to improve the city's built environment and increase its value (CML, 2013a), which are expected to increase tax revenue ultimately by attracting businesses and jobs. The Priority Investment Programme for Urban Rehabilitation (Programa de Investimentos Prioritários em Ações de Reabilitação Urbana, or PIPARU) provides an investment budget of EUR 117.2 million for rehabilitation of designated priority investment areas, including educational, cultural and other utilities (EUR 56.6 million), council-owned and private housing (EUR 38.4 million), and public spaces (EUR 22.3 million). The City Council also initiated a programme to improve the quality of housing and the built environment (2011).

The city is also helping to renew housing stock with a high vacancy ratio of 12% (2011) that is in need of refurbishment. It provides incentives for house buyers, a specific rent scheme below-market price and an urban rehabilitation scheme with incentives for renovating existing housing stock (CML, 2013c).

## ***Institutions***

### *The city's strategic vision featuring the need to restore its economy is clearly stated in its long-term vision*

As explicitly mentioned in Lisbon's vision for 2013-20 and the City Government Programme (2013-17), is the fact that improving the city's resilience requires a revival of the local economy and the city's neighbourhoods. Promoting Lisbon as an international city and improving its attractiveness to both businesses and new residents are a critical part of the city's strategies to overcome these challenges and weakened social cohesion. Lisbon's aim to improve its international appeal is integral to achieving the goals of Lisbon's vision for 2013-20: more people, more jobs and a better city for life and work. The City Government Programme (2013-17) also envisages "a city for people".

### *Co-ordination with the national agency to enhance policy coherence*

The Lisbon Regional Coordination and Development Commission (CCDR-LVT) is a decentralised body of central government. Its mission is to promote an integrated and sustainable development of the Lisbon region which includes 52 municipalities and 355 *freguesias*. The CCDR-LVT is tasked with co-ordinating and promoting in the Lisbon region governmental policies with regard to regional planning and development, environment, land management, inter-regional and cross-border co-operation and also support local government and inter-municipal associations. The CCDR-LVT's fields of intervention also encompass the management of regional operational programmes funded

by the European Union, as well as other regional development financing instruments. The CCDR-LVT is in charge of developing a set of tasks in the following areas: 1) regional development and strategic planning; 2) environment and nature conservation; 3) management of EU funds; 4) support to local authorities and their associations; and 5) co-ordination of decentralised services of the central government. A close relationship between the city of Lisbon and the CCDR-LVT promotes inter-regional and trans-regional co-operation and ensures co-ordination among institutions under direct administration of the state and local authorities, contributing to the integration of the regional territory.

#### *Administrative reform to increase the responsibilities of freguesias*

Ongoing decentralisation has delegated more administrative responsibilities to *freguesias*. This process of administrative simplification was expected to produce efficiency gains and speed up bureaucratic processes, such as licensing and permitting. The delegation of responsibility under the BIP/ZIP Programme offers a way of boosting local partnerships and initiatives to improve local neighbourhoods, carried out by *freguesias*, local associations, institutions and non-governmental organisations. This tool is strengthening social and territorial cohesion in the city.

## **Conclusions**

- The city of Lisbon can rely on the lower level governments, the *freguesias*, to funnel city resources more efficiently to people in need and initiatives that improve the quality of life in local communities. The *freguesias* also play a critical role in engaging citizens in local initiatives, and as such devolving more responsibilities to the *freguesias* has been a successful tool to allocate resources more efficiently.
- To ensure a standard of living in the long run, better economic prospects and a higher degree of integration into the global economy are critical. Therefore, the investments the city is putting toward the diversification of its economy and to strengthen the evolution of entrepreneurial ecosystems will be beneficial to the city's well-being in the future.
- Examining the extent to which gentrification leads to the displacement of the local population is critical as well as understanding the mechanisms in the gentrification process that impact established neighbourhood communities. This could identify or suggest: 1) areas or ways that policies could be improved; 2) help to ensure the best use of available resources; and 3) help to identify how programmes can be effectively integrated into communities' everyday lives.

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## ***Chapter 11.***

### **Oslo, Norway**

*This chapter provides an overview of Oslo, followed by an assessment of the current challenges for Oslo's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

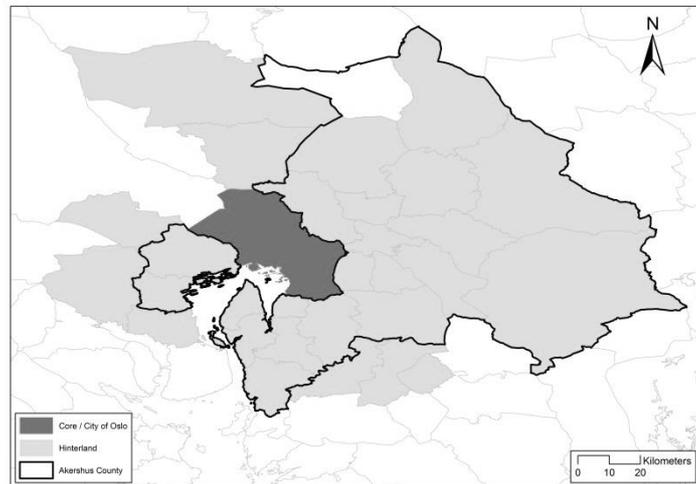
## Overview of Oslo

Oslo is the capital city of Norway, with a population of 647 676 in 2015 (Statistics Norway, 2016) and 1 299 955 within its functional urban area in 2014 (OECD, 2015), of whom approximately 50% live in the city's urban core. Oslo's population increased by 1.6% annually between 2000 and 2015, and the city's gross domestic product (GDP) per capita in 2013 was NOK 728 605 (Statistics Norway, 2016). Oslo is almost entirely surrounded by Akershus County, which accounts for the majority of Oslo's hinterland (Figure 11.1 and 11.2).

Figure 11.1. **Oslo, Norway**



Figure 11.2. **Oslo Metropolitan Area**



Source: Based on the OECD definition of functional urban areas. Own illustration.

Population growth in Oslo and Akershus combined is projected to increase by 350 000 by 2030, calling for the construction of over 100 000 housing units over that period (City of Oslo, 2015). Similar growth is projected for Oslo's neighbouring county, Akershus. Both are driven by natural population growth, the influx of younger people

from other areas of Norway and international migration attracted by the city's rapidly evolving economy. In 2014 and 2015, younger people of between 20 and 29 years old accounted for the major share of newcomers, offsetting out-migration in other age groups, for a net migration of 1.1% of Oslo's total population in 2015.

Unemployment in Oslo's metropolitan area has remained low, at around 3% between 2000 and 2014 (City of Oslo, 2015), despite the most recent financial crisis. Oslo's economy is largely based on business services and research and development (R&D) activities, with over 80% of employment in the tertiary sector (Table 11.1). As an important centre of maritime services, Oslo is the base for numerous firms that provide services in this sector and employ 8 500 people (Council of Europe, 2014). The strong share of business services in the Oslo region, coupled with high labour force participation (83%), has resulted in household disposable income 12% higher than the national average (2013).

Table 11.1. **Employment by sector in Oslo and Norway, 2008-14**

	Oslo							Norway
	2008	2009	2010	2011	2012	2013	2014	2014
Industrial sector								
Agriculture, forestry and fishing	0.2%	0.2%	0.2%	0.1%	0.2%	0.1%	0.1%	2.6%
Industrial activities	9.5%	9.0%	8.9%	9.2%	9.3%	9.5%	9.5%	12.8%
Trade, transport, commercial, financial, real estate	53.2%	51.9%	51.7%	51.8%	52.2%	51.9%	51.6%	37.3%
Public administration, defence, social security	7.1%	7.7%	7.7%	7.6%	7.7%	7.7%	7.7%	6.5%
Education	7.4%	7.4%	7.6%	7.5%	7.2%	7.4%	7.4%	8.5%
Human health and social work activities	16.4%	17.3%	17.3%	17.3%	16.8%	16.9%	17.0%	19.5%
Other service activities	5.6%	6.0%	5.8%	5.7%	5.9%	5.9%	5.9%	9.3%
Other	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.6%	3.5%

Source: Statistics Norway (2016). <https://www.ssb.no/statistikbanken/selectarval/saveselections.asp> (accessed March 2016).

Within Norway, Oslo stands out as a hub of high value-added R&D activities, business services and commerce. Its tertiary sector accounted for 87% of the city's gross value added (GVA) in 2013 (Euromonitor, 2014). Business clusters in the Oslo region include maritime services (financing and insurance, technical services, and maritime safety) and energy production, both of hydroelectricity and petroleum. Emerging clusters in Oslo include life sciences, the creative industries that build on established national institutions and the urban fabric of venues and galleries, as well as information and communication technologies (ICT), with an increasing specialisation in software development.

## Challenges for Oslo's resilience

### *How to foster internationally competitive enterprises*

Norway's economy largely benefits from oil-related industries that boost national economic output, and many of these oil-related industries are based in Oslo. As such, Oslo's economy is sensitive to external shocks, such as the recent fall in oil prices. Therefore, economic diversification and improving entrepreneurship and innovation are critical for reducing the reliance on the petroleum industry, whose financial and business services are primarily located in Oslo's metropolitan area. While the city has made a considerable effort to diversify its industrial base, much remains to be done to develop

internationally competitive local clusters and policies to support the development of more internationally competitive/oriented business enterprises that have become important as part of the innovation and entrepreneurship strategy.

The labour force in Oslo has higher levels of education. Employed persons with a tertiary education (level 4-) are increasing in number and the percentage in the total population, from 135 998 (44.2%) in 2007 to 178 634 (51.0%) in 2014 (Table 11.2). However, high drop-out rates in high schools and colleges have held back tertiary education, which is critical to Oslo's strategy to foster more internationally competitive business enterprises. High unemployment among minority groups and the lack of opportunities to integrate these groups into the labour market hamper the development and upgrading of skills that could be applied to the economy more broadly.

Table 11.2. **Employed persons with a tertiary education in Oslo, 2007-14**

	2007	2008	2009	2010	2011	2012	2013	2014
Employed persons with a tertiary education (level 4)	135 998	140 990	146 402	148 755	153 361	167 192	173 390	178 634
Total employed persons	307 456	316 389	314 847	319 883	330 068	334 670	341 523	349 982
Percent of employed persons with a tertiary education (level4)	44.2%	44.6%	46.5%	46.5%	46.5%	50.0%	50.8%	51.0%

Source: Statistics Norway. <https://www.ssb.no/en/arbeid-og-lonn?de=Employment> (accessed March 2016).

### ***How to accommodate increasing migration in urban areas***

Inflow population has accelerated the diversity of citizens' background. Oslo is an ethnically diverse city, 31% of its population are of foreign origin (2015). Among this group, Pakistani and Polish account for the largest share (17%) followed by Somalian and Danish (12%) (City of Oslo, 2015). Foreigners from EU countries account for 11% of Oslo's population. Continued in-migration by ethnic Norwegians is likely to remain high and outweigh foreign-born migration, given that government policy is to disperse migrant settlers throughout the country (City of Oslo, 2012).

Rapid population growth, driven by an increase in labour migration from the European Union, has posed challenges on housing and urban development policies. Oslo's strong population growth from abroad, coupled with the relocation of families to areas with more affordable housing in the neighbouring regions, has resulted in an uneven increase in the city's density and building pressure on the capacity of physical and social infrastructure. Oslo and much of the urban area in Akershus are surrounded by a legally binding green forest belt, preventing urban expansion in greenfield sites. While good planning and adequate financing have so far accommodated the region's growth, it has not been possible to develop unused land and brownfields within the existing green belt at a pace commensurate with population growth. It is also difficult to deliver the infrastructure to provide public services to newly developed areas. The City of Oslo (2016) has identified that current transport capacity is insufficient to manage the anticipated growth in jobs and population. Not only are public transport systems overcrowded, but sprawling development in surrounding municipalities has increased road traffic. In addition, the metropolitan area of Oslo is composed of 44 municipalities, which poses some challenges in co-ordinating land-use and transport policies (OECD, 2012).

## Elements for building resilience in Oslo

### *Economy*

#### *Entrepreneurship and innovation have been surging in Oslo*

Innovation, entrepreneurship and growth of existing businesses have been facilitated through a number of support programmes. For example, an online help service called Oslo Start-up offers entrepreneurs in the Oslo region guidance on start-up-related questions (Oslo Business Region, 2016). This online platform, through the Oslo Business Region, also offers information about co-working spaces and maker spaces, quick guides and other useful support for start-ups and entrepreneurs. Some of the new start-up services are digitally based, while others are physical meeting points for networking and building skills. The aim is to spread knowledge about what kind of business and start-up initiatives are evolving in the region and to help entrepreneurs maximise ideas and opportunities for their businesses.

#### *The alliance approach to increase competitiveness*

The Oslo Regional Alliance was founded in 2005 to co-ordinate and implement strategies that improve economic diversity and the quality of life in the Oslo region. It consists of 78 local authorities, including the city of Oslo and the 4 counties of Akershus, Buskerud, Hedmark and Østfold (Oslo Region, 2014). The alliance is a collaborative, political membership organisation whose goal is to strengthen the Oslo region as a competitive and sustainable region in Europe (Oslo Region, 2014) and to support growth in the context of the national economy.

To strengthen Oslo's international attractiveness, the Oslo Regional Alliance is collaborating in the “#ProjectOsloRegion”, with central stakeholders that include the private sector, education institutions and non-governmental organisations (NGOs). The Oslo Region and Oslo Business Region are developing an international profiling strategy to increase Oslo's visibility as a prime business location. This project is supported by the city of Oslo and 75 municipalities that are part of the Oslo Region (#ProjectOsloRegion, 2015).

The main objective of the alliance is to promote the Oslo Region as a competitive and sustainable region in Europe. It focuses on transport and spatial development, climate change and the management of Oslo's international brand. The alliance has developed a joint strategy for transport and spatial development in the region, which serves as a shared basis for the individual plans of municipalities and counties in the Oslo metropolitan area. It has recently developed a brand management strategy with the Oslo Business Region and VisitOSLO, including several hundred stakeholders from the Oslo region.

### *Society*

#### *Oslo has an active civil society*

Civil society organisations are actively working with the city to identify and implement new programmes for citizens. In the planning phase, NGOs and civil society are invited to participate in formulating the master plan for Oslo's urban development. In the implementation phase, NGOs and civil society organisations participate in the design of projects that are ultimately planned and implemented by private companies.

*Foreign-born residents and socially disadvantaged groups are supported through various programmes*

In Oslo and Akershus, there are many locations in the greater metro area where concentrations of very different socio-economic groups are juxtaposed with each other. Socio-economic spatial divisions of different social groups remains comparatively modest in an international perspective, although more pronounced in the national perspective (Wessel, 2016). Oslo has strong policies for integrating minority groups. This includes both foreign-born residents who have difficulty being assimilated in the labour market and local communities, as well as socially disadvantaged groups whose socio-economic background or low educational attainment prevents them from fully engaging in society. The city supports programmes, such as Diversity in Focus in Academia, which is devoted to increasing the number of students from minority groups at Oslo University and transforming it into a multicultural study environment, and Diversity in the Workplace, which aims to get more people of migrant background into mainstream workplaces and to change the culture of Norwegian business (Council of Europe, 2012).

***Environment***

*Oslo's compact city strategy intends to accommodate increasing population sustainably*

Oslo is growing at a faster pace than other European cities of a comparable size, and the consequent pressure on the housing market has resulted in new, denser urban environments. Outside the municipality of Oslo, the region is growing equally rapidly, while the vast majority of inhabitants live in urban settlements and towns that bear little resemblance to the central city (City of Oslo, 2015).

Policies to increase the city's compactness are clearly addressed in the city's development master plan, promoting a higher degree of densification. The aim is to protect environmentally vulnerable areas in the urban hinterland for future generations, despite the expected increase of Oslo's metropolitan population. Compact city development has been implemented by prioritising urban development within and adjacent to identified centres of regional growth in the urban area. This involves various policy actions by many players:

- A core document for this strategy is Oslo's 2014 approved City Plan, which outlines a path to economic competitiveness and sustainability.
- Effective land-use policies are based on the principles of polycentric development and the preservation of environmental assets, as well as an environmentally friendly and efficient transport system that minimises reliance on cars.
- The public transport agency has been helping to design compact city policies with this in mind. Co-ordinating Oslo's Master Plan and the Regional Plan for spatial development in Oslo and Akershus has helped co-ordinate compact city policies throughout the Oslo metropolitan region.

*Dense development for access to services: Intensification along public transport arteries*

The main compact city policies focus on densification of the city's core and public transit hubs. The city's strategies for climate change protection include urban growth near

public transport nodes and axes, developing a transport system for sustainable mobility, facilitating the transition to green vehicles, encouraging greener vehicles in Oslo, and promoting car sharing as well as city bikes (City of Oslo, 2014).

Efforts have been made in recent years to co-ordinate public transport in the Oslo region, including metro, tram, boat and main bus services. A common regional land-use and transport strategy based on compact city principles was embodied in an action-oriented regional plan for the city of Oslo and the Akershus County Council (OECD, 2012). In 2014, the use of public transport in Oslo increased by 3.3% from the previous year (Ruter, 2014). Moreover, 29% of journeys in Oslo took place on foot, equalling the public transport share. Cycling accounted for 6%, meaning that approximately 65% of all journeys were “green” in 2014 (Ruter, 2014).

Oslo’s efficient, well-developed public transport system minimises transport costs for its residents. However, its housing expenses per household are particularly high, reducing the overall affordability of the city. In 2013, consumer expenditure per household on transport and housing combined was 9% higher in Oslo than in the rest of the country (Euromonitor, 2014).

### ***Institutions***

#### *A long-term vision and policy co-ordination at a metropolitan scale*

A decree by the national government in 2008 required Oslo and Akershus to integrate their transport and spatial development planning. This was critical for improving co-ordination across different levels of government within the Oslo metropolitan region and facilitated dialogue between regional authorities responsible for transport services and local municipalities outside Oslo responsible for land use. The Oslo-Akershus Joint Regional Plan for Spatial Development includes a development vision for the metropolitan area through 2050. Polycentric development is proposed for five regional centres around Oslo’s inner city. Population and job growth is directed to four of the five regional centres located in Akershus, on the fringes of the Oslo urban area. These growth centres are expected to boost the development of the core functional area. The fifth regional centre is located 50 kilometres north of Oslo central business district (CBD), in the vicinity of the Oslo airport.

The co-ordination of policies across the metropolitan area of Oslo is subject to a reform of formal powers at the regional level. Ongoing discussions of local government reform are expected to reduce the number of municipalities in the metropolitan area by the end of 2018 (City of Oslo, 2016).

#### *Policy co-ordination with the national government*

To co-ordinate national policies in the metropolitan region, the national government has a representative in the Oslo-Akershus region. The representative’s responsibilities include supervising and co-ordinating national functions in the region, and mediating and resolving planning proposals that conflict with national sectoral policies. Health, transport, welfare and education are split between national and regional levels. This makes it essential to communicate and achieve clear agreement on issues where citizens require services from more than one level of administration.

Transport in the city region is a priority. National infrastructure is developed under national priorities co-ordinated with projects in the rest of the country, whereas regional

infrastructure is based on priorities for the city and neighbouring areas. The challenge is to align national funding mechanisms with local priorities, which are often more ambitious. To mitigate potential conflict in this area, extensive dialogue between regional and national transport bodies is required. In addition, the toll-ring agency Oslo and Akershus implemented in the 1990s raises about EUR 350 million annually and is a vital factor in funding regional transport infrastructure.

## Conclusions

- An early awareness of the dependence of Oslo's economy on Norway's oil industry has funnelled attention to evolving other economic sectors, such as the digital economy and financial services. The city's economic adaptability would be therefore strengthened by supporting emerging sectors, in particular the digital economy.
- In the face of increasing population, Oslo and its surrounding county of Akershus are co-ordinating the planning across the metropolitan area in spatial planning, transport and economic development. This co-ordination facilitates a better integration of transport services across the metropolitan region, as well as to manage the development of new housing and public infrastructure that have been outlined in Oslo's 2008 Master Plan.
- The integration of Oslo's economy into global markets beyond the long tail of services in the oil industry could be further improved. Efforts to support business clusters and start-ups could benefit from a closer co-operation with the private and academic sector, for example for developing skills and business services necessary to support a growing start-up environment. This could further develop Oslo's entrepreneurial community and increase the international connectivity of its economy.

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## ***Chapter 12.***

### **Ottawa, Canada**

*This chapter provides an overview of Ottawa, followed by an assessment of the current challenges for Ottawa's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

## Overview of Ottawa

Ottawa is the capital city of Canada, which borders the city of Gatineau in Quebec (Figure 12.1 and 12.2). The Ottawa-Gatineau Metropolitan Area comprises the urban core of both cities with a population of 1 203 329 and the municipalities in its hinterland with a population of 274 552, in an area of 17 251 km<sup>2</sup> (OECD, 2014).

Figure 12.1. **Ottawa, Canada**



Figure 12.2. **Ottawa-Gatineau Metropolitan Area**



Source: Based on the OECD definition of functional urban areas. Own illustration.

Ottawa also forms the core of the Ottawa-Gatineau census metropolitan area (CMA) and the National Capital Region (NCR). The Ottawa-Gatineau CMA is larger than the NCR and covers an area of 6 287 km<sup>2</sup> and a population of 1 318 122 (2015) (Statistics Canada, 2011).

In 2014, the Ottawa-Gatineau census metropolitan area ranked as the sixth-largest in Canada, with a population of 1 318 122 (City of Ottawa, 2015b). Unlike many large Canadian cities, the area has a large population of young people, 45% of whom is under 35 years of age. The opportunities and quality of life in the capital area have made it an attractive destination for talent from all over the world, and the population is becoming

increasingly diverse. About one in five residents in the region are foreign-born (City of Ottawa, 2012).

Table 12.1. **Unemployment rate in the Ottawa-Gatineau CMA and Metropolitan Area and Canada, 2009-14**

	2009	2010	2011	2012	2013	2014
CMA	5.6%	6.5%	5.6%	6.2%	6.3%	6.5%
Metropolitan Area	6.33%	7.02%	6.79%	6.45%	6.52%	6.8%
Canada	8.3%	8.0%	7.4%	7.2%	7.1%	6.9%

Source: OECD (2014), *OECD Metropolitan Database*; <http://stats.oecd.org/Index.aspx?Datasetcode=CITIES> (accessed on 10 May 2016); Statistics Canada (2014b), <http://www5.statcan.gc.ca/cansim/a26?lang=eng&retrLang=eng&id=4770104&pattern=unemployment&tabMode=dataTable&rchLan=-1&p1=1&p2=-1>, (accessed June 2016).

The unemployment rate of the Ottawa-Gatineau Metropolitan Area stood at around 6.8% in 2014 (OECD, 2014; Table 12.1). In 2014, approximately 108 600 people were employed by the public administration in Ottawa CMA, which accounted for about one in every five workers (Table 12.2).

Table 12.2. **Employment by sector in the Ottawa CMA and Canada, 2014**

By major sector	Thousands	
	Ottawa	Canada
Primary	1.7	677.7
Utilities	1.6	136.9
Construction	19.6	1 371.2
Manufacturing	17.5	1 711.0
Wholesale trade	16.4	2 729.3
Retail trade	52.6	
Transport and warehousing	14.8	896.8
Information and cultural industries	14.8	*
Finance, insurance and real estate	24.4	1 083.8
Professional, science and tech services	60.5	1 333.3
Administrative and support services	21.3	734.8
Health and education	106.1	3 456.6
Arts, entertainment and recreation	12.4	757.2
Accommodation and food services	35.8	1 207.5
Other services	23.6	795.1
Public administration	108.6	910.7
Total employed residents	533.8	17 802.2

Note: The Ottawa CMA is the Ontario part of the Ottawa-Gatineau Census Metropolitan Area, defined by Statistics Canada as the city of Ottawa, the city of Clarence-Rockland and the township of Russell.

\* Data for information and cultural industries are included in arts, entertainment and recreation.

Source: Statistics Canada (2014a), Labour Force Survey.

As Canada's capital city and home of its federal government, Ottawa has the country's top talent in leadership and innovation. With four universities and several major

federal research facilities, Ottawa is one of the leading areas in research, new technology and policy development in Canada. The city has also emerged as a centre of technology employment, partly as a result of early pioneering companies, such as Computing Devices of Canada, and thanks to the presence of the National Research Council (NRC), which supports a cluster of high-tech employers. In 2014, private sector employment represented 63.3% of all jobs in the Ottawa CMA, up from 62.3% in 2013 (Statistics Canada, 2014a).

### Challenges for Ottawa’s resilience

While several trends and forces of change are likely to create challenges for Ottawa over the coming decades, the most pressing matter is the impact of its growing population. It is projected that over the next 50 years Ottawa’s population will grow by approximately 50%, reaching 1.8 million by 2060 (City of Ottawa, 2012). Moreover, while federal employment provides some buffer against downturns in the economy, it has also created vulnerabilities. Approximately 20.6% of Ottawa CMA’s employed residents are attributable to the public sector (Statistics Canada, 2014a). Further, many of the private sector organisations in the city exist primarily to provide goods and services to the government sector (City of Ottawa, 2015a). The reform of the public administration and the likely downsizing of the sector make it difficult for the city to maintain its main industry of public administration. The most challenging tasks for Ottawa are to ensure that: 1) the region can manage the growing and changing population; and 2) diversify economic activities to secure economic growth and employment.

#### *Promoting compact city policies to accommodate population growth and housing*

The population of the city of Ottawa is growing (Table 12.3). It grew by 30.0%, 177 653 in the 14 years from 2001 to 2014. Within the city (Figure 12.3), the greatest population growth in 2014 continued to take place in the areas outside the greenbelt and suburbs (Table 12.4), following the pattern of past years (City of Ottawa, 2015b).

Table 12.3. **Population in Ottawa and Canada, 2001-14**

	2001 Census	2006 Census	2011 Census	2014 city estimates
Ottawa	774 072	812 129	883 391	951 725
Canada	30 007 094	31 612 897	33 476 688	35 540 400

Source: Statistics Canada Census.

Table 12.4. **Population by areas of Ottawa**

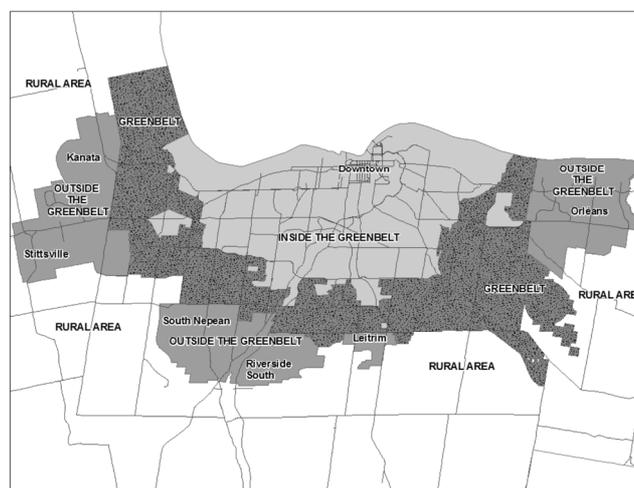
Area	Population	Change (2013-14)
Downtown	99 018	+1.3%
Inside greenbelt	429 560	-0.1%
Outside greenbelt	329 304	+2.2%
Suburbs (rural)	93 837	+0.7%

Source: City of Ottawa, Planning and Growth Management.

Despite the population growth, housing starts in the city of Ottawa in 2014 were down by 11.9% from the previous year (City of Ottawa, 2015b). Available data show that

the area within the greenbelt accounted for 36% of the city's total housing starts in 2014. In addition, Ottawa's rental vacancy rate declined to 2.6% in 2014 from 2.9% in 2013. This tightening of supply is likely to be explained by continuing inflow into Ottawa and a reduced number of first-time homebuyers looking to rent instead. Rental rates for a two-bedroom apartment have increased by 20.3% since 2006 (City of Ottawa, 2015b). The city of Ottawa intends to invite population inside the greenbelt and downtown (Figure 12.3). In the area outside the greenbelt, however, because of higher housing prices and the limited availability of new land inside the greenbelt, new housing starts cannot meet the population increase. It is critical that the inflow of population be contained in those areas. On the other hand, population losses inside the greenbelt are missed opportunities, because housing and other infrastructure for residential use have already been developed. To manage the steady increase of population in areas outside the greenbelt and suburbs, given the declining housing capacity, Ottawa is required to take measures to accommodate population growth.

Figure 12.3. **Ottawa by districts**



Source: City of Ottawa.

### ***Diversifying economic activities to secure economic growth and employment***

In the past few years, Ottawa's economic growth has been slow, due mostly to federal public service cutbacks in 2012. With federal workforce reductions expected to continue through to the end of 2017, the Conference Board of Canada is predicting low levels of growth for the Ottawa-Gatineau CMA over the next few years (City of Ottawa, 2015a). It is clear that any structural change to the federal government would significantly affect the city's economy. Relocation plans for federal government office space is also a concern. If the federal government moves its offices from the city of Ottawa to the city of Gatineau, employment in Ottawa will drop. Even relocation within the area of Ottawa will change local economy and transport patterns. Economic diversification and new industries are a challenge for Ottawa, to safeguard its employment against unexpected changes in the public sector and to ensure economic prosperity in the future.

## Elements for building resilience in Ottawa

### *Economy*

#### *Ottawa's strategy for diversifying its economy*

In 2015, the city of Ottawa developed a new document, “Partnerships for Innovation”, which outlines its economic development strategy for 2015-18. It focuses on four key pillars: investment attraction and business expansion and retention; entrepreneurship; tourism development; and research and information tools.

Under the city's initiatives, a concerted effort has been made to lay the groundwork for reducing the share of employment and economic growth of the federal government and for diversifying the economy. The efforts mainly focus on three factors: 1) supporting the advancement of knowledge-based sectors; 2) investing in tourism and attracting major events; and 3) encouraging and supporting entrepreneurship as a career choice. Knowledge-based sectors of aerospace, security and defence; clean-tech; digital media; film and television; wireless and telecom; photonics; life sciences; and software are some of the industries featured in the initiatives. Ottawa's knowledge-based industry now includes nearly 1 700 companies. With the city's extensive research infrastructure, including the National Research Council, Canada's leading research institution, and many other federal and academic research institutions, Ottawa is in a leading position in research and development spending, with an estimated CAD 3 billion in total public and private funding annually (City of Ottawa, 2015a).

#### *Attracting investment and expanding business*

To attract investment, expansion and retention of businesses, the former Ottawa Centre for Research and Innovation (OCRI) was restructured in 2012 and renamed Invest Ottawa. An arm's-length organisation, it organises collaborative economic development programmes in the areas of entrepreneurship, business incubation services, commercialisation, targeted sector development, investment attraction, business retention, expansion and global trade development.

Together with Invest Ottawa, the city introduced the Capital Investment Track Program (CIT) in 2012. This concierge programme guides strategic investment projects through city requirements and processes, such as planning and building codes. Priority projects are assigned a dedicated account manager to provide guidance and ensure that all issues relating to the project are resolved in a timely, effective manner. Participants in the CIT programme have provided positive feedback on how this pro-active attention from City Hall has helped move their investment plans forward. The programme is part of the city's and Invest Ottawa's investment attraction toolkit and is promoted to companies interested in setting up operations in Ottawa. It is also promoted to local companies looking to expand operations in the city.

#### *Entrepreneurship and innovation contribute to Ottawa's economic prosperity*

Innovation is an important element of the resiliency strategy, and Ottawa provides new businesses and start-ups many options for support from the ground up. For example, the Economic Development and Innovation Department manages the Community Economic Development (CED) Grant Program. Its goal is to support projects that increase the community's economic prospects, including job creation, economic diversity, entrepreneurship and small business development, tourism and skills development. Similarly, the city of Ottawa supplies Invest Ottawa with new procurement

opportunities through a compilation service of public sector request for proposals (RFP) on a monthly basis. The RFPs and bids are organised by Invest Ottawa's strategic sectors and are promoted through the organisation's newsletter. These bid opportunities help Ottawa-based businesses look outside the city to compete nationally and internationally. The website receives hundreds of views each month (City of Ottawa, 2015a).

The "Lead-to-Win" project supports entrepreneurship. This is a community of individuals and organisations that jointly help students in post-secondary institutions and community entrepreneurs launch and grow their ventures. The aim is to deliver community-level outcomes not achievable by the participants on their own. Lead-to-Win has incubated start-ups since 2002, with companies from the last five years of the programme generating over CAD 19.3 million in sales in 2014. The Lead-to-Win programme was named among the top 10 academic business incubators in North America by UBI Global (Ottawa Business Journal, 2015).

#### *Taking advantage of tourism to revitalise the economy*

Ottawa's tourism sector is an important component of the local economy. As the nation's capital, the city, with its heritage and cultural institutions, is a key destination for tourists. Similarly, as home to the majority of federal government departments, the city is also a major destination for corporate and convention travel. In 2012, the Ottawa-Gatineau CMA welcomed approximately 10.5 million visitors, an increase of 5.6% from 2011. Visitor spending results in billions of dollars injected into the local economy, and has kept Ottawa's hotel industry healthy. The average hotel occupancy rate for the Ottawa-Gatineau CMA was 69.8 % in 2014 (City of Ottawa, 2015a).

Attracting large-scale cultural and sports events to Ottawa has been integral to the city's strategy to boost tourism in the region. With the opening of the Shaw Centre (formerly the Ottawa Convention Centre) in 2011, the EY Centre in 2012 and Lansdowne Park in 2014, the city significantly increased its capacity to host large-scale business conventions and major cultural and sporting events. In 2011, the city partnered with Ottawa Tourism to create Events Ottawa, a major event office responsible for pro-actively targeting and attracting a diverse set of major events to Ottawa. These events have had a significant economic impact and attract national and international exposure for the city.

#### *Skilled talent attraction and retention to support the economy are high on the city's agenda*

Talent attraction is a key element in generating new industries. This has become particularly important given the slow growth in the labour force, as the current working population begins to leave the workforce. Because Ottawa aims to promote innovation, attracting highly skilled talent is essential. To this end, the city plans to develop a Talent Attraction Toolkit with other stakeholders, offering Ottawa's private sector common messaging and marketing to attract talent. The city also plans collaborations between the private sector and Ottawa's academic institutions to recruit international students. The strategy, currently under development, aims to facilitate community and business linkages for international students studying in Ottawa, and to encourage them to live and work in Ottawa upon graduation (City of Ottawa, 2015a).

## ***Society***

### *Ottawa encourages residents to participate in the land-use planning*

Ottawa offers the Planning Primer Program to help residents participate in the land-use planning process, as intensification and community change occurs. The programme also helps build working relationships between residents and the city. Participants are able to learn the legislative and policy basis on which land-use planning decisions are made, the way policy documents are amended and how to make a development application. They are awarded a certificate on successful completion of the programme.

### *Encouraging entrepreneurship of immigrants and facilitating assimilation*

An initiative to support the effective integration of immigrants economically, socially and culturally is a priority for the city. In partnership with an external service provider, the city has hosted the Annual Immigrant Entrepreneur Awards for the past three years. The event recognises the business success of residents born outside Canada for their contributions to Ottawa's economy. The event has grown in size and profile and continues to highlight entrepreneurship as a means of employment and prosperity.

## ***Environment***

The long-term vision of Ottawa's urban plan recognises that where residents live and how they travel has far-reaching consequences for the environment (City of Ottawa, 2012). The city promotes intensification of existing areas and higher densities for new development. While automobiles remain one of the most convenient forms of transport in Canada, excessive use of private automobiles has an impact on energy consumption and the environment. The city also aims to reduce the use of private automobiles and make public transport, walking and cycling more efficient and attractive. "A plan for sustainability and resilience in Canada's capital region", published in 2012, highlighted the importance to the city of managing its land and how its residents travel. The plan emphasises intensification of existing areas and higher densities for new development, while improving transport systems to enable easier, more rapid access to the main areas of employment, academic, recreational and commercial activity. Such initiatives are in line with the key characteristics of a compact city identified by the OECD: dense and proximate development patterns, areas linked by public transport systems, and accessibility to local services and jobs (OECD, 2012).

### *Dense development: Ottawa has increased residential intensification*

The Official Plan of the city of Ottawa directs intensification to areas with high levels of transit service or where dwellings may be located close to employment. Areas targeted by the plan are the central area, main streets, mixed-use centres, town centres, in the vicinity (within 600 metres) of rapid transit stations and enterprise areas. These areas received 67% of newly built apartments in 2014. The Official Plan also establishes an increasing residential intensification target from 2007 to 2031. For the five-year period 2007-11, the Official Plan's target was to achieve intensification for 36% of new units in the urban area. That target was achieved, with intensification averaging 39.3% (City of Ottawa, 2015b). In 2014, the intensification achieved was 54%, with a combined 2012-14 average of 52% (City of Ottawa, 2015b). The next five-year period, 2012-16, has a target of 38%.

*Public transport: Ottawa encourages sustainable mobility*

Public transport systems facilitate mobility in urban areas and enable different areas to function effectively. The higher densities of jobs and housing expected around the stations can also support a mix of services, creating liveable communities. Ottawa is on track to open the first portion of an extensive 43-kilometre light rail transit (LRT) network by 2018, connecting commuters from residential areas to downtown. The LRT stations, maintenance yard and other infrastructure, as well as the construction process itself, aim to meet high standards in terms of sustainable design, waste management and energy efficiency. The OLRT is also expected to make it easy for users to access the system by cycling and walking, and to encourage physically active mobility (City of Ottawa, 2012).

*Urban redevelopment projects with good links to public transport*

Zibi, a major urban redevelopment currently under way, aims to build a sustainable lifestyle community straddling the Ottawa/Gatineau border. The intent is to create a community integrating both sides of the river and providing easy connection points through public transit systems, such as bike paths. Zibi is designed to encourage residents and tenants to live the healthiest lifestyle possible, with access to public parks, outdoor recreation facilities, walking and cycling paths, plazas and squares to accommodate social gatherings.

***Institutions****Ottawa's initiative for a strategic programme with regional partners*

The city of Ottawa, Gatineau and the National Capital Commission (NCC) are working closely to outline a clear vision for development in the area, with horizontal policy co-ordination outside municipal boundaries. The National Capital Commission is a federal Crown corporation created by Canada's parliament in 1959 under the National Capital Act. The corporation is responsible for planning, as well as taking part in the development, conservation and improvement of Canada's Capital Region in partnership with the city of Ottawa and Gatineau (NCC, n.d.).

*Choosing Our Future (since 2008)*, a city of Ottawa initiative in partnership with the city of Gatineau and the National Capital Commission, aims to guide Canada's Capital Region towards a sustainable, resilient and liveable future. Another example is the Sustainability and Resilience Plan (2012), the result of an unprecedented three-year partnership between the city of Ottawa, the city of Gatineau and the National Capital Commission. Its aim is to ensure long-term economic prosperity, healthy communities, ecological integrity and cultural vitality in Canada's Capital Region. An overarching plan with a long-term vision, it recognises that many aspects of the community are likely to change in the next 50 years and sets goals for economic, social, cultural and environmental sustainability.

*New partnerships with the private sector help drive Ottawa's economic development*

Partnerships with the private sector are effective instruments for the city's economic development vision and agenda. Such partnerships include the formation of an arm's-length economic development agency, Invest Ottawa, and a major events attraction office, Events Ottawa. Additionally, the Ottawa Council of Business Improvement Areas (OCOBIA), a new body, was formed to enhance the city's business improvement areas (BIAs). Invest Ottawa (2012) has helped offset federal government job losses by focusing

on job creation, sector diversification and entrepreneurship. In 2015, Invest Ottawa facilitated 1 438 jobs, attracted foreign investment worth CAD 32.2 million, and helped 168 companies to grow globally (Invest Ottawa, 2015). In the coming years, the city's support for Invest Ottawa is expected to ensure that it continues to secure the necessary resources and tools to build on success and contribute to its momentum.

## Conclusions

- Ottawa's integrated approach to develop a Plan for Sustainability and Resilience with the city of Gatineau and the National Capital Commission enables horizontal policy co-ordination (e.g. economy, energy and land-use planning) beyond municipal boundaries and assists the city and the national Capital Region for eventualities.
- The city's initiatives such as Partnerships for Innovation diversifies economic activities into tourism, entrepreneurship and other industries beyond the public sector-oriented job market, strengthens its economy against any structural changes in the public sector and sets a good example for other capital cities.
- The city has so far successfully managed to pursue compact urban form by increasing residential intensification to accommodate population growth and housing needs while preserving the green zone, and strengthening an adaptive capacity of the city. This approach should be further promoted. In particular, encouraging development supportive of the public transportation network will increase residents' accessibility to services and jobs.
- The city's economic development strategy is to focus on investment attraction, business expansion, entrepreneurship, tourism development, and research and information tools, and will require continuing co-operation with the neighbouring municipalities, universities and the private sector.

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## ***Chapter 13.***

### **Tampere, Finland**

*This chapter provides an overview of Tampere, followed by an assessment of the current challenges for Tampere's resilience. It also examines existing policy measures to overcome these challenges from economic, environmental, social and institutional perspectives, followed by suggestions for future action.*

## Overview of Tampere

Tampere region is a NUTS 3 level unit, consisting of 22 municipalities. The functional urban area of Tampere consists of eight municipalities with a total population around 377 000, which account for 75% of the total population of the Tampere region (Figure 13.1 and 13.2).

Figure 13.1. Tampere, Finland

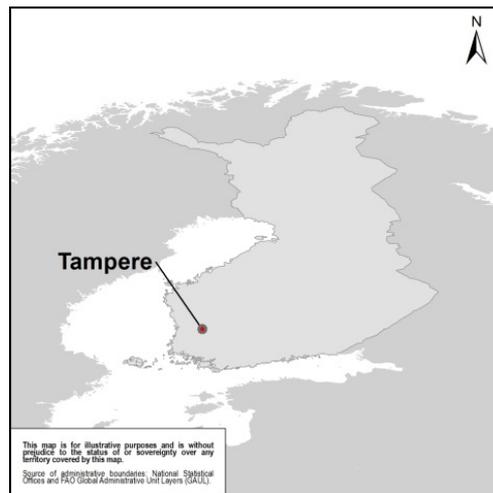


Figure 13.2. Tampere region



Source: Council of Tampere Region.

The city of Tampere is the major municipality in the region and has a population of 223 292, while the Tampere Region had 503 758 inhabitants in 2015 (Statistics Finland, 2015). The city of Tampere is Finland's third most populated city, and the largest inland city in the Nordic countries. Every fifth person in the city of Tampere is a student.

Tampere has about 40 000 university students and more than 34 000 vocational college or adult students. The region’s population grew by 16.85% in the period from 1990 to 2013, much higher than the national average of 9.09% (Newcastle University, 2014). The population is estimated to grow by an additional 90 000 inhabitants by the year 2030 (Invest Tampere, n.d.).

At the end of December 2015, the unemployment rate in the region stood around 16.4%, with 39 857 unemployed jobseekers. The rate was higher in the city of Tampere, at 18.9%, with 21 356 unemployed jobseekers (City of Tampere, 2016). The city’s unemployment rate was approximately 10.0-15.5% between 2004 and 2012 (Table 13.1).

Table 13.1. **Unemployment rate in the city of Tampere and Finland, 2004-12**

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Tampere	13.4%	12.5%	10.9%	10.4%	11.3%	15.5%	13.8%	12.6%	14.2%
Finland	8.8%	8.4%	7.7%	6.9%	6.4%	8.2%	8.4%	7.8%	7.7%

Source: Statistics Finland; International Monetary Fund, IMF World Economic Outlook <http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/weorept.aspx?sy=2000&ey=2014&scsm=1&ssd=1&sort=country&ds=.&br=1&c=172&s=LUR&grp=0&a=&pr1.x=39&pr1.y=15> (accessed on 10 May 2016).

## Challenges for Tampere’s resilience

Tampere has a continuous tradition of innovation and change throughout its history of more than 200 years. It has faced and, by continuously developing its innovation strategy, successfully managed, various structural changes. This started with the cradle of the Finnish industrialisation in the 19th century and continued through its manufacturing heyday in the 1960s. It moved on towards a university-driven knowledge economy, becoming a Nokia-led global ICT hub from the 1990s to the early 2010s (City of Tampere, 2015).

The Regional Development Act of 1994 laid the foundation for Finland’s contemporary period of regional innovation policy, as the country was recovering from the severe recession of the early 1990s. This marked the beginnings of a change in regional policy thinking. The paradigm shifted from growth triggered by external drivers such as investment and subsidies from the national government, to an “innovation-driven development” paradigm, aimed at mobilising local actors such as universities and existing companies to leverage indigenous assets for endogenous growth.

The innovation system in the Tampere Region was initially structured by a focus on a few core cluster areas, principally mechanical engineering and information and communications technologies (ICT). The most significant single private sector actor in the regional innovation system is Nokia in the ICT area. This global telecommunications corporation is named after the town in the Tampere Region, which was a wood pulp and rubber producer in the 19th century. After exploring development of mobile telecommunications, Nokia became a key part of the Finnish national innovation system in the 1990s, contributing a significant share of national gross domestic product (GDP) growth and exports, and in return receiving significant public support for research and development (R&D) and labour force development from the state through its technology agency and universities.

On the other hand, the large companies that predominantly constitute the region’s machine-building specialisation remain important, accounting for approximately 26% of total employment in the region in 2014 (City of Tampere, 2016). However, after the global financial crisis in 2008, this sector, the present-day legacy of the region’s

traditional heavy-industry base, has had to face lower demand and competitive pressures, leading to declining investment and employment in the sector.

### ***Leading innovation amid technological change***

Signal-processing technology, in which Nokia had a competitive advantage, was no longer seen as a strategically important component for the mobile phone industry. This technological change in the mobile phone industry obliged Nokia to change its business strategy and to downsize globally. Its workforce was reduced by 76 000 from a global total of 125 000 in 2008. A major wave of redundancies occurred in 2011 (Newcastle University, 2014). The negative impact of this downsizing was clearly shown in the drop in the regional GDP growth rate (Table 13.2). Persistent high unemployment in the region also suggests that the city needs to explore ways of creating more employment and increasing opportunities for job seekers.

Table 13.2. **Annual GDP growth rate in the Tampere Region and Finland, 2005-13**

	2005	2006	2007	2008	2009	2010	2011	2012	2013
Tampere	3.9%	2.1%	9.1%	3.6%	-10.8%	3.3%	7.8%	-1.6%	-1.2%
Finland	2.8%	4.1%	5.2%	0.7%	-8.3%	3.0%	2.6%	-1.4%	-0.8%

Source: Statistics Finland (n.d.) Annual National Accounts, [www.stat.fi/til/index\\_en.html](http://www.stat.fi/til/index_en.html) (accessed March 2016).

For roughly five years, it has been clear that the region's innovation system needs review. Concern has arisen about the competitive position of its dominant firms, whether in machine building or in ICT. The decline of Nokia and its related industries has highlighted the need for Tampere to develop a new innovation policy, encouraging a move away from the previous cluster-based emphasis on sectoral specialisation towards a focus on cross-cutting platforms that support more open innovation processes.

The region is now trying to adjust to the structural change in the economy. The key anchor institutions that supported the regional economy in the past, such as universities and corporate R&D facilities, are well embedded in the innovation system, and have started to make a successful transition to a more entrepreneurial and open mode of innovation, through their involvement in various platforms. This transition is likely to have an impact on unemployment.

## **Elements for building resilience in Tampere**

### ***Economy***

#### *The city's overall strategy supports cross-sectoral innovation*

The overall city strategy, "Tampere, working together for a bright future" (2013), provides a strong strategic background and policy framework for open government, open innovation and collaboration. The strategy was prepared by the City Council with an extensive analysis of the operating environment, City Council seminars, a brainstorming session organised by the Mayor, as well as various opportunities for participation for the city's residents, employees and stakeholders. The overall strategy describes the goal for the city in the year 2025 in a number of policy areas, such as creating more new businesses and improving the education sector, ensuring a continuing holistic approach to encourage an innovation-based economy.

The overall city strategy includes a programme to promote cross-sectoral innovation. Its new Open/Smart/Connected (O/S/C) strategy is based on three key elements: open innovation platforms, open data and interfaces, and open participation. Tampere aims to facilitate new digital services and smart urban living by providing open access to all information resources on urban development and everyday living. This involves engaging citizens in service, business and urban development, and shifting towards innovative, results-based public procurement based on an open dialogue with companies and citizens. These initiatives aim to encourage an active exchange of information, data and resources among different sectors and stakeholders.

Tampere has attracted a total of EUR 30 million for new projects and EUR 20 million of start-up support since 2012. In the same period, more than 100 new companies and more than 600 new knowledge-intensive jobs have been generated. The city's technology industry includes 2 800 companies and 34 000 employees, with a total annual turnover of EUR 7 800 million. Overall, the O/S/C strategy has encouraged innovation, and R&D activities offer significant employment opportunities. The Tampere Region is Finland's second-largest centre for research and development after the Helsinki conurbation, accounting for 13-15% of national spending on both private and public sector R&D (Tampere Region, n.d.). In recent years, total R&D expenditure in Tampere has totalled more than EUR 800 million annually, and EUR 927 million in 2013 (City of Tampere, 2015).

#### *New innovation platforms support new sources of economic growth*

The O/S/C initiative also builds on innovation platforms based in the universities. New Factory, for example, is a unique model for encouraging open innovation activity. It attracts multidisciplinary expertise to create innovation in over 1 100 m<sup>2</sup> of co-creation space located in the heart of Tampere. Since 2012, it has facilitated more than 600 projects with 300 partner companies and other partner organisations, generating 110 start-ups and more than 650 new knowledge-intensive jobs, and attracting EUR 18 million of funding for start-ups and innovators (City of Tampere, 2015).

The Demola project began operating at the New Factory in 2008, bringing together teams of university students in different disciplines from Tampere's three universities to develop products and services, together with companies and public sector organisations. The idea for Demola originated with researchers in the Nokia Research Centre and Hermia (the Technology Centre previously attached to the Science Park). Building on the Nokia Corporation's Open Innovation R&D strategy, they recognised that innovation was increasingly taking place across sectoral boundaries. Moving on from the established cluster structures promoted in the regional policy of the time, they wanted to engage universities and particularly students in this more fluent collaboration and co-creation process. Demola has developed into a European-wide ecosystem for collaborative innovation, and now operates in 12 cities in 9 countries, and has 40 university partners (City of Tampere, 2015).

Mediapolis, established in 2013, is another platform in Tampere to promote the media and digital industry. Its content production and ICT campus hosts more than 30 firms and other organisations. The single largest group consists of production companies, while the largest individual organisations include the Finnish Broadcasting Company (Yle), as well as two educational institutions providing media programmes, Tampere University of Applied Sciences (TAMK) and Tampere Vocational College (Tredu).

## ***Society***

### *Tampere's universities' role in advancing innovation*

Tampere's O/S/C strategy closely involves its three universities and world-class technology industry in innovation. The University of Tampere, Tampere University of Technology and Tampere University of Applied Sciences, with a total of 38 000 students, are key operators at open innovation platforms on campus, where they run interdisciplinary innovation and business-university co-creation programmes. As a result of the success of the O/S/C strategy and such projects as Demola, Tampere 3, a project to merge the three universities, was launched in 2014 to facilitate collaboration.

### *Universities help train a highly skilled workforce*

The two main universities in the region and their research resources reliably produce highly skilled graduates. The Finnish higher education system in the past two decades has focused on large-scale investment to meet the labour market needs of the knowledge economy, expanding the number of graduates in information technology, media and engineering. The Tampere University of Applied Science and a number of vocational schools also focus on industry-relevant technical skills.

### *Primary education plays an important role in promoting an entrepreneurial culture*

Primary schools are also engaged in O/S/C activities, through entrepreneurship education and pilot programmes. Tampere schools are actively involved in a Finnish education innovation project, "Me & MyCity". This is a learning environment where sixth graders work in a profession and function as consumers and citizens as part of society. In November 2015, the city of Tampere was awarded the "Finnish Schools on the Move" award for national best practice in promoting a physically active culture in Finnish comprehensive schools, and for cross-sectoral co-operation (City of Tampere, 2015).

## ***Environment***

### *Tampere's urban development projects encourage innovation*

Tampere's O/S/C strategy builds on an innovation platform, *Oma Tesoma* ("my own Tesoma" in Finnish), launched in 2013 and based on one of its urban districts. Tesoma, originally built in the 1960s and 1970s, is a diverse city district of 20 000 inhabitants. Under the programme, the city district is being developed as an innovation district. Companies, residents and local communities are encouraged to generate service innovations, business opportunities, attractive living environments, and economically viable and sustainable urban areas. Investments of EUR 90 million were already planned and agreed in 2012-15 to support the programme, and to be implemented in 2013-18, including a health and well-being centre (City of Tampere, 2015). Residents of Tesoma are actively involved, through measures such as participatory budgeting, to ensure that the programme is relevant to the needs of stakeholders.

Tesoma is the first instance in Tampere's O/S/C strategy in which innovation platform activity has been integrated into urban development policies and projects. The results and experiences of *Oma Tesoma* will be scaled up for other major urban development projects and investments. The total value of new investments to be

implemented under the O/S/C strategy by 2030, such as transport infrastructure and new residential areas, will be as much as EUR 3 billion (City of Tampere, 2015).

### *Tampere plans to encourage sustainable mobility*

Efficient public transport systems connecting different areas of the city can facilitate collaboration between different universities, businesses and other stakeholders. Plans are under way for the construction of a light rail system to replace some of the city's most popular bus lines, as well as commuter rail service on the railroad lines connecting Tampere to the neighbouring cities of Nokia and Lempäälä. The tram network is projected to carry 47 700 passengers daily on weekdays. The route would serve four university campuses, with a combined student population of 40 000 (Railway Gazette, 2014). Work on the first section from Hervanta to the city centre could start in 2016, for a planned opening in 2018-19. This would include a depot in Hervanta, as well as an automatic tram control and information system. Later phases would build a branch east to the central hospital for EUR 20 million, and extend the main route to Lentävänniemi in the northwest of the city at a cost of EUR 60 million. All three phases are expected to be completed by 2022.

### ***Institutions***

#### *Tampere's budget reflects its overall strategy and monitors its performance*

The city of Tampere developed the city's overall strategy "Tampere, working together for a bright future" (2013) while consulting with a number of stakeholders in the region. To ensure that the strategy and related programmes would serve as tangible action plans for all stakeholders and guide their operations to promote innovation, the annual budget is allocated to specific objectives outlined in the strategy. Progress towards operational objectives is assessed in the annual report and financial statements. The data are also used to review and update the city's strategy (City of Tampere, 2013).

#### *Tampere collaborates with neighbouring municipalities*

Historically, the city of Tampere is actively taking a collaborative approach with the Council of Tampere Region. This approach was particularly effective in handling Nokia's downsizing and in exploring new innovation strategies, when metropolitan scale policies are needed. The city of Tampere has also developed several municipal services and land-use planning solutions in close co-operation with the other municipalities in the metropolitan area.

Several formats of collaboration with neighbouring municipalities are also playing key roles, in which the city of Tampere and Tampere Region are the main players.

- The Tampere Region Economic Development Agency (TREDEA) promotes the business development in Tampere Region. TREDEA was established in 2009 and is predominantly owned by Tampere (60%), with the remaining 40% stake held by seven surrounding municipalities. TREDEA provides free services, information and assistance to firms and individuals hoping to invest in or start a business venture in the region. TREDEA was instrumental in leading the region's international marketing on tourism, investment and innovation. It manages Tampere Region's marketing strategy through the website "Tampere – All Bright!" ([www.tampereallbright.fi](http://www.tampereallbright.fi)). This brand is aimed at international marketing, and its goal is to present the advantages of the

Tampere Region in tourism, living, innovations and investment opportunities. The brand frames regional marketing.

- The Baltic Institute of Finland (BIF) promotes inter-regional co-operation, including Tampere. The BIF was established in 1994 as a non-profit foundation to promote Finnish participation in the Baltic Sea region after the collapse of the Soviet Union. The city of Tampere sponsors and hosts the Baltic Institute (Newcastle University, 2014). The BIF board members are drawn mainly from the city of Tampere, the Council of Tampere Region, and the Tampere Chamber of Commerce and Industry, as well as from universities and the Ministry of Employment and the Economy. The BIF has also been active in securing a number of European projects and developing networks that are broadly relevant to a smart specialisation agenda in Tampere. For example, the BIF currently represents the Tampere Region in the INTERREG IVC projects Smart Europe and TR3S (Towards Regional Specialisation for Smart Growth Spirit), which involves knowledge exchange between government and other organisations from, respectively, 11 and 9 regions in EU member countries (Newcastle University, 2014).
- The O/S/C strategy also plays an active role in co-operation with European partner cities and regions. The Tampere strategy correlates strongly with priorities and flagships of Europe 2020. It follows the priorities and activities of the Horizon 2020 Work Programme 2016-17, such as smart and sustainable cities, promotion of healthy ageing and personalised healthcare, and piloting of demand-driven collaborative innovation models in Europe.

#### *National policies support Tampere's innovation-based economy*

Finland's national "INKA-Innovative Cities" programme was launched in 2014 to create competitive, high-tech companies and promote the emergence of innovation clusters. The programme's aim is to generate new business and new companies from high-quality competences, creating more jobs. The programme is based on close local co-operation and pooling of resources between science, education, companies and the government. The Ministry of Employment and the Economy has approved five national themes for the programme and named the urban regions responsible for leading the work. Of its five themes, "Smart City and Renewable Industry" is the focus of the Tampere Region. The Smart City theme will link new technologies to urban development. Through projects that involve a citizen-focused user-driven dimension, it aims to promote local service and social innovation, as well as to exploit market opportunities by developing exportable business or service models.

Tampere also plays a key role in another national strategy, "The Six City Strategy – Open and Smart Services (2014-2020)", aimed at sustainable development for the six largest cities in Finland. Tampere leads the Six City Strategy spearhead project on open data, and has an important role in the spearhead projects on open innovation platforms and open participation.

## **Conclusions**

- Moving away from a sector-specific innovation strategy to more cross-sectoral innovation enables Tampere to break down silos and improve the exchange of expertise, contributing to the development of more adaptive and flexible innovation.

- Tampere’s approach to promote innovation in co-operation with universities in the city has proved successful, particularly in terms of skilled human resource attraction and retention. Its new Open/Smart/Connected (OSC) strategy has led to the development of open innovation platforms such as Demola and fostered a culture of entrepreneurship, enabling university researchers and students with different areas of expertise to form a cross-sectoral innovation policy.
- Working closely with the Tampere Region enables the city to develop an integrated approach to advance innovation and sets a good example of multi-level governance.
- Further efforts could be made in order to take advantage of innovation and related industries to create more jobs and reduce unemployment in the city.
- Tampere should consider further to reduce the high unemployment. Measures to encourage unemployed residents to take part in the labour market could be further developed and promote social cohesion in the city.

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