

Chapter 8

Regional Urban Economic Clusters

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8.1 Introduction

Successful industrial clusters are socially constructed by human activities, building on a base of physical location attributes. Their economies thrive on an “innovation habitat”, an interlinked network of relationships among people, companies and regulatory institutional practices that promote job and personal mobility, educational attainment, community infrastructure and related attractive arrangements such as cooperation and environmental preservation. A key “lighthouse” industry attracts other firms and needed levels of skilled labor to a regional sustaining culture in a closely located, distance diminishing synergy. It should be noted that all of the metropolitan areas featured benefit from an economic base utilizing innovative strategies, whether product or process related, and survive due to leadership that binds political and economic factors maximizing spatial interaction and social networks (Fig. 8.1).

This chapter is organized into three pairs of case studies comparing the economic trajectory of six major Chinese and US urban areas in different parts of the country and in different stages of development (Sies and Silver 1996; CSSB 2002; CRSUD 2011). The format for each city is similar. Fixed factors such as location and economic base are first identified, followed by a look at the development strategies, problems, and policies involved in their human geography. The initial set looks at the cities of Harbin-Dalian and Pittsburgh, Pennsylvania that grew on the basis of traditional heavy industries, in some cases leading to a rustbelt revival. They are located on the east coast corridor of early industrial development, and their lessons have to do with preserving old strengths while dealing with new opportunities in changed economic circumstances. The second set features the mid-continental

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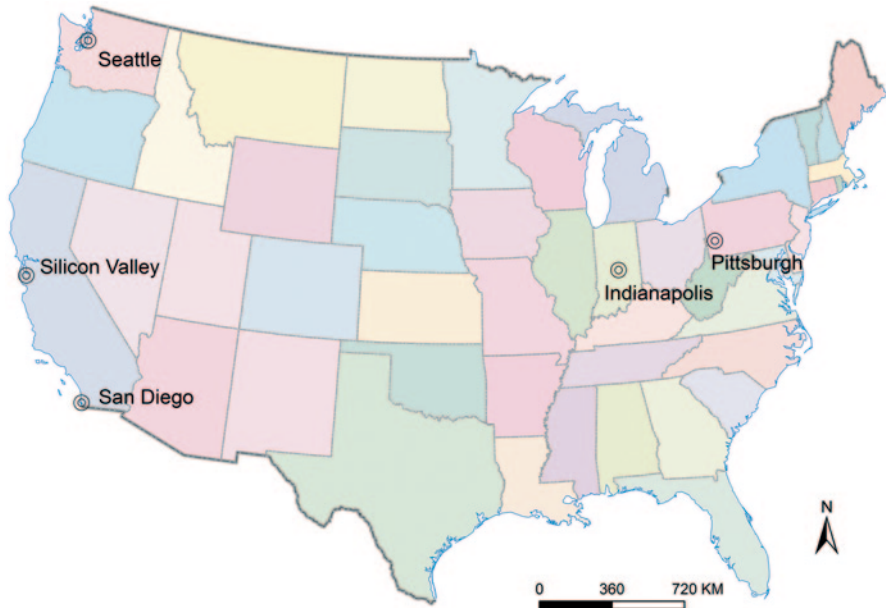


Fig. 8.1 Location of case study cities in the United States of America

inland transportation hubs of Wuhan and Indianapolis that leveraged their location advantage for inter-modal growth. Economic opportunity lies with providing a service moving goods between origin and destination points, as well as innovative improvements and diversifying economically with services, as in the two case study clusters. A contrasting pair of high tech habitats wraps up the comparison of models that seem similar but differ in important respects, such as Beijing's Zhongguancun and the U.S. west coast's San Diego, Silicon Valley, and Seattle. The concluding section summarizes major lessons from metropolitan experiences (Fig. 8.2).

8.2 Harbin-Dalian: Traditional Industrial Cluster —NE China Steel Industry and Transportation Infrastructure

8.2.1 Location and Industrial History

The Harbin-Dalian industrial cluster lies in the central area of Northeast China. In total, this region includes 21 cities along the Harbin-Dalian railway line from the most northern province of Heilongjiang through Jilin Province in the middle to Liaoning province on the southern end. This region covers 354.5 thousand km², occupying 28.6% of Northeast China and 45% of the three provinces listed above.

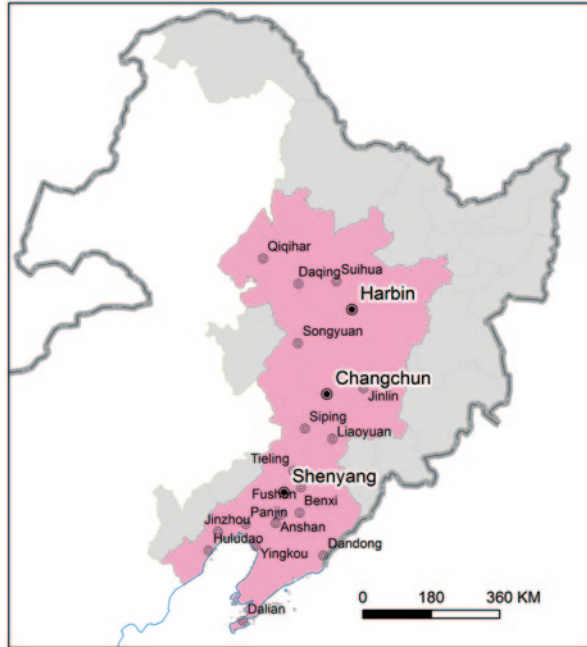


Fig. 8.2 Location of case study cities in China

Large parts of Northeast China were subjected to colonization from the late nineteenth to the mid-twentieth century. To take advantage of the abundant natural resources, colonizers constructed the Harbin-Dalian Railway and several harbors in order to transform raw materials and to ship products overseas. After 1931, when Japan used the Northeast Region as an ordnance and ammunition manufacturing base, several cities and heavy industries began to develop such as steel and iron making, machinery, and the chemical industry.

With the establishment of the People's Republic of China in 1949, regional clusters developed quickly by implementation of development plans. During the period

Fig. 8.3 Geographical location of the corridor



of the first Five-year Plan, 54 of 156 national projects were laid out in northern China. These included building up Anshan Steel Corporation, Benxi Steel Corporation, Fushun Coal Corporations, Fulaerji Heavy Machinery Plant, China First Automobile Corporation in Changchun, Jilin Chemical Industry corporation, and three power plants in Harbin. During the period of the Second Five-year Plan, Daqing Oil Field, Jilin Oil Field, Qinghe Power Station, and Liaoyang Chemical Fiber Corporation were built up. The Northeast is known as China’s “industrial giant” since this region contains more than 1,700 state-owned large and medium enterprises, accounting for 1/7 of China’s total number. Meanwhile, this area also integrated an extractive base of planting, farming, forest and fishing.

Since the late 1980s the northeast region experienced a period of slow growth. In 1990, the industrial output value of the northeast region increased by only 0.6% over the previous year, far below the national average of 7%. The profits of enterprises fell by 25–45%, a significantly higher decline than the national average of 18.5%. The serious recession experienced by manufacturing is called in China the “northeast phenomenon”. This region’s clusters played a leading role and made great contributions to the renaissance of Northeast China. At present, the region contains the most important agglomeration of population and industries in China, and its general regional product accounts for more than 70% of that of Northeast China (Zhao and Chen 1999) (Fig. 8.3).

8.2.2 State of the Local Economy

By 2001, the GDP of the Harbin-Dalian cluster reached \$ 95.04 billion, accounting for 69.15% of the total for Northeast China. Per capita GDP was \$ 1,782.05, nearly double the national average of \$ 911.32. The main industries are machinery manufacturing and energy, which mostly focus on the early stage of processing of raw materials. Different city clusters feature different types of leading industries. Rich mineral resources, agricultural and forestry development, the construction of infrastructures such as seaports, railway and other kinds of transportation lines and the national development strategy all promoted the prospects of this area for becoming a new industrial center. Northeast China rests on five bases in steel, energy, machinery manufacturing, forestry, and commodity grains to lead economic development in this region. The northeast region's cultural facilities, education popularization and graduation rates are among the best in China. The popularity of higher education in Liaoning province ranks first in China. The northeast region is China's fourth economic growth pole (Wang 2008).

8.2.3 Urban-Industrial Transformation Strategy

Contemporary administrative segmentation restrains integrated development of the region. Blending the industrial structure is a big problem in the Harbin-Dalian cluster. Each province puts forward its own development plan emphasizing industrial competition between cities. Liaoning Province focuses on two industrial bases and three sectors. One of the two industrial bases consists of an equipment manufacturing industrial base including transportation equipment manufacturing, fundamental equipment and complete equipment manufacturing, and military equipment manufacturing. The raw material industrial base includes the petrochemical industry, steel and iron, and construction material. Three other clusters consist of high-tech and new technology industries, agricultural product processing and modern services. Shenyang continues to be the core of the urban agglomeration in the middle of Liaoning. Greater Dalian is designed to become the international shipping center of Northeast Asia.

Jilin Province aims to construct five industrial bases: a national level automobile industry, petrochemicals, agricultural product processing, modern Chinese medicine and biomedicine, and a high-tech and new industry base. Another goal is to improve the metallurgy industry and the promotion of tourism and other advantageous industries. The city of Changchun is the core in the urban agglomeration of central Jilin. Heilongjiang province intends to set up six industrial bases: equipment manufacturing, petrochemicals, energy manufacturing making use of coal, agricultural product processing, green food production, a medicine industry base in the north of China, and forest product processing (Wang and Zhao 2004).

Since 2003, China redeveloped traditional industries in the Northeast. Industrial transformation and upgrading, especially the sustainable development of resource-based cities, constitutes one of the most crucial issues. The fundamental way for

the development of Northeast China is economic system reform and transforming the mode of economic growth. The key measures of reform include the following:

- Cultivating superior industry clusters and actively extending the industrial chain. The northeast region should focus on raw materials and subsequent processing industry, equipment manufacturing industry, intensive processing of agricultural products and high-tech industry clusters.
- Promoting opening up a wide range of multi-directional and multi-level developments.
- Accelerating the restructuring and reorganization of state-owned enterprises by improving the investment environment, removing restrictions of administrative divisions to promote steel, automotive power and other key industries across restructured regions.
- Strengthening infrastructure facilities by construction projects such as traffic equipment, water conservancy and energy in order to attract more domestic and foreign investments.
- Developing education and cultivating the quality of human capital to promote the combination of “production, teaching and research” and accelerate the transformation of high-tech achievements and industrialization.
- Strengthening ecological construction to improve the capacity for sustainable development by making good use of the comparative advantage of ecological environment and resources to develop an eco-economy industry.

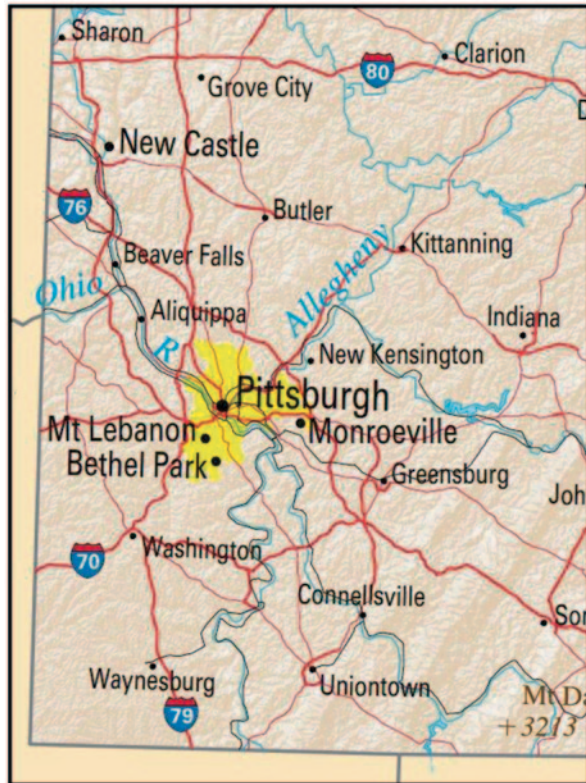
8.3 Pittsburgh: Traditional Mid-Atlantic Heavy Industrial Cluster

8.3.1 Location and Industrial History

Pittsburgh lies at the confluence of the Allegheny and Monongahela rivers, which form the mighty Ohio River system and gave rise to its nickname of “City of Bridges”. It was also known as the “Steel City” since, like Detroit, access to water transportation fed the city’s strength as a historic steel manufacturing center. Industry titans such as Carnegie, Heinz and Mellon bequeathed amenities from libraries to museums that generated a strong civic pride. To regenerate their town, twenty-first century city leaders raised taxes and built on funds from a newly profitable natural gas industry in order to restore sullied facades and sustain landmarks, prioritizing pride of place for retaining urban labor talent as advocated by Richard Florida, local Carnegie Mellon University geographer-author of the bestseller *Creative Cities*.

European colonizers set up a fur trading station in the late seventeenth century at this confluence of major rivers such as the mighty Monongahela and Ohio. The desirable physical location made it a contentious area for Indian tribes, British and French colonizers, and later during the American War for Independence. Following

Fig. 8.4 Greater Pittsburgh region (www.nationalatlas.gov)



the expulsion of the French from their fort at the site, British General Forbes constructed a new fort which he named Fort Pitt after the then-Secretary of State William Pitt; the name stuck to this settlement at a strategic site. In the mid-nineteenth century completion of the Pennsylvania canal and the Pennsylvania Railroad confirmed its importance as a transport hub. In the early twentieth century, Pittsburgh's industry and commerce developed rapidly and the city served as a center for the industrial revolution. Steel king Andrew Carnegie started Carnegie Steel Company, which built on the innovative high-temperature Bessemer furnace to monopolize the North American steel industry. Andrew Mellon's financial firms provided funding to further develop key Pittsburgh based industries such as aluminum, coke ovens, and industrial abrasives. Pittsburgh native Henry Heinz organized what became the global food industry giant Heinz Company in the late 1800s. The Heinz brand is best known for condiments such as ketchup ("57 Varieties") and side dishes such as baked beans. A century later Pittsburgh sought a new economic base to supplant its faded industries and became a model of reform. By the dawn of the twenty-first century Pittsburgh became a US urban economic success reform model, drawing in part on the foundations set up by its wealthy citizens of an earlier era (Fig. 8.4).

8.3.2 State of Local Economy

The second largest city in Pennsylvania with a population of 334,563 in 2000, and occupying 58.3 sq. miles (151 km²), Pittsburgh's population was estimated to have declined by 100,000 jobs since the 1980s, reflecting its faded prospects as a north-eastern rustbelt center. However, from mid-2011 to mid-2012 the city added almost 15,000 jobs to signal its comeback status. The regeneration strategy is built on two legs, the first of which uses existing transportation infrastructure strengths to ship energy resources of coal, nuclear, solar, wind, oil and gas from shale. A "new economy" is fueled by healthcare and medicine, education (University of Pittsburgh and Carnegie Mellon among other research institutions) in a metro area with the nation's highest percentage of young professionals with a graduate degree and a third of the above-25 population with a bachelor's degree, robotics technology, nuclear engineering and financial services. The seven-county metropolitan area currently contains a population of 2.35 million people.

The universities are the city's largest employers. Major corporations headquartered in Pittsburgh include PNC Financial Services, PPG Industries (diversified coatings, chemicals, optical), U.S. Steel, H.J. Heinz Company (ketchup and condiments), Mylan Laboratories (pharmaceutical), WESCO International (engineers, designers), CONSOL Energy, and Dick's Sporting Goods. Other companies in these fields with major operations in Pittsburgh range from Alcoa (aluminum) to Bayer (a German pharmaceutical) and energy companies. Western Pennsylvania's largest private employer, UPMC is the medical complex anchored by the University of Pittsburgh.

8.3.3 Urban-Industrial Transformation Strategy

According to the president of Pittsburgh-based Future Strategies LLC, Pittsburgh's experience holds two lessons: "... you can come back successfully from major economic decline with the right kind of leadership and support" and "... don't try to hang on too long or wait for what you lost to come back". Several city leaders also ascribe Pittsburgh's resurgence to a fortunate match between the research strengths of its universities and the "hot" areas of the new economy, such as robotics, that began to emerge in the late 1980s through the 1990s. By the end of the next decade, in both 2009 and 2010 Pittsburgh was named "Most Livable City in the U.S." by several major magazines and had earned a new nickname: "The Paris of Appalachia". In one of the poorest, mountainous regions of the country, Pittsburgh used its leadership skills to find an economic way back as an urban star, successfully transitioning from brawn to brain based job skills and building a broad-based economy to sustain future growth.

Key areas of reform include:

- Strengthening infrastructural facilities with more construction projects such as traffic equipment and industrial park land to attract more domestic and foreign investments. Tax abatements downtown fueled a post-recession building boom of office skyscrapers and residence apartments.
- Developing a high technology economy by shifting to new management mechanisms, providing funds and other support to cultivate the new technology industry and manufacturing industry promotion for a new enterprise foundation in energy resources and supporting service providers.
- Developing education to cultivate human capital based on the large number of local institutions of higher education, particularly focusing on the most employable science, technology, engineering, and mathematical (STEM) fields. Additionally, at the K-12 level the “Pittsburgh Promise” extends a \$ 40,000 college scholarship to graduates with a good attendance record and B- grade point average.
- Improving entertainment such as high quality sports and performing arts facilities to increase amenity attractions. A state film tax credit attracted investment in movie industry facilities, transforming a steel mill and vacant spaces to studios.

8.4 Wuhan: Inner China Transportation Hub

8.4.1 Location and Industrial History

Wuhan is situated in central Hubei province, east of the Jiangnan plain, intersecting the middle reaches of the Yangtze and Han rivers which divide Wuhan into three parts: Hankou, Hanyang and Wuchang, which are generally known as Wuhan’s “Three Towns”. Wuhan is an important strategic supporting point of Central China. It connects the east with the west, channels the north to the south, and links rivers with seas by means of its developed water, land and air traffic. Because of Wuhan’s excellent transportation links the city is relatively close to foreign countries such as Japan and the Republic of Korea. China’s major metropolises such as Beijing, Shanghai, Guangzhou, Chengdu, and Xi’an are all within a circle around the center of Wuhan with a radius of 1,000 km (FAOHPPG 2011).

Wuhan’s economy was at the forefront of Asia in the late Qing dynasty and the Republican period. As the largest treaty port in inland China, Hankou had the reputation of the “Chicago of the East”. After the founding of the People’s Republic of China in 1949, a large number of enterprises were built up such as Wuhan Steel, Wuhan Boiler Factory (WBC), and the Wuhan heavy machinery plant, which tremendously promoted Wuhan’s economic status and the city’s comprehensive strength. From 1959 to the beginning of the Reform and Opening Up period in the late 1970s, Wuhan’s industrial output was in the top fourth in China. In the 1980s, Wuhan failed to keep up with the pace of reform. However, in the 1990s Wuhan established Wuhan Economic and Technological Development Zone in Hanyang, the Wuhan East Lake Hi-tech Development Zone in Wuchang, the Wuhan Wujiashan Taiwan-investment Area in DongXiHu, and the Yangluo Development Zone in Xinzhou.



Fig. 8.5 Geographical location of Wuhan cluster

As one of the origins of China's modern industry, Wuhan is China's traditional base of manufacturing and one of the biggest automobile industry bases in China; domestically, nine out of a hundred cars are produced in Wuhan Citroen-Dongfeng. Wuhan is also one of the biggest iron and steel industry bases in China; Wuhan Iron and Steel Group is the third largest iron and steel consortium. In 2007, the State Council approved Wuhan City Circle as a comprehensive experimental zone for resource efficient and environmentally friendly reforms. The Wuhan 8+1 City Circle includes Wuhan city, Xiaogan city, Tianmen city, Qianjiang city, Xiantao city, Xianning city, Ezhou city, Huangshi city and Huanggang city. The main projects of Wuhan's comprehensive experimental reforms include strengthening industries, finance, transportation and reducing the differences between rural and urban areas. In recent years Wuhan focused on the development of high-tech industries and became the biggest optoelectronic information industry base in China; Wuhan's China Optics Valley has become a leading new high-tech industrial agglomeration (Fig. 8.5)

The Wuhan city circle is situated on the Yangtze River economic belt, at the Jing-Guang Railroad and Beijing highway intersection point. This constitutes the north-south development axis, located at the Midwestern intersection with the Yangtze valley's middle reaches and central five provinces, which historically is always referred to as the "nine province thoroughfares". At present Wuhan boasts one of the four largest railway stations in the nation, serves as a first-class highway hub, a mid-Yangtze River transportation center, the third biggest communication service command and adjustment center in the nation, a telecommunication fiber optics ring

net connection node, and holds a superior transportation and communication position with which other central China regions cannot compete.

8.4.2 State of the Local Economy

Wuhan is one of the 15 subsidiary cities in China. The largest city in central China at 9.1 million in 2010, on 8,494.41 km², Wuhan's urban population has been in the fourth position for a long time. Wuhan is known as one of China's important industrial bases, a science and education base and a comprehensive transport hub. Wuhan also has the reputation of the "biggest port in central China", the "Aviation center in central China", and "One of China's four railway hubs". As the first choice of foreign investment in central China, Wuhan is also the top location for French investment in China.

Wuhan possesses strong economic and regional advantages. The headquarters of Wuhan Iron and Steel Group company (one of the top three Iron and Steel Group companies) and Dongfeng Motor Corporation (one of the top three Automobile Works) are located in Wuhan. The city attracted a Microsoft innovation technology center, an IBM global service center, an EDS global service center, a France telecom software R&D center and a well-known domestic enterprises software service outsourcing and financial service center. Wuhan is abundant in technological resources, with 76 universities or colleges, one state laboratory, 12 state key laboratories, 56 state-level and province-level research institutes, 10 state engineering and technology research centers, three national technology centers in enterprise, 1,050,000 university students and over 350,000 graduates every year.

8.4.3 Urban-Industrial Transformation Strategy

Wuhan is the primate city of Inner China, thus limiting the development potential of other cities. It deters the flow of information, energy, personnel, materials and the development of alternate clusters. Market barriers still exist. The territory's transportation and corresponding network system lags in its economic development speed, and significant damage to the environment from air and water pollution persist in the region. Key strategies for improvements are as follows:

- Establish a cross regional benefit coordination mechanism. All levels of urban government should agree on the cross region interest distribution in order to break specialization divisions and best utilize regional resources.
- Implement unified management.
- Actively construct a unified legal system platform. Every city must locally implement the legislation that is exercised by the National People's Congress or the provincial government.
- Establish an urban circle coordinated advancement mechanism through an expert consultant committee for the Wuhan city circle.

8.5 Indianapolis: Midwestern “Silver Buckle on the Rustbelt”

8.5.1 Location and Industrial History

Formerly known as “Indiana-no-place” and “Naptown”, this typical American “Heartland” capital of Indiana is the only city at the confluence of three of Joel Garreau’s Nine Nations: the rustbelt (upper Midwest), the bread basket (Plains), and the bible belt (South). Its location on the southern edge of the flat glacial plains connecting the American industrial heartland, from Chicago and Detroit around the southern edge of the Great Lakes, made it an important railroad city and the site of the first “Union Station” conjunction of major intersecting lines. The automobile was invented near Indianapolis, so it was fitting that a former airport became the famous “Indianapolis Speedway” for showcasing high tech car races. The city’s economy really took off with the birth of pharmaceutical company Eli Lilly & Company, only the second major “Big Pharma” firm (along with Minnesota’s Merck) outside of the east coast. Lilly’s decision in the 1970s to stay in Indianapolis, as a “big fish in a little pond”, saved its future and fueled its rebirth as the Rustbelt’s “silver buckle” (Fig. 8.6).

8.5.2 State of Local Economy

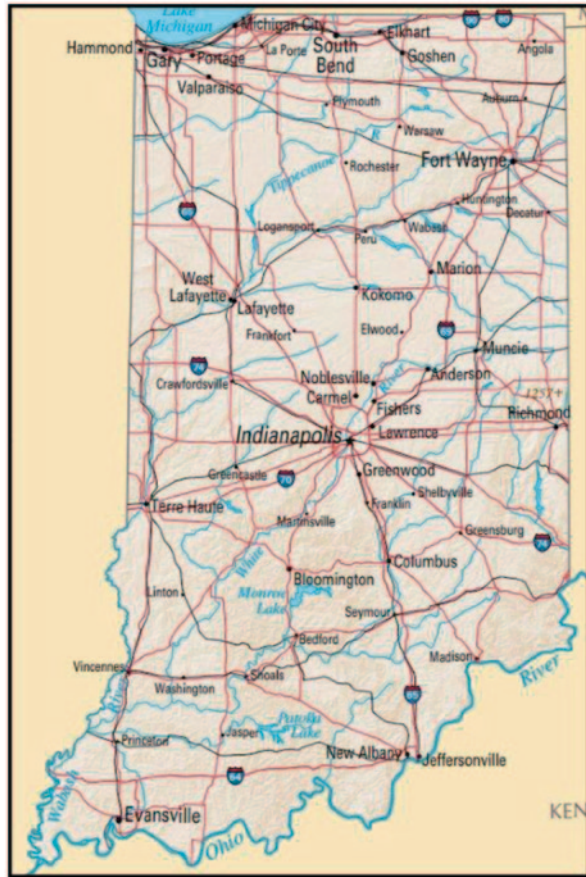
Indianapolis’ city population is 798,382 (2010), with a metro population of 1,715,459. The city remains the bright spot of the state’s struggling economy. A Midwest transportation hub, Indianapolis straddles six major interstate highway systems and is the hub of the state’s spoke configuration of roadways. A major deficit is the lack of a strong local research university; for historic reasons the two major universities (Indiana University and Purdue) are located in different parts of the state.

The driver of Indianapolis’ economy is health care, accounting for the largest proportion (13.6%) of the city’s workers. This sector utilizes a synergy among the area’s hospitals and Lilly’s research facilities, as well as medical device manufacturers and other medical services in the life science cluster. Biotechnology research tends to be located either in-house at Lilly or within its nationally and globally dispersed biotech affiliates. Construction and manufacturing continue to decline, as the city searches for a way to leverage its strengths and escape from its blue collar past.

8.5.3 Urban-Industrial Transformation Strategy

Stone’s famous “Growth Machine” book about the power of congenial, socially networked business leaders to transform their city was built on the model of Atlanta

Fig. 8.6 Indianapolis, capital of the Midwestern “Heartland”, transportation nexus of an interstate highway and railroad network (www.nationalatlas.gov)



and Indianapolis. A growth coalition formed in the early 1970s, launched by the innovative “Unigov” that stretched the urban boundary out to encompass the more prosperous inner suburbs. A group of businessmen who had attended similar colleges formed a civic planning group outside of the city bureaucracy (Greater Indianapolis Progress Committee) to reimagine their town as a healthy place—building on the presence of Lilly and the Raceway to attract major sports events and convention traffic. New sports and arts facilities and museums were constructed, financed with public-private partnerships to make Indianapolis the kind of place where footloose high tech employees (principally Lilly’s) would want to live. This in turn attracted similar companies.

Indianapolis leverages its transportation position in several ways. As a major interstate hub it has developed numerous warehouse and distribution centers around the bypass highway circling the city and linked to its airport. Business generated by the expanding Fed Ex hub fueled the construction of a recently completed new airport. The former Union Station was turned into a downtown shopping center, anchoring a new strip that sports the façade of the old buildings that a major new

enclosed mall has replaced. Baseball, basketball and football stadiums also bring crowds downtown, as do cultural performances, to enliven the heart of the central business district and the pockets of the city (Wilson and Lindsey 2005).

8.6 Zhongguancun: Beijing Hi-tech Breakthrough

8.6.1 Location and Industrial History

Zhongguancun Science Park (Z-Park in brief) originated from what in the early 1980s was called the “Electronic Street” in Beijing. With the approval of the Chinese government, Z-Park was officially established as the first national science park in 1988. Zhongguancun Science Park includes all of Beijing’s highly concentrated educational, scientific research and high-tech industrial zones. With its centerpiece in the city’s northwest, the Park features a landscape of multiple sub-parks and industrial bases including Haidian, Fengtai, Changping, “the Electronics City”, Yizhuang and others located around Beijing. The total area of the Park is 232 km².

The nearly 20,000 high-tech enterprises residing in Z-Park have maintained an annual growth rate of over 25% continually over the last decade. In 2006, the high-tech enterprises in the Z-Park attained a revenue of over 600 billion Yuan (or approximately \$ 80 billion), equivalent to one seventh of the nation’s science parks’ revenue combined. As the largest high technology industry base, Zhongguancun focuses on fostering new industries of strategic importance such as information, biology, energy saving, environment protection and new energy (Ma, Jiang and Tong 2000; ZCP 2013).

8.6.2 State of Local Economy

As the high-tech center of Beijing, Zhongguancun is known as “China’s Silicon Valley”. In 1988, foreign exchange earned through export was 100 million \$, increasing to 19.7 billion \$ in 2007. Per capita foreign exchange earnings through export increased from one thousand dollars in 1988 to 22 thousand dollars in 2007. In 2000, there were 6,186 firms in Z-park, producing 3,941 types of products and 775 patents. In 2007, 20,125 firms produced 14,880 types of products, and 3,214 patents. Among 14,880 kinds of products, those made by firms’ own technology reached 85.6%. That demonstrates the rapid increase of innovation capability. Zhongguancun features abundant human resources and is the most intellectual-intensive region in Beijing. Population related to science and technology activities increased from 71 thousand in 2000 to 340 thousand in 2007 (Fig. 8.7).

R&D was 48 thousand in 2000, and increased to 179 thousand in 2007. Until 2007, Z-park attracted 9,527 overseas people, and 32 thousand graduate students. More than one million professionals work on innovative activities, with skills in



Fig. 8.7 Geographical location of Beijing high-tech cluster

venture capital, business management and commercialization of high and new technology. China's most prestigious and selective colleges and universities are located in the capital city, providing a ready source of high skill labor.

8.6.3 *Urban-Industrial Transformation Strategy*

The central government's leading role in the early construction of the Park was very important. However, as the park continues to expand, an intricate administrative network restricts the development of Zhongguancun. As the driving force of the Zhongguancun Science Park, universities and research institutions naturally

become the main body of technological innovation in the region. However, the relationship between industry and research lacks sufficient interaction. Financing of safeguards has become a bottleneck to the improvement of the technological innovation capacity of Zhongguancun. The management system should adopt the principle of “minimum institution, maximum service” which can advance the government’s management and improve the interaction of industry and research. The government should establish a venture investment mechanism to improve the overall investment environment (Wang and Wang 1998).

Zhongguancun Science Park now must make full use of high-tech industry to support the development of multi-risk investment funds and guarantee funds for risky small and medium enterprises (the current size of the total capital of 10 billion), focus on the commercialization of Zhongguancun high-tech achievements. In line with international norms, the venture capital market operation mechanism should be established with the following steps:

- Set up the relevant investment legal system;
- Establish a finance service guarantee for high-tech corporations;
- Adopt related policies and measures to encourage high-tech enterprises to actively utilize foreign capital;
- Focus venture capital on cultivating venture capitalists and venture capital firms to meet the needs of high-tech enterprise development.

8.7 Three West Coast Axes of Excellence: San Diego, Silicon Valley, and Seattle

8.7.1 Location and Industrial History

These three cities became high technology urban growth poles centered on different industries—biotechnology in San Diego, IT in Silicon Valley, and aerospace/computer software development in Seattle—but driven by a similar cultural wind of innovation. The predominance of the west coast cities of the United States as models of profitable creativity, birthing new industries from research bench to competitive market, was no coincidence. As a seaport city, San Diego, California is a major federal navy and marine site supported by the state-funded University of California at San Diego. Silicon Valley is a product of private Stanford University and other San Francisco Bay area colleges. Seattle, Washington is a major aviation, transportation and internet services center fuelled by the public state-funded University of Washington. All three profit from numerous grants and attract a vibrant, interactive scientific and venture capital community supported by financial institutions, consultancies and major accounting and legal firms that undergird regional strengths.

Fig. 8.8 Southern California borderland and biotech center city of San Diego



8.7.2 *State of Local Economies*

San Diego is the second largest city in California and the second largest technopole in the state, after the Silicon Valley region. Similar to the situation of Pittsburgh, this seems to inspire a positive “try harder” attitude. Its population of 1.3 million (2010 est.) in 324 square miles (963.6 km²) lies 15 miles north of the border with Mexico, and slightly south of its research rich suburbs such as La Jolla. Drawing on an excellent harbor location and the post-WW II presence of the navy, San Diego’s major economic engine is the defense industry, manufacturing—particularly high tech research university spillovers such as biotechnology, computer science, electronics, software development, and wireless telecommunications—and agriculture, including agricultural biotech. The latter strength supports California’s premier position as a flourishing exporter of fruit and vegetables, along with more value added products based on them such as wine (Troutman 2004) (Fig. 8.8).

Silicon Valley acquired its name in 1971, referring to the location of this area in the Santa Clara Valley (including parts of Alameda, San Mateo and Santa Cruz counties) south of the San Francisco Bay and its early importance as the birthplace of the semiconductor industry, based on the invention of the silicon chip. Major cities in the Valley are San Jose and Mountain View. A long and distinguished list of high tech innovative companies includes Bell Labs, Xerox, and Cisco, feeding off their proximity to the local cluster of research universities including Stanford and various University of California and State University branches, from Berkeley north of San Francisco to San Jose State and UC Davis near Sacramento. Several features sustain this regional economic corridor: (1) an entrepreneurial spirit among well-paid workers that enables them to start their own companies to explore the feasibility of their own ideas, (2) a local pool of venture capital stemming from computer millionaires seeking to invest funds in the Next Big Idea, and (3) the convenience of staying close to universities with facilities and talent to develop new ideas (Saxenian 1994). Almost half of the Valley residents speak a non-English language at home; 60% of the scientists and engineers were born outside the U.S. (Fig. 8.9).

Fig. 8.9 Sizzling Silicon Valley, north central California innovation habitat



Seattle is a seaport on an isthmus 100 miles south of the border with Canada, stretching over 142.5 sq. miles (369.2 km²). Its population is 617,000, with a metropolitan population of 4.2 million, similar to Atlanta, Georgia. Seattle took off as a staging area for the trek to the Alaskan gold fields, but blossomed as a transportation corridor (including highways and rail) and port known as “The Gateway to the Pacific”. Further recent distinctions include being highest in coffee drinkers, college graduates, and literacy. Seattle’s economic base is a diversified blend of old and new economy, from lumber to internet and technology services, design and green technology startup firms. Six young Fortune 500 companies have headquarters in this city: Washington Mutual (banking), Amazon, Starbucks, Nordstrom, Safeco (insurance), and Expeditors (global logistics). Nearby giants include Costco, Microsoft, Nintendo, Weyerhaeuser (forest products), truck manufacturers, and T-Mobile USA. The city’s largest private manufacturing employer remains Boeing, though headquarters moved to Chicago (Morrill 2013) (Fig. 8.10).

8.7.3 *Urban-Industrial Transformation Strategy*

All three city regions thrive from local university technology transfers, consciously linked to a business community that promotes and privately finances risk-taking entrepreneurship. As one local leader said, “It’s not how many times you fall down; it’s how fast you get up.” A supportive community that seeks to coordinate policies nurturing the local workforce and businesses is also common to all three areas, in the frontier pioneering spirit of the West Coast. They also benefit from a global workforce that attracts bright and energetic minds from many countries, a particularly prominent demographic in the case of Silicon Valley (Kenney 2000).

Fig. 8.10 Seattle: Northwest Fortune 500 frontier for entrepreneurial research (www.nationalatlas.gov)



8.8 Conclusions

Despite their different regional locations stretching from the east to west coast and the continental heartland of their country, each urban cluster displays some similar characteristics that have sustained it through economic downturns and transitions. These include:

- A location that benefits from transportation by a combination of road, rail or water;
- A key profitable industry base;
- An amenity environment that creates and sustains a well-educated labor force;
- Good city planning which directs incentives in line with business attraction goals;
- Technological innovation within the cluster;
- Rapid adaptation to changing circumstances due to information networks.

While technology's innovation ability has a significantly positive effect on an industrial cluster's development, leadership that actively works with political and business leaders to promote mutually beneficial policies for forming a coalition "growth engine" is key to bringing all the listed factors together. Adjacent cities that demonstrate cooperation with each other also promote a mutually beneficial urban economic cluster. Despite many intriguing similarities, major differences between the situation in the Chinese and U.S. cities discussed include the relative proportion of government and private involvement in the political economy of each area.

The political economy supporting a cluster, whether based on advanced manufacturing or high technology innovation, includes services and attractive quality of life-enhancing amenities, housing, schools, suitably configured and priced business and residential real estate. The “information highway” along which these city regions cluster consists of physical, social and institutional infrastructure including bench to market expertise, financing, legal and accounting counsel, a favorable tax structure, and community support to nurture the new, which could be quite different from the former economic base but represent a necessary transition to a vibrant economic future.

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