CITIES & ECONOMIC CHANGE

2

Cities, Technologies and Economic Change

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Technologies have been instrumental in the formation and growth of cities since the dawn of urbanization (Childe, 1950). 'Technologies' are a wide-ranging, nearly all-encompassing concept that can span such innovations as the plow, irrigation, writing, record keeping, and the transmission of information through time and space to the point today whereby electronic innovations permit personal and targeted interactive networking and the ability to tap into seemingly infinite sources of information. This chapter examines some of the principal developmental relationships of these new information and communications technologies (ICTs) to city-regions and resultant economic change in the context of today's globalized economy. Often, technologies, especially material infrastructure, and information technologies (IT), are conceived as development ends in their own right. However, ICTs should be seen as means to the more strategic ends of creating innovative knowledge for the marketplace and the societal advancement of Intelligent Development of places, city-regions and national territories.

Technological innovation is a critical instrument for changing places. The basic thesis of this chapter is that knowledge can be used by stakeholders to take informed action and influence decision-making to improve the development of places – especially city-regions where most people live and work today. Such development, to be intelligent and effective, requires a working understanding of the roles and impacts that contemporary information and communications technologies have had and can have.

In order to plant the seeds of mobilization for the practice of intelligent urban regional development, five substantive points are discussed: (1) technopoles; (2) deepening of urban technological change; (3) competitive advantage; (4) resulting new urban spaces; and (5) impacts on urban labour markets. The chapter concludes by discussing some over-arching issues about technology-based urban development. Thereby, the reader is challenged to use the understandings that have been gathered from the chapter to make informed and on-going contributions to the improvement of their own city-region's future development and to an improved civic society.

The chapter is framed and referenced with the intent that readers, students and teachers might derive knowledge and follow a pedagogic strategy to learn the content and issues raised in this discourse; the goal is for readers to devise, perfect and practise their own self-designed learning strategy for customizing and selective application. Given the limitations of space, the Asia-Pacific region of the global economy is used as a principal touchstone and empirical source for grounding the discussion. In the Asia-Pacific, the developed global north would include Japan, Korea, Macau, Hong Kong, Taiwan, Singapore, Malaysia, Australia and New Zealand, while the emerging global south would include all remaining countries, such as India, China, Indonesia and others. The Reference section includes a deep selection of resources that facilitate readers to emulate the chapter's approach for analyzing the urban, technological and economic relationships within and across other major regions of the global economy. Refer to the box on 'Pedagogy and Learning' below.

Pedagogy and Learning

For the learner, the new economy has yet another critical meaning; we are in a globalized information society. This also brings the challenge of path dependence. The legacies of the old economy's muscular mindset shape dated interpretations and expectations, and require us to revisit concepts and issues in light of the new economy. Whether teaching, learning, or researching cities, technology and economic change today, it should be remembered that these subjects and relationships are complex and highly dynamic. Therefore, *it helps to have a framework to impose some working conceptual order*. For example, the ALERT Model and the concept of comprehensive Intelligent Development strategy are suggested as organizing frameworks for aiding understanding and the taking of informed collective civic action (Corey and Wilson, 2006; Wilson and Corey, 2008). An additional useful approach is to select theory-driven organizing strategies such as growth poles, or life-cycle concepts, clusters, or technopoles as means to understand complex empirical realities and in the process be positioned to take informed action as a result of improved understanding (Plummer and Taylor, 2001a, 2001b).

One might design such a self-learning and or pedagogic process first by selecting a city-region as a *benchmark* and *'good' practice* against which comparisons might be made (Vettoretto, 2009; Corey and Wilson, 2010; Ward, 2010). Another approach could be via a manageable set of criteria such as per capita income or internet penetration per 100 population (Table 2.3) across the Asia-Pacific. These can serve as basic organizing means for identifying and learning about socio-economic development issues, places, their spatial organization and changing relationships across a range of development from developed global north economies to emerging global south economies and selected gradations in between.

To begin an exploration analogous to the research that produced this chapter, one might study data and narratives on the global knowledge economy and global information society as a whole for context and then drill down into such country aggregations as Latin America, the Middle East and North Africa, Sub-Saharan Africa and parts of the less technologically developed countries of Asia; such studies will provide insights into the global south. The global north, at varying levels of technological development, might be studied similarly by exploring Western Europe, North American data and narratives; Eastern Europe and Russia will reveal different levels of technology-based development measures. For data (Table 2.3) and analysis, see: Taylor and Walker, 2004; World Bank, 2006; Huggins et al., 2008; Foster and Briceno-Garmendia, 2010; International Telecommunications Union, 2010; Internet World Stats, 2010; Taylor, 2010; and World Bank, 2010. For selective narratives, see Hall and Pain, 2006 for some city-regions of Western Europe; for the tropical internet, see Warf, 2007; for the Arab internet, see Warf and Vincent, 2007; for Australia, see Plummer and Taylor, 2001b; West, 2001; Yigitcanlar et al., 2008.

CITY-REGIONS AS CENTRES OF TECHNOLOGICAL INNOVATION

The reasons for exploring these relationships are: (1) to *understand* the dynamics that underlie informational technologies and their interaction with the development of city-regions; and (2) to engage in informed decision-making and planned *actions* to contribute to a more civil society. As citizens of an increasingly interdependent global economy and fragile global environment, each of us has a responsibility to contribute to the common good.

Today, half of the world's population lives in cities (Seetharam and Yuen, 2010). Urban places have been dominant as locations where information-based technologies, intelligence and knowledge have been combined to generate economic growth that has been characterized as the *new economy*. William Beyers has offered thoughtful analyses on defining the new economy (Beyers, 2002), which he concludes is one with: (1) relatively high multi-factor productivity growth; (2) relatively high levels of capital investment in information technologies; and (3) structural changes in production and consumption of ICT (Beyers, 2008).

The term 'city-region' is used here as a reminder that we are concerned with cities, the functionally connected areas and places nearby, and the distant locations linked remotely by networked information technologies. This more encompassing concept of the city-region better represents the 'city' realities of today's highly connected and layered global knowledge economy and network society.

These new-economy dynamics have produced complexities that are understood more effectively when *conceptual frameworks* are used for organizing and analyzing urban dynamics. For example, in the British framework for sustainable communities:

> City-Regions are the enlarged territories from which core urban areas draw people for work and services such as shopping, education, health, leisure and entertainment. The city-regional scale also plays a significant role for business in organizing supply chains and accessing producer services. The City-Region is therefore an important *functional* entity. (Office of the Deputy Prime Minister, 2006)

City-regions also have been used by scholars to identify issues and possible implications for local development as a result of the new-economy forces of globalization (Scott, 2001b). In the context of economic globalization, the city-region is the principal working local unit of observation.

THE TECHNOPOLE THESIS

In 1994, Manuel Castells and Sir Peter Hall published their book, *Technopoles of the World: The Making of 21st Century Industrial Complexes*. This timeframe coincided with the widespread adoption and dissemination of the internet. It also was an ideal time for researchers to assess the shift from traditional manufacturing production to more high-technology production of not only goods but also advanced services (compare Scott, 1993; Hutton, 2004; Daniels et al., 2005). *High-technology* production may be defined as having significant investment in research and development (R&D) related occupations and employment, as well as significant investment in the creation and production of new technologies, new products and new kinds of services (Corey and Wilson, 2006: 202–03). Conferring priority on such innovation is intended to transform production processes and result in higher economic productivity, greater profit, wealth creation and enhanced competitiveness for the participating stakeholders, investors and the place and country hosting these clusters of such science and technology (S&T) based and R&D functions.

The French and Japanese have framed such hosting environments for technology-facilitated R&D as 'technopoles'. Castells and Hall adopted the term and the concept of technopole to organize and focus their research and findings, which they portray as the:

> social, institutional, economic, and territorial structures that create the conditions for the continuous generation of synergy and its investment in a process of production that results from this very synergistic capacity, both for the units of production that are part of the milieu and for the milieu as a whole. (Castells and Hall, 1994: 9)

Castells and Hall used four empirical classifications for technopoles: (1) '*industrial complexes* of high-technology firms that are built on the basis of innovative milieu. These complexes, linking R&D and manufacturing, are the true command centers of the new industrial space' (Castells and Hall, 1994: 10). Examples include Silicon Valley, California and Route 128 in the Boston region; (2) *Science cities* are complexes not necessarily co-located and directly connected to informing manufacturing innovation. Tsukuba, Japan is an example; (3) *Technology parks* and science parks that seek to attract high-technology manufacturing firms to city-region space set aside and planned specifically for such development, such as Sophia-Antipolis in southern France; and (4) The case of *an entire national-scale developmental programme of technopoles planned for Japan*. The purpose of Japan's Technopolis Program was to de-concentrate Tokyo-region development and in turn to enhance development of other targeted regions (Malecki, 1997: 265–6). Additionally, (5) Castells and Hall discovered that beyond the spontaneous and planned technopoles, they concluded that '*the great metropolitan areas of the industrialized world*' should be studied for their innovative milieux and role as advanced manufacturing centres; such as Tokyo, Paris and London (1994: 11, italics added).

The Asia-Pacific region is already heavily urban, containing most of the world's largest urban regions. Asia includes 63% of the world's urban population and 253 major metropolitan areas (Seetharam and Yuen, 2010). Much of global urban growth in the future will be in Asia. The emerging economies of population and areal giants China and India in particular will generate significant urban growth. By 2030, China will be 65% urban, bringing up issues of housing, quality of life, and sustainability (UN-Habitat, 2010b).

Table 2.1 Major technology policy initiatives in China since the reform

Year	Policy initiative
1978	First National Science Congress, held on 18 March
1982	Key Technologies Research and Development Program
1985	Decision on the Reform of the Science and Technology System, issued after the National Working Conference of Science and Technology
1986	High-Tech Research and Development Program (Program 863)
1988	Torch Program
1990	First group of 27 high-tech parks set up
1991	The first high-tech park (Zhongguancun High-Tech Park) established
1993	Technology Progress Law enacted
1995	Decision on Accelerating Science and Technology (S&T) Development announced by the State Council
1995	211 Program to construct 100 top universities in the 21st century
1996	Technology Transfer Law enacted
1997	National Program for Priority Basic Research and Development (Program 973)
1998	Knowledge Innovation Program (1998–2010) to improve the scientific performance of the Chinese Academy of Sciences and build it into China's pre-eminent S&T centre for innovation capability
1999	Decision on Enhancing Technology Innovation, High-Tech Development and Industrialization issued
2006	Medium- and Long-Term National Plan (MLTP) for Science and Technology (S&T) Development 2006–2020 to promote a S&T development strategy and enhance innovation capacity. Selective development is to occur in energy, water resources, environmental protection, innovation in information technology, new materials, advanced manufacturing technology, and bio-technology
2006	The 11th Five-Year Plan on Western Region Development
2006	National S&T Development Plan for the 11th Five-Year Period (2006–2010)
2008	China Association for Small & Medium Commercial Enterprises to enhance innovation capacity and market competitiveness of domestic firms
2008	The Thousand Talents Program to connect domestic scientists with global first-class researchers by bringing to China overseas expatriates
2008	Framework for Development and Reform Planning for the Pearl River Delta Region (2008–2020)
2011	The 12th Five-Year Plan (2011–2016) will have many technology, science and knowledge initiatives that build on and extend current technology policies

Source: Summarized by the authors; see Fan and Wan (2008: 11); and CORDIS (no date)

China, India and other Asia-Pacific places can illustrate the dynamics and relationships of the technopole (Phillips and Yeung, 2003; Koh et al., 2005; and Walcott and Heitzman, 2006). To stimulate science and technology-facilitated and knowledge-based economic growth for the future, *research and development-centred policies* (see Table 2.1) have been planned and implemented in numerous locations across China. One of these important programmes was the early development of technopoles in the forms of high-technology zones and high-technology parks. What are some of the key lessons to be taken from these first-generation Chinese technopoles?

In the late 1980s, 52 High and New Technology Industry Development Zones were established throughout China. Researchers found that these technopoles or 'the high-tech zones in coastal provinces, perform only slightly better than those in interior provinces' (Wang et al., 1998: 293). It was found that interior provincial capitals can compete with coastal cities in the development of high technology industries. *Distinct Chinese characteristics* were attributed to this counter-intuitive finding. Because of their political status, provincial capitals are privileged by government investments as construction of infrastructure for communications, international airports, and logistics facilities. Such capitals often have research institutes and higher education institutions in proximity. Producer services and business services in capital city-regions are needed to support research and learning institutions as well as government; so banks and financial services, along with other services such as management consultancy, market research, advertizing and legal counsel, are attracted to capitals.

Among the range of six types of ownership and as measured on a per employee basis, *overseas-invested*, *joint-stock* and *privately owned* enterprises outperformed the other three types, which included the *state-owned*, the *collectively-owned* and *other enterprises* of different ownership types, such as co-operatives, with no overseas investment (Wang et al., 1998: 293 & 295).

ADVANCED TECHNOLOGY AND THE 'TECHNOLOGICAL DEEPENING' OF THE CITY-REGION ECONOMY

The early adoption of technopoles laid the R&D groundwork for much of China's science and technology based economic growth. In this section, recent technological deepening and the evolution of the urban knowledge economy are examined. How has the technopole thesis fared as an early organizing and inspirational concept for urban-regional economic growth in China?

Early technopole initiatives were characterized by interdependencies with manufacturing, and more recently a mix of high-technology manufacturing-oriented R&D and knowledge-oriented advanced services R&D (Malecki, 1997: 265). First generation science parks did not seem to create the synergies necessary to be self-sustaining; spin-offs and local linkages had not yet emerged in various high-tech centres in the United Kingdom, Germany, Japan and Korea (Malecki, 1997: 270–1). French technopoles also experienced mixed results as they matured (Chordá, 1996). In contrast, South Korea's mature technopole, Taedok Science Town, has been judged to be successful (Oh, 2002).

Returning to the case of China's technopoles, Hu's research into High- and New-Technology Parks illustrates more recent (1992–2000) performance in high-tech R&D based economic change and growth in China. Hu's research results:

> provide no evidence that firms benefit from concentrating in technology parks or being close to a large metropolis. However, I do find that these firms are more productive when their host city receives more FDI [foreign direct investment], although this may not necessarily be in the form of spillover. (Hu, 2007: 86)

His analyses also revealed that in their early development stages, these technology parks slowed the regional inequality divide between the interior technology-park technopoles and their coastal-region counterparts. However, this effect was not strong enough to reverse the trend of regional inequality. Without evidence of knowledge spillover and with a strong trend of fast converging labour productivity growth, the high growth of Chinese technology parks seems influenced by preferential policies such as tax breaks that operate to generate the return on investment. These conclusions raise the question of whether the growth of these technology parks can be sustained once policy supports are ended and if no external economies are captured.

In the aggregate, China's full range of technology, science and knowledge based urban places, including the various types of Chinese technopoles, have combined to

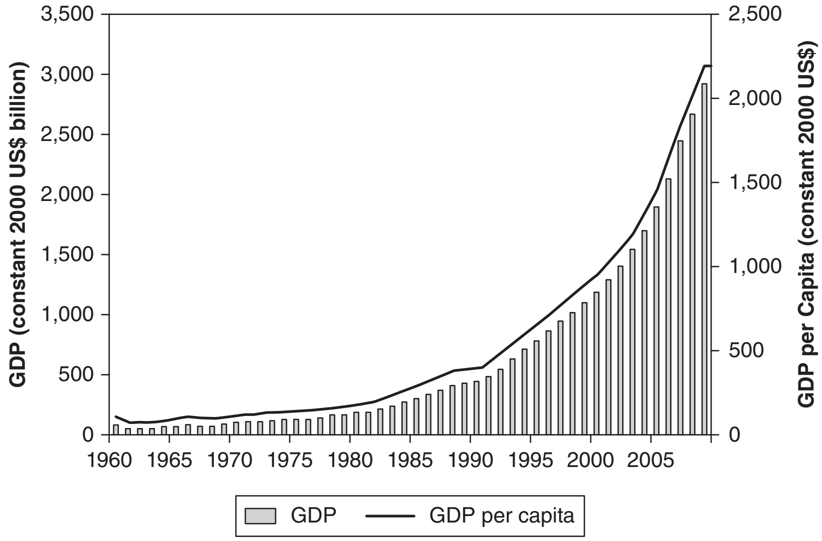

Figure 2.1 China's economic development 1960–2009

Source: World Bank (2010)

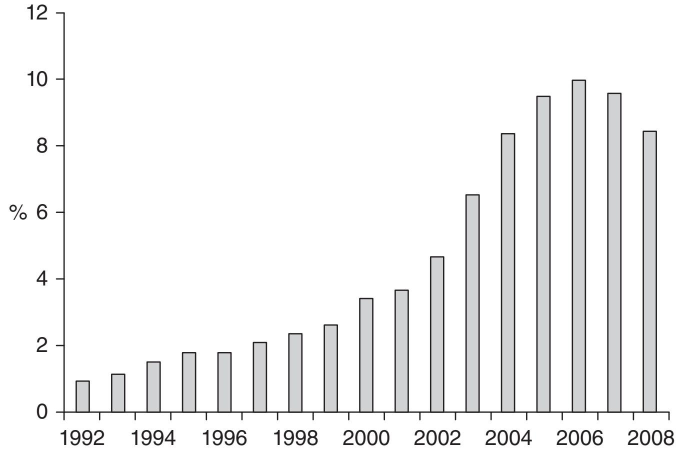

Figure 2.2 High-tech exports as a percentage of China's GDP

Source: World Bank (2010)

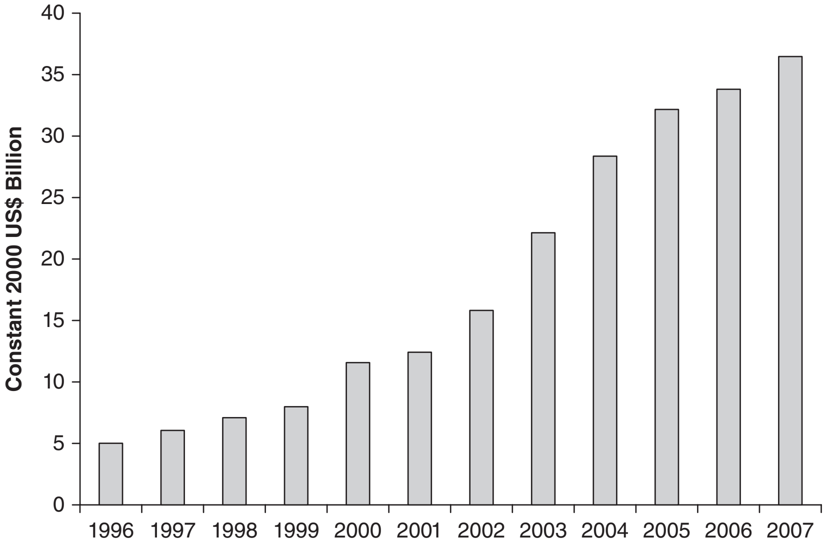

Figure 2.3 China's R&D expenditure

Source: World Bank (2010)

produce high rates of economic growth. Its great city-regions' high- and new-technology industrial and knowledge complexes, plus China's local-government technology parks have contributed to GDP growth, high-technology exports and increasing R&D input and output. Refer to Figure 2.1 China's Economic Development 1960–2009; Figure 2.2 High-tech Exports as a Percentage of China's GDP; Figure 2.3 China's R&D Expenditure; and Figure 2.4 China's R&D Expenditure as a Percentage of GDP.

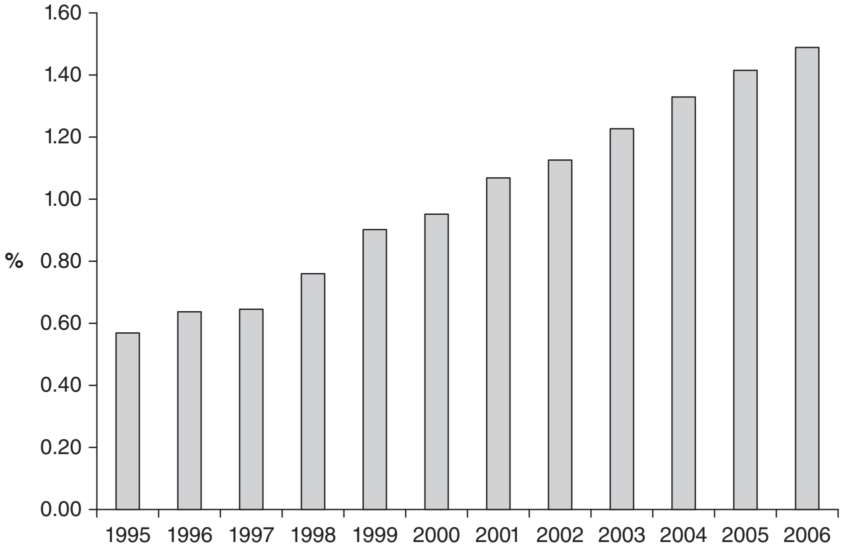

Figure 2.4 China's R&D expenditure as a percentage of GDP

Source: World Bank (2010)

In 2007, there were 56,047 certified high-tech companies in China (Zhou and Yang, 2010) and 48,472 of these enterprises were in high-tech zones (National Bureau of Statistics, 2009). Thus, 86% of China's high-tech companies were located in high-tech zones in 2007. This and the economy's overall performance have enabled China, over the last decade, to grow its R&D expenditures at a dramatic 19% in inflation-adjusted dollars (National Science Board, 2010: 4–5).

Technology has been a significant part of GDP growth. Using the production function to explain the sources of growth for China, Fan and Wan (2008) decomposed the growth of GDP into three parts: capital, labour and technology. Over 1981–2004, technology contributed on average 49% economic growth (Fan and Wan, 2008: 10–11); ranging as high as 72% and as low as 39%. See Table 2.2 which decomposes the GDP growth into the three factors: capital, labour and technological progress. The details of the Total Factor Productivity decomposition method are described by Fan and Watanabe (2006: 305–7; Fan, 2011).

In recent years, these patterns have been characterized as *new economy*; 'this paradigm is based on the notion that productivity increases observed since the mid-1990s have been based (in part) on the cumulative impact of information technologies, which have finally raised multi-factor productivity levels for a window of time' (Beyers, 2008: 1). In addition, to the relatively high multi-factor productivity growth, the new economy has high levels of capital investment in IT and the new economy manifests structural changes in production and consumption of IT, including growing consumer demand in services.

China's state-led macro-economic strategic planning and policies implementation have allowed it to accelerate and modernize the science and technology (S&T) capacity

Table 2.2 Contribution of technology progress to economic growth in China 1981–2004

Time Periods and Sectors	% Contribution
1981–1985	
Technology Progress	41.0
Labour	18.0
Capital	42.0
1986–1990	
Technology Progress	52.0
Labour	19.0
Capital	29.0
1991–1995	
Technology Progress	43.1
Labour	05.7
Capital	49.6
1996–2000	
Technology Progress	72.1
Labour	08.1
Capital	19.8
2001–2004	
Technology Progress	38.8
Labour	06.1
Capital	55.1

Source: Calculations based on data from World Bank, 2006

of its economy. China's technology and scientific knowledge have been and can be expected to be advanced and extended by means of continued major R&D investment. Since the initiation of the reform period in the late 1970s and early 1980s, central government economic development policies have been dominant. The policies also demonstrate increasing interest in investment shifts that reflect both internal maturation of high-technology development and more targeted and selective new-economy investment strategies. See Table 2.1 'Major technology policy initiatives in China since the reform', e.g. note the 2008 Thousand Talents Program.

Already China has more researchers than any other country. By means of such initiatives as the Thousand Talents Program and other targeted development policies, China is competing globally for human capital, commodities and other resources that are needed to continue its drive toward prosperity. After many generations of having been exploited by foreign powers, China now is on the economic and political ascendancy and is regaining its former position as a world power.

Technology, infrastructure and place qualities will be even more critical as China pursues its high-technology development goals. As other countries have learned, China will perfect its planning and implementation for the next generation of high-tech centres and technopole hubs. The US National Research Council foresees China preparing for the realization of these high-tech development goals by establishing 'modern facilities built around innovation-technology-education clusters' (2010: 31) and investing in education, infrastructure, and ICT networks and databases (National Research Council, 2010: 26).

Such developments might be located not only in the larger city-regions of the eastern and coastal provinces, but also in interior locations in secondary and third-tier city-regions. The intent might be to stimulate high-technology development and R&D investment with growth-pole (Plummer and Taylor, 2001a: 222–3) aspirations in mind. In the meantime, foreign and outside investors will continue to be interested in less risky locations such as the Pearl River Delta region (Wei, 2007: 29–30). Recently, for example, Guangzhou and Singaporean investors signed a contract to establish a joint venture to create Guangzhou Knowledge City. The ultimate multi-billion yuan city project is intended to attract knowledge-based industries, skilled personnel and talent in eight sectors: information technology; bio-technology and pharmaceuticals; energy and environmental technology; advanced manufacturing; creative industries;

Table 2.3 Internet penetration as a percentage of population selected Asia–Pacific economies. *Updated 30 June 2010 and 30 September 2010

Political-Economy	% Population
New Zealand*	85.4
South Korea	81.1
Brunei Darussalam	80.7
Australia*	80.1
Japan	78.2
Singapore	77.8
Taiwan	70.1
Hong Kong, SAR, China	68.8
Malaysia	64.6
Macao, SAR, China	49.5
China	31.6
Philippines	29.7
Vietnam	27.1
Indonesia	12.3
Pakistan	10.4
Sri Lanka	08.3
Laos	07.5
Bhutan	07.1
India	06.9
Nepal	02.2
Cambodia	00.5
Bangladesh	00.4
Myanmar	00.2

Source: Internet World Stats, 30 June 2010 and 30 September 2010* education and training; health and wellness; and research and development. By 2015, the development should host 500 companies and contribute 20 billion yuan to the GDP; by 2030, the Knowledge City should house 300,000 residents and generate 300 billion yuan for the economy (Low, 2010).

TECHNOLOGY AND COMPETITIVE ADVANTAGE WITHIN URBAN SYSTEMS AND HIERARCHIES

This is a useful place to remind ourselves that our mindset for analyzing and planning informed action for cities, technologies and economic change is derived from applicable theory and best practices (Vettoretto, 2009). Competitive advantage is an aggregate of behaviours and processes that 'endow some regions, places, and nations with more success than others (Plummer and Taylor, 2001a: 226–7). Such behaviour is practised by business enterprises, institutions, governments and individuals. Regional competitive advantage can be earned from the sum of these behaviours leading to successful productivity, effective strategy, rate of creativity, responsiveness to demand, focus of demand, return on investment, and among other attributes, the integration of the firm and or a locational clustering of related and supporting enterprises into the city-region's agglomeration of externalities of skilled labour availability, learning, technology, and innovation (Plummer and Taylor, 2001a: 227).

As competitive advantage is considered in the context of the interdependencies of city-regions, technologies and economic change, it is imperative to employ a *relational mindset*. Henry Wai-chung Yeung counsels not to put sharp edges on our conceptualizations (Yeung, 2002). Yeung offers a visual framework of three relationalities that portray the interactions and connectivities among: (1) actors and their various institutional structures; (2) hierarchies of scale – local, regional, national and global; and (3) socio-spatial themes that may be framed as economic, social and political (Yeung, 2005: 43–4). The latter element may be extended thematically to include culture and creative enterprises, the natural environment and so on. It is through the continuous practice and application of relational theory to the empirical contexts of cities, technologies and economic change that one will uncover stimulus-response understandings and be positioned to offer insight into the possible actions and interventions needed to enable imaginative and responsive planned futures scenarios to be constructed so as to realize Intelligent Development (Corey and Wilson, 2006, see especially pp. 214–16; and 131–8).

Competitive advantage within the context of the global knowledge economy has been explored by Robert Huggins, Hiro Izushi and their colleagues at the Centre for International Competitiveness, University of Wales Institute in Cardiff. This work offers us some operational insight into the comparative *competitive advantage* of 145 city-regions across 19 knowledge economy benchmarks. The places span the wide range of knowledge-based and technology-facilitated city-regions from one end of the global north to the other end of the global south. These data were used to construct a composite index of the global economy's leading sub-national urban regions. The

Huggins and Izushi group now has generated five editions of the *World Knowledge Competitiveness Index* (WKCI). They define competitiveness as:

> [the] capability of an economy to attract and maintain firms with stable or rising profits in an activity, while maintaining stable or increasing standards of living for those who participate in it. … Competitiveness … involve[s] balancing the different types of advantages that one place may hold over another – the range of differing strengths that the socio-economic environment affords to a particular place compared to elsewhere. (Huggins et al., 2008: 1)

High technology and information technology indicators, among others, were used to take the pulse of and to monitor the regions. Focusing on these benchmarks, the WKCI framed three as 'Knowledge Capital Components', including government and business R&D spending and patents registered. In recognition that local investment in ICT infrastructure is critical in today's economy, the WKCI has framed five 'Knowledge Sustainability' indicators, including secure servers, internet hosts, broadband access, and public spending on education.

The Index is composed of three additional categories of indicators including 'Human Capital Components' of employment levels in IT, bio-technology, automotive and mechanical engineering, instrumentation, high-tech services, and management. 'Regional Economy Outputs' include labour productivity, earnings and unemployment, while 'Financial Capital Components' are represented by private equity investment.

Some of the highlights of the 2008 *World Knowledge Competitiveness Index* (WKCI) include the leadership role of Silicon Valley (San Jose-Sunnyvale-Santa Clara city-region) followed by the Boston region. Among the top 20 knowledge-competitive urban hubs are: three additional New England city-regions (two from Connecticut and one from Rhode Island); five more from California; two from Sweden; two from Japan; two from Michigan; and one each from Iceland; the Netherlands and Finland. The global south city-region representatives are from the emerging economies of China and India, including eight from China/Hong Kong and three from India.

Additionally, the WKCI-2008 digs deeper into China's urban knowledge-hub concentrations. Special analyses were provided for the three principal regional clusters of the Bohai Gulf Region (cf., Zhou, 2008), the Yangtze Delta Region and the Pearl River Delta Region. A special insightful feature of Chapter 8 of the WKCI-2008 document is an integrated discussion of the policy mechanisms, the performance outcomes that are attributable to the particularities and unique enterprise cultures of these three regions as their development paths have evolved to date (Huggins and Luo, 2008: 34–46).

Huggins, Izushi and colleagues have developed a *body of findings* that enables us to delve deeper into some of the dynamics of competitive advantage within city-regional systems. A selection from this body of work includes: Huggins, 2000; Huggins and Izushi, 2002; Huggins and Izushi, 2007; Huggins et al., 2007; and Huggins, 2008.

TECHNOLOGY AND ITS ROLE IN SHAPING THE CITY-REGION SPACE-ECONOMY: CONCENTRATION AND DISPERSION

Since Castells and Hall published *Technopoles of the World* (1994), it was clear that technopoles could be attributed to several sets of forces and results. Using the life-cycle of French technopoles, Chordá has framed the dynamics producing technopole outcomes as: (1) the pole model; and (2) the agglomeration model.

The *pole model* is a land and building-property initiative to create a locationally focused cluster of supplier and user enterprises of high value-added technology-centred R&D activities on a site with strong investment and financial support from sponsors. 'The "pole" model is a top-down supply-led and purposeful approach, usually starting from scratch.' The *agglomeration model* seeks to take advantage of a spatially wide set of existing local and regional technological and R&D talents and occupations engaged in producing new and advanced services and new and advanced products. Multiple technological poles are usually established as parts of the agglomeration across the designated territory being branded (See Chordá, 1996: 147; and compare with Plummer and Taylor, 2001a, 2001b).

In this age of information society and the knowledge economy, what are the processes that stimulate concentration responses and dispersion responses? *Codified knowledge* principally is information that can be written and electronically transmitted easily – even over long distances via the internet. In contrast, *tacit knowledge* is impossible or much more difficult to write down; indeed it requires skilled experts or knowledgeable people to communicate and interpret the often nuanced meanings of such innovative knowledge. One of the principal characteristics of new economy interactions was that it 'still demanded face-to-face meetings and that structural change was favoring non-standardized production processes requiring such meetings' (Beyers, 2008: 2).

Over time however, tacit knowledge is increasingly becoming more codified. When there is familiarity and commonality of experience or even trust, more routine codified information can substitute for some tacit knowledge. Even though codified knowledge renders distance less critical to proximity in the era of the internet, tacit knowledge will continue to be more highly valued. With tacit knowledge, 'it is much easier to enjoy the rents attached to ownership of the knowledge, precisely because its tacit nature makes it harder for it to spill over to competitors' (Swann, 1999: 187). As a consequence, today's digital technologies and capitalistic networks 'cannot yet undermine all agglomeration economies' (Swann, 1999: 188).

Peter Swann uses the dispersion properties of codified knowledge and the concentration properties of tacit knowledge to differentiate broad categories of economic activity: '*innovation* is the most tacit process; followed by *production*'. *Trade* in goods and services are more codified than production processes (Swann, 1999: 188). He modeled the relationships between economies of scale, economies of scope, agglomeration economies and the effects of information technologies and observed that ITs do not seem 'to erode economies of scale, and indeed bring economies of scope in line with economies of scale' (Swann, 1999: 192). As a consequence, economies of agglomeration advantages remain and the 'forces for concentration remain potent' (Swann, 1999: 192).

The location of innovation is at the heart of the concentration and dispersion discussion. Audretsch and Feldman (1996) have examined the critical locational factor of the technologically facilitated business of creativity. They used a quotation from Glaeser, Kallal, Scheinkman and Shleifer that captures the essence of understanding these issues and their related concepts – 'intellectual breakthroughs must cross hallways and streets more easily than oceans and continents' (1992: 1127). In exploring the locational factor of innovation, Audretsch and Feldman observed:

> The location of innovative activity might not matter in the absence of what has become known as *knowledge spillovers*. New economic knowledge is said to spill over when the unit of observation which utilizes that new economic knowledge is distinct from the one that produced it. These knowledge spillovers do not, however, transmit costlessly with respect to geographic distance. Rather, location and proximity matter. That is, while the costs of transmitting *information* may be invariant to distance, presumably the cost of transmitting *knowledge* and especially *tacit knowledge* rises along with distance. (1996: 256, italics added)

From their research of 4,200 manufacturing innovations, they noted that as industry matures its innovative activity may be dispersed to existing production capacity in the same region. Specifically, '…what may serve as an *agglomerating influence* in triggering innovative activity to spatially cluster during the introduction and growth stages of the industry life-cycle, may later result in a *congestion effect,* leading to greater dispersion in innovative activity' (Audretsch and Feldman, 1996: 271). Technopoles are dynamic. Now that technopoles across the global economy have functioned for over a generation, one generally may assess their stages of evolution and the processes of concentration and dispersion upon which they are premised.

Scholars have expressed some dissatisfaction with the simple concentration-dispersion binary relationality. For example, Bathelt et al. have formulated a buzz-and-pipeline model of cluster competitiveness that reflects the need for a more relational perspective. They have explored 'why firms can gain *competitive advantage* by being co-located in a cluster with many other firms and organizations which are involved in similar and related types of economic activity' (2002: 20). They argue four points to answer this question.

1. 'A milieu where many actors with related yet complementary and heterogeneous knowledge, skills and information reside, provides a perfect setting for dynamic interaction' (2002: 21).
2. 'The more developed the pipelines between the cluster and distant sites of knowledge, the higher the quality (and value) of local buzz benefiting all firms in the local cluster' (2002: 21).

3. In order to manage effectively *both* the inward-looking and the outward-looking information flows, informal channels of communication and interpretive schemes need to be put in place so that the cluster buzz is sufficiently intense to insure that it gets to the units 'where it could be transformed into commercially useful knowledge' (2002: 21).
4. Lastly, the authors hypothesize 'that a large number of independent firms in a cluster can manage a larger number of pipelines than one single firm alone' (Bathelt et al., 2002: 22). This may explain why spatial clustering of many complementary and heterogeneous firms stimulate *competitive advantage*.

In discussing collective innovation and open networks, Anna Lee Saxenian has observed that 'co-location is a tremendous asset, as are shared language, culture and worldwide view' (Saxenian, 2006: 43). She cites Stan Shih, founder and CEO of Taiwan's Acer corporation who summarized the innovative benefits of location in Taiwan's Hsinchu Science Park (Lin, 1997; and Lee and Yang, 2000):

> Industry clustering speeds up the pace of innovation. Once … clustering is established, working within its disintegrated structure can allow an individual business to concentrate its capabilities on a certain task and share risks with other companies. If there are risks associated with a larger initiative, tasks can be appropriately allocated and coordinated among upstream, midstream and downstream satellite businesses; and if by chance the direction is wrong, everyone involved can communicate and the plan [can be] adjusted quickly. Even if some losses are incurred, they are shared by all the parties involved, and the loss for individual companies is minimized. (Saxenian, 2006: 43)

Other scales of re-shaping the urban space-economy include changes that occur for districts within city-regions. Suburban technopoles in Japan have been elaborated. The *international campus-garden-suburban style* approach has been analyzed as one that results in pleasant environments that are supportive of and conducive to innovation and creativity. Given the low density of this style, it may accommodate relatively large numbers of knowledge workers and residents (Forsyth and Crewe, 2010).

Technopole development in Japan's Kansai region has revealed that seeming failure of business site developments branded as high-technology hubs have the foundation of potential success built into past experience. The initial promotional behaviour and approach of the business and political elites of Osaka City and Osaka Prefecture demonstrated that if technopole locations are to attract high-technology and knowledge-intensive activities – especially international enterprises – then the basics of *innovative milieu and capacity* need to be there. Advanced business services and local synergies that integrate spin-offs and start-ups into new sites need to be evident in attracting IT firms. For example, cost-benefit analyses, focused attention to such requirements and demands as logistics, telecommunications and supportive institutional synergies are essential. Thus, in the business context, if reality and rhetoric can become one and the same, then successful technopole development is more likely to be realized (Anttiroiko, 2009).

As the era of technologically-enabled high-technology developments mature, new spatial patterns are being exposed. Stephen Graham and Simon Marvin have introduced us to the concept of *splintering urbanism* which sees a parallel process of unbundling due to infrastructure networks. 'Such a shift … requires a reconceptualization of the relations between infrastructure services and the contemporary development of cities' (Graham and Marvin, 2001: 33).

Some of these dynamics were illustrated by Graham and Guy (2002) by means of their analysis of downtown San Francisco and this central city district's relationships to the dot-com era. They raised the critical issues of contestation and inequalities that often surround the then-emerging neoliberal practices of *digital capitalists*. Such actors include: urban IT entrepreneurs, technology firms and local government politicians committed to succeeding by aggressive steering of the public purse toward the acquisition of land and the building of premium infrastructure in support of these preferred technology stakeholders.

It is valuable to distinguish between the locational concepts of digital *space* and urban *place* and contrasts between elite digeratis (Brockman, 1996: xxxi) and ordinary people (Friedmann, 2010). Politicians and business elites join forces to enable for-profit enterprises to be privileged with world-class infrastructure provision such as highways, ICTs, and airports. Such special provisions enable knowledge-economy business formation to the city-region that otherwise would not likely occur. However, too often infrastructures, the land, space and basic service needs of the area's poor and vulnerable are bypassed in the process of attracting new-economy investments as part of development visions and strategies to enable the locality to compete in the global knowledge economy. In the global south, Bunnell and Das (2010) have illuminated these neoliberal processes in the Kuala Lumpur Multimedia Super Corridor (MSC) in Malaysia, and the Hyderabad-Andhra Pradesh, India city-region. Further, they have made the connection of the role that the MSC strategy played for inspiring analogous high-technology development approaches to be taken by the state of Andhra Pradesh in Hyderabad city-region. The effects on the ground in and around Hyderabad have been documented as object lessons of neoliberal practices (Biswas, 2004; and Kennedy, 2007).

The boxed text below documents the critical role that computer gaming played in transforming the South Korean broadband technology environment into one of the most creative of the globe's economies. There is widespread recognition around the world that culture can be a driver and creator of new spatial organization. Among urban-regional economies of the West a 'new cultural economy' and related spatial organization are being driven by new media, video game production, and computer graphics and imaging, shaped by interdependencies of technology, creativity, talent, and attributes of 'place', in locations such as London, New York, San Francisco, Paris and Los Angeles (Scott, 2000). These fusions of technology and other factor inputs are changing the economic landscape of Asian cities such as Tokyo (Shibuya, Roppongi), Seoul (Kangnam and the 'Teheran Valley'), Shanghai (Suzhou Creek and many other 'cultural quarters'), Beijing (District 798), and Singapore (Esplanade–Theaters by the Bay). This cultural-space dimension of economic innovation has become a noteworthy force throughout the Asia-Pacific region from New Zealand's 'Frodo Economy', to

India's 'Bollywood Economy', and its many other regionally-based language, music and dance cinema industry manifestations. These and many other culture-economy forms, industries and emerging new spaces have recently been researched and compared (Izushi and Aoyama, 2006; Kong and O'Connor, 2009; Yamamoto, 2010). Learning about such dynamics in the increasingly globalized economy is important for understanding the ability of diverse places 'to support the development of indigenous content and local idioms in artistic work' (Kong, 2009: 1). These diverse cultural-economy functions and clusters attract external interest such as tourists and conventioneers; they are also important complements to the local hosting environment for retaining and attracting technology- and knowledge-based production talent as new-economy enrichments to the quality of life and amenities of the city-region (refer to Corey and Wilson, 2006: 126–8).

For follow-up, consult *New Economic Spaces in Asian Cities* by editors Peter Daniels, Kong Chong Ho and Thomas Hutton (2011). It includes Asian cities case studies, and a theoretical and normative discussion of the emergence of the new cultural economy. The cases include: Tokyo, Seoul, Shanghai, Beijing, Shenzhen and Singapore.

South Korea's Leap-Frogging to Global Prominence in Broadband and Internet Penetration

Prior to the Asian Financial Crisis of 1997–1998, South Korea's performance in broadband and internet services was undistinguished. However, the crisis and its serious negative impact on South Korea's economy was a spur to government, business and citizen stakeholders to re-think the country's competitive position on the consumption side of telephony and IT services.

Three sets of factors were identified for action: (1) Public-sector supply-side actors moved to liberalize the regulatory framework to spur the internet market and create a more competitive and less monopolistic marketplace. Demand for fast, accessible and affordable broadband was stimulated through IT literacy programs targeted to home-makers, elderly, military personnel, farmers, low-income families, and the disabled, among others. High-density high-rise housing was exploited to lower connectivity cost while cyber building certificate programs and inter-building competition operated to speed up broadband adoption among households and businesses alike. (2) For-profit actors formulated new business strategies to take advantage of the deregulated market place. The increase in additional small and large competitors resulted in lower-priced broadband services. (3) The social and cultural factors of South Korean society converged to produce a climate of receptivity and demand that had not existed earlier. The citizenry and business community were reeling under the various remedies that were being imposed on the economy to address the Asian Financial Crisis issues. There was high demand, especially among young people, to engage in *computer gaming*; much of this *demand* was being met by cyber cafés called PC Bangs. Family and parents, however, preferred children to use computers in the home where responsible use could take place. For this to occur, residents needed IT literacy training.

The convergence of factors allowed for demand and supply to be matched and addressed relatively quickly. The core demand, in the form of high bandwidth online gaming provided the 'killer application' that was needed to shift from too-slow home dial-up, thereby creating the huge household demand that enabled the now-multiple internet service providers to respond to the newly-created demand within the context of fierce competition. Refer to: Lee et al., 2003; Kim et al., 2004; Lau, Kim and Atkin, 2005; and Kim, 2006.

TECHNOLOGY AND URBAN LABOUR MARKETS

Over the last several human generations, structural shifts in the ways that economic production have evolved have been significant. How do city-regions develop within the production system of modern capitalism? Allen Scott answered this question by analyzing these structural shifts from industrialization to urbanization by means of the division of labour (Scott, 1988b: 1–2). Beginning in the 1960s, scholars and policy actors began paying more attention to the rise of the role of services in economies (Hutton, 2004; and Daniels et al., 2005). 'Changes in the way production is organized carries with it major social, economic and political change for work, workers and the places where we live and work' (Corey and Wilson, 2006: 12).

Jean Gottmann's urban-centric regional research into the processes that generated *Megalopolis* (1961) was some of the earliest that examined the structural shifts in industries and occupations as national and local economies moved more into services from manufacturing (Corey and Wilson, 2006: 7–11). This 'white-collar revolution' (Gottmann, 1961: 565–630) at its core depended on the integral role of information, characterized by Gottmann as the 'life blood of commerce anywhere' (p. 576). Further, he discriminated employment in 'tertiary' services such as retail sales, from more advanced 'quaternary' economic services such as 'transactions, analysis, research or decision-making, and also education and government' (p. 575).

Over the following decades, the differentiation between such routine services and advanced services became the object of research and reflection. For example, William Beyers derived a definition of the *new economy* as one:

> …changing the mix of industrial outputs, the ways of producing across the economy, with related shifts in consumer and business demands, changes in occupational structure, and the emergence of some new lines of industrial activity. While measurement is difficult, particularly in services that have been heavy purchasers of information technologies, it appears as though one of the important attributes of the New Economy has been an increase in productivity. (Beyers, 2002: 5)

Beyers and Gottmann identified the path dependence problems of actual structural economic changes out-pacing the capacity of society and governments to achieve a widespread working consensus within and across national economies on responsive classification schemes to measure and thereby accurately portray the structural shifts from old economy to new economy (Beyers, 2008). To this day, structural shifts and their associated fuzzy definitions and lack of widely accepted and used measurements continue to plague researchers and policy analysts alike (De Roo and Porter, 2007). As a consequence, case studies and their life-cycles enable us to continue learning about the dynamics, patterns and variances of high technology places and spaces, i.e. technopoles.

The Cambridge high technology industry cluster in the United Kingdom is one of the global knowledge economy's most successful and reputed technopoles (Keeble, 1989). A recent key research question was to what extent R&D workers benefit from being in the cluster? The study found that many of these researchers do not believe that their work benefits from being in the cluster. However, the research revealed that there were labour market advantages, such as job mobility within the cluster, along with an indirect benefit – 'the global image or "brand" of Cambridge as a place of excellence in science and technology' (Huber, 2010: 20). Another advantage of the Cambridge cluster is that many R&D workers rely on alternative sources of knowledge from other enterprises within the cluster. At this mature stage of the cluster's life-cycle it may be necessary to re-set policy priorities to manage the brand and emphasize labour market activities that retain and attract a critical mass of R&D workers (Huber, 2010).

Since each technopole cluster around the world has its own unique mix of characteristics, it is prudent and strategic to monitor a technopole's empirical status. Turning to North America, Wolfe and Gertler (2004) have conducted a national study of 26 knowledge-intensive clusters across Canada, using four indicators: inflows; outflows; local social dynamics; and historical path dynamics. Both commonly shared experiences and unique local circumstances were identified to reveal the forces shaping each cluster. Five themes were derived; one, labour, is the focus here. 'Inflows of people are, in our view, an especially robust indicator of local dynamism. It is increasingly well established that highly educated talented labor flows to those places that have a "buzz" about them – the places where the most interesting work in the field is currently being done' (Wolfe and Gertler, 2004: 1084). In particular, the importance of local 'talent' drawn to the area is noted along with the need for a critical mass of talent to maintain and grow the region.

Global-scale human capital and social capital networking are also important relationships to understand. The mobility of science and knowledge workers is significant. In addition to the benefits that receiving countries derive from educating and training knowledge workers (many of which stay on), the sending countries also benefit. Foreign degrees and post-doctoral experience can promote and sustain science, technology and development collaborations by means of social capital network building that link regions and support knowledge hubs. Among respondents from six Asia-Pacific countries, i.e. Australia, China, India, Japan, Korea and Taiwan, they documented strong relationships among those with foreign post-doctoral positions and knowledge-producing collaborations. Further, such networking was found to persist through time (Woolley et al., 2008: 180). The above recent research findings suggest that again, both local market forces and trans-national forces play important roles among highly skilled workers in the global knowledge economy.

LOOKING BACK TO MOVE FORWARD

The above five lenses and their relationships have been used in this chapter to demonstrate the importance of technology in influencing urban economic change: (1) technopoles or high-technology R&D locations; (2) the technological deepening of the recent urban economy; (3) competitive advantage within urban systems and hierarchies; (4) reshaping the urban space economy in terms of concentration and dispersion; and (5) impacts on urban labour markets. By way of drawing conclusions from the discussion above, several over-arching issues may be posed and elaborated. These elaborations may be taken as benchmarks from which informed future expectations may be made.

Technological innovation-based development has been used as a strategic tool to stimulate economic take-off and sustain economic growth by countries of the Asia-Pacific, specifically Japan (Freeman, 1987), the Newly Industrialized Economies (Hobday, 1995; Wong and Ng, 2001) and the more recently emerging China and India (Lal, 1995; Gu, 1999; Mahmood and Singh, 2003). For instance, for the two most distinguished periods of Japan's economic development, the Meiji Period (1868–1890) and Post World War II (1956–1986), the Japanese government involved itself directly in the country's industrial development by identifying national priorities and providing guidance and direction. Improving Japan's technological capability was emphasized particularly (Freeman, 1987). Similarly, to enhance their innovation capabilities, China and India have invested heavily in R&D expenditure and R&D personnel in recent decades. Consequently, innovation capacity has contributed significantly to the economic growth of China and India, especially in the 1990s (Fan, 2011).

Economies of the Asia-Pacific, especially Japan, South Korea, Taiwan, China, and India, have adopted a 'walking on two legs' strategy to import technology from the West and to develop indigenous R&D capacity simultaneously (Johnson, 1982; Kim, 1998; Lall and Teubal, 1998; Fan, 2006; Fan and Watanabe, 2008). For instance, while Japan sent a large number of students overseas to European countries in the Meiji Period, the country also diligently worked on improving the technological capacity of its own nascent enterprises. In the post World War II period, the government not only relied on technological transfer, but also organized research consortiums for various strategic industries, such as super-computing and energy, so as to promote indigenous capability of Japanese companies as technological leaders in these industries (Johnson, 1982). Further, evidence shows that developing indigenous R&D, together with technology transfer from the West, is crucial for China and India to catch up in the telecommunication equipment industry and biotechnology industry, respectively (Shen, 1999; Fan, 2006; Fan and Watanabe, 2008). Such domestic R&D capacity building should be expected to continue.

Technology-based development, like other growth-pole development strategies, has different implications for different cities and regions. Those places that have possessed or invested heavily in technological and science assets, such as research institutes and universities and skilled technological labour force, will be able to grasp the development opportunities. Other places which do not possess these assets will not be able to take advantage. Many cities and regions in the Asia-Pacific that had a strong base in traditional manufacturing have invested heavily in their technological assets and utilized industrial upgrading to shift the focus of local economies towards technology-intensive industry. For instance, Shanghai experienced significant industrial restructuring in recent years. While certain labour-intensive sectors such as textiles, have relinquished their dominant positions, other technology- and capital-intensive sectors such as electronics, telecommunication equipment, transportation equipment, and petrochemical, have become major new players, contributing 75% of Shanghai's industrial growth from 1996 to 2000 (Gong, 2003). Correspondingly, many people who worked in traditional manufacturing for decades, such as state-owned textile enterprises, lost their jobs, whereas white-collar migrants who are highly educated have continued to flow into the city to take up various new positions in Shanghai's emerging technology-intensive industries.

Increasingly, the Asia-Pacific has played an important role in a *new* international division of labour (Fröbel et al., 2000), not only in labour-intensive industries, but also in technology-intensive industries. Due to large reserves of knowledge workers available in the region, a significant amount of global R&D has been attracted to the region, especially in Japan, and the Newly Industrialized Economies, and China, and India. A survey by the Economist Intelligence Unit (2004) has demonstrated that China and India are two of the top ten destinations for foreign R&D expansion; this is attributable to their rich endowment of low-cost and well-trained scientists and engineers, accompanied by fast growing domestic markets and the increasing foreign investment in manufacturing (Sun et al., 2007). By 2005, multinational companies had set up 750 foreign R&D centres in China, growing five times since 2003 (Walsh, 2007). Further, certain cities became the concentrated location for global R&D Beijing, Shanghai, and Shenzhen have attracted over 84% of foreign R&D centres in China (Yuan, 2005).

Historically, economies such as Japan, South Korea, and Taiwan have benefited from the returnees who studied and worked in technology-intensive industries in the West to establish their own high-tech industries such as steel, machinery, electronics, semiconductor, and the automobile industries in the Meiji Period and the 1960s (Freeman, 1987; Kim, 1998; Amsden and Chu, 2003). China and India started to send a large number of students overseas only in the last three decades. Already, they are both benefiting from returnees who set up ventures in biotechnology, the internet, semiconductor and other technology-intensive industries (Saxenian, 2006; Fan and Watanabe, 2008). Asian cities have joined other city-regions in the West to lead or participate in various global R&D networks of technology-industries. For instance, Singapore has become a global hub for biotechnology R&D, attracting top-tier scientists in the field from all over the world, including the Atlantic realm; Seoul has become the global R&D centre for the digital wireless technology Code-Division Multiple Access (CDMA) mobile phone technology and gaming software; Bangalore is considered the IT outsourcing centre and the software development capital of the world.

More than a generation ago, the late communication guru and opinion setter, Everett Rogers planted the seeds for a new development paradigm. He envisaged a more equitable form of development that included economic growth and material advancement, but had matured to also incorporate 'a widely participatory process of social change' in a society that intended to seek social advancement and the freedom for the majority of people to gain 'greater control over their environment' (Rogers, 1976: 225). Further, his prescience foresaw an important facilitative role for communications and information in the realization of this new development paradigm. With today's global knowledge economy based on an increasingly pervasive distribution of personal, mobile and other powerful multi-media ICTs, we have the option, and indeed the social and civic responsibility, to inform ourselves individually and collectively to engage in purposeful change toward the kind of places that the stakeholders of a city-region and its country want.

Lastly, the reader, including the teacher and learner alike, are challenged to use the five lenses of this chapter to construct their own learning strategies. Thereby, their knowledge capital may continue to grow and their world will expand as other macro regions of the global knowledge economy are explored. See the boxed text within this chapter. These selections are intended to provoke continuous general learning and illustrate selective focused lessons, i.e. the catalytic role that technological demand and close attention to the needs of consumers can play. Such particularized empirical lessons may be revealed by drilling down via individual researches into selected city-regions and their host countries of the Asia-Pacific, e.g. places in China and India – and in other regions of the world economy. Regardless of the regions being researched, it is imperative to ground the material and technological realities and cultural particularities of the city-region's place and space (Yeung and Lin, 2003). Looking to the future is important; for example, the role of science and the city-region (Matthiessen et al., 2006; Nature, 2010; Van Noorden, 2010) and the central role of network connectivities and advanced services (Taylor and Walker, 2004; Taylor, 2010) both will continue to expand and deepen. Rigorous empirical research, as informed by applicable theory can be blended to produce intellectual growth, generalizable results, and the preparedness and capacity to engage in Intelligent Development (Corey and Wilson, 2006: 205–6).

Engaging in Intelligent Development may be facilitated by consulting a recently published book entitled, *Global Information Society: Technology, Knowledge, and Mobility* (Wilson, Kellerman and Corey, 2013). By presenting the intellectual and regional empirical underpinnings of the globalized information society and the roles that urban-regional technologies perform to enable information networking, the core narrative of the book leads the inspired reader to demonstrate ways for collaborating with other local and regional development stakeholders in order to take advantage of the new economic and social opportunities offered by today's global technological change. Ongoing digital education and pervasive social media, especially as framed by relevant concepts and tailored strategies, can empower and stimulate imaginative approaches to harness the development potential of today's cities and other places and regions. Relying on fact-based informed decision making, this resource is a means to extend the knowledge introduced in this chapter and this book into shaping the life of your community and your future.