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# Tale of Two Cities: From Farmland to Tech Mecca

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RESEARCH

# INTRODUCTION

Bordering Hong Kong, Shenzhen used to be a small farming and fishing village in the Pearl River Delta and more recently a low-cost, labor-intensive manufacturing center. Thanks to China's reform and opening-up policy in the late 1970s, China—and Shenzhen in particular—gradually opened its markets to the outside world and transformed. Nowadays, Shenzhen has become a modern and economically flourishing hub in the consumer electronics world. The city is known as a powerhouse of innovation and credited as “China's Silicon Valley”<sup>1</sup> and “Silicon Delta.”<sup>2</sup> Shenzhen is home to well-known tech companies like Huawei, Tencent, and ZTE.

There have been numerous efforts to replicate Silicon Valley around the globe. While some have been relatively successful, other efforts have proven mediocre or even total fiascos. Even within China, not all special economic zones (SEZs) have achieved the same degree of success as the Shenzhen SEZ. The Shenzhen SEZ is by far the most successful among them and has become China's innovation economy role model. Although there have been many studies on Silicon Valley and its counterparts,<sup>3</sup> little attention has been paid to the comparison between the Bay Area and the young Shenzhen city-region. While the two clusters operate under two rather distinct political and economic systems—the Bay Area in a market economy vs. Shenzhen in a planned economy—both have been recognized as innovation and technology hubs with great economic success. Studying the two cases at the extremes of the institutional spectrum can provide different angles in understanding how the two clusters emerged, evolved, and proved sustainable, and in offering lessons for places intending to create new clusters. More specifically, this paper attempts to address two research questions. First, what are the factors (e.g., economic development policies, entrepreneurship) contributing to economic success? And, second, to what extent can these contributing factors be replicated?

<sup>1</sup> Bloomberg, “Why China's Silicon Valley Is a Magnet for Tech Millennials,” February 23, 2017, <https://www.bloomberg.com/news/articles/2017-02-24/why-china-s-silicon-valley-is-a-magnet-for-tech-millennials>; Christopher DeWolf, “Construction in China's ‘skyscraper capital’ shows little sign of slowing,” CNN, July 23, 2017, <http://www.cnn.com/style/article/shenzhen-skyscraper/index.html>.

<sup>2</sup> The Economist, “Welcome to Silicon Delta: Shenzhen is a Hothouse of Innovation,” April 8, 2017, <https://www.economist.com/news/special-report/21720076-copycats-are-out-innovators-are-shenzhen-hothouse-innovation>.

<sup>3</sup> See Timothy Bresnahan and Alfonso Gambardella (Eds.) (2004). *Building High-Tech Clusters: Silicon Valley and Beyond*. Cambridge: Cambridge University Press, for example.

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To answer the aforementioned questions, the next section will review the history of both the Bay Area and Shenzhen to give the reader a better understanding of the historical context in their economic development. Based on the historical review, the ensuing section will analyze the key elements driving the rise and development of both clusters and evaluate the applicability of measures they utilized in accumulating their innovation and technology capacity. Through this investigation, this paper intends to provide further insights into the formation of innovation and technology clusters and economic development.

# HISTORICAL DEVELOPMENT

This section provides background information for the two city-regions and offers a historical context that covers the origin, evolution, and recent transformation of the Bay Area and Shenzhen. This brief review also illustrates some key drivers contributing to the economic success of the two city-regions that will be further analyzed in the next section.

## BACKGROUND

The term “Silicon Valley” in the U.S. often refers specifically to the area around San Jose. Despite this, conceptually most people would also associate San Francisco with Silicon Valley, generally known as the San Francisco Bay Area. The Bay Area approximates both San Francisco-Oakland-Hayward, CA and San Jose-Sunnyvale-Santa Clara, CA metropolitan areas. In 2015, the Bay Area had a population of 6,610,805, 13,357 square kilometers of land area and a population density of 495 persons per square kilometer.<sup>4</sup> Nonetheless, there is a considerable variation in population density within this area. Except for Oakland and San Francisco, the rest of this area has a relatively low population density.

The city of Shenzhen, a Chinese counterpart of the U.S. Silicon Valley, comprises 10 districts and covers 1,997 square kilometers of land area. In 2015, it had a population of approximately 11 million with 5,697 persons per square kilometer.<sup>5</sup> Today, Shenzhen is a vibrant city dotted with various stores, restaurants, hotels, and offices along its commercial boulevards. Shenzhen’s skyline is being outlined by emerging high-rises. In 2016, there were 128 buildings over 200 meters completed around the world. Among them, China accounted for 70 percent of the pool and Shenzhen alone had 11 of them, outnumbering the quantity in the entire U.S.<sup>6</sup>

<sup>4</sup> Data on populations and land areas are from Moody’s Analytics and U.S. Census Bureau (2016). American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for San Francisco-Oakland-Hayward, CA Metro Area, <https://censusreporter.org/profiles/31000US41860-san-francisco-oakland-hayward-ca-metro-area/> and U.S. Census Bureau (2016). American Community Survey 1-year estimates. Retrieved from Census Reporter Profile page for San Jose-Sunnyvale-Santa Clara, CA Metro Area, <https://censusreporter.org/profiles/31000US41940-san-jose-sunnyvale-santa-clara-ca-metro-area/>, with authors’ calculations on population density.

<sup>5</sup> Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, pp. 3-4.

<sup>6</sup> Christopher DeWolf, “Construction in China’s ‘skyscraper capital’ shows little sign of slowing,” CNN, July 23, 2017, <http://www.cnn.com/style/article/shenzhen-skyscraper/index.html>.

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The gross domestic product (GDP) per capita of Shenzhen in 2015 was approximately \$24,000<sup>7</sup> whereas the levels of per capita personal income (PCPI) for San Francisco-Oakland-Hayward, CA and San Jose-Sunnyvale-Santa Clara, CA metropolitan areas were \$79,206 and \$81,592, respectively.<sup>8</sup> Even after accounting for purchasing power parity (PPP), the income level of Shenzhen was still far behind that of the Bay Area. Nonetheless, Shenzhen has experienced phenomenal economic growth in recent decades. From 1979 to 2015, Shenzhen's GDP jumped from 196 million yuan to 1.75 trillion yuan, with an annual average growth rate of 23 percent.<sup>9</sup> From 2010 to 2015, Shenzhen's GDP growth rate was 79 percent, easily surpassing 29 percent and 44 percent of San Francisco-Oakland-Hayward, CA and San Jose-Sunnyvale-Santa Clara, CA metropolitan areas, respectively.<sup>10</sup> Furthermore, Shenzhen's GDP is expected to be \$350 billion in 2018, surpassing the \$345 billion GDP of its neighbor, Hong Kong.<sup>11</sup> Both the Bay Area and Shenzhen gained population from 1979 to 2015. During this period, the growth rate of population for the San Francisco-Oakland-Hayward, CA and San Jose-Sunnyvale-Santa Clara, CA metropolitan areas combined was 46.2 percent whereas the population in Shenzhen grew by more than 3,600 percent (from 314,100 in 1979 to 11.4 million in 2015).<sup>12</sup>

Behind these staggering rates of income and population growth, Shenzhen's real transformation comes from the alteration of its industrial composition. In the past two decades or so, the city has been a base for hardware manufacturing and notoriously known as a copycat center, or the capital of shanzhai, for its pirated mobile phones in particular. Since around the early 2010s, Shenzhen has been moving up the value chain and has gradually become an innovation hub. The city has so far attracted many domestic and overseas innovators and entrepreneurs to its soil. It has had great economic success in recent years. For instance, Shenzhen has repeatedly claimed the fourth place in the Milken Institute's "Best-Performing Cities China" rankings from 2015 to 2017.<sup>13</sup>

<sup>7</sup> Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, p. 5. The GDP per capita of Shenzhen in 2015 was 157,985 yuan, which was approximately \$24,000.

<sup>8</sup> Bureau of Economic Analysis, "San Francisco-Oakland-Hayward, CA (MSA)," November 17, 2016, <https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=41860&areatype=MSA&geotype=4>; Bureau of Economic Analysis, "San Jose-Sunnyvale-Santa Clara, CA (MSA)," November 17, 2016, <https://www.bea.gov/regional/bearfacts/pdf.cfm?fips=41940&areatype=MSA&geotype=4>. The numbers reported in these two links are per capita personal income (PCPI). Strictly speaking, these numbers are not really comparable given that the number for Shenzhen is GDP while the ones for the two U.S. metros are PCPI. In addition, for international comparison, income data should be corrected for purchasing power parity (PPP). See Michael Storper, Thomas Kemeny, Najji P. Makarem, and Taner Osman (2015). *The Rise and Fall of Urban Economies: Lessons from San Francisco and Los Angeles*, Stanford: Stanford University Press, p. 8.

<sup>9</sup> Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, p. 5.

<sup>10</sup> Authors' calculations using the data from the Bureau of Economic Analysis, "Gross Domestic Product by Metropolitan Area, 2015," September 20, 2016, [https://www.bea.gov/newsreleases/regional/gdp\\_metro/2016/pdf/gdp\\_metro0916.pdf](https://www.bea.gov/newsreleases/regional/gdp_metro/2016/pdf/gdp_metro0916.pdf); Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, p. 5.

<sup>11</sup> Eric Lam, "Hong Kong's Economy May Soon Be Eclipsed by the Chinese City Next Door," *Bloomberg*, September 5, 2017, <https://www.bloomberg.com/news/articles/2017-09-05/as-shenzhen-overshadows-hong-kong-the-ex-colony-keeps-its-jewel>.

<sup>12</sup> Authors' calculations based on data from Moody's Analytics and Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, p. 4.

## ORIGIN

The origin of Silicon Valley can be traced back to the leadership of Stanford University. Frederick Terman, who was a professor at Stanford's School of Engineering, is widely credited with being one of the key facilitators in spawning this tech cluster. His leadership and efforts led to the emergence of many technology firms in the electronics industry including the Hewlett-Packard Company (HP). The early growth of many of these companies can be largely attributed to military contracts for manufacturing military electronic products during World War II, the Korean War, and the Space Race with the former Soviet Union. During the second half of the 1940s, Terman realized the importance of engaging Stanford University with advanced research and facilitating the collaboration between the university and local industries. To achieve these goals, the Stanford Research Institute, the Stanford Industrial Park, and a cooperative program that brought industrial workers to Stanford's classroom were established under his facilitation. By the late 1960s, Silicon Valley had become known as a cluster of aerospace and electronics industries.<sup>14</sup>

Unlike Silicon Valley, there were no prestigious academic institutions at the onset of Shenzhen's establishment. Shenzhen had a relatively humble beginning. Nearly forty years ago, Shenzhen was a small village (previously known as Bao'an County) where agriculture and fishery were the mainstays of its economy. It did not gain its municipal status until 1979. Thanks to China's reform and opening-up policy in the late 1970s, one of the nation's first four special economic zones (SEZs) was founded there in 1980.<sup>15</sup> The selection of Shenzhen as an experimental zone for China's economic reforms can be largely attributed to its geographic proximity to Hong Kong. Its location in between the Chinese mainland and Hong Kong rendered Shenzhen an important intermediary in commodity circulation and factor imports.<sup>16</sup>

<sup>13</sup> The Milken Institute's Best-Performing Cities China series has traced the economic performance of Chinese cities since 2015. For more details, visit <http://best-cities-china.org/>.

<sup>14</sup> AnnaLee Saxenian (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press.

<sup>15</sup> The other three are Shantou and Zhuhai in Guangdong Province and Xiamen in Fujian Province.

<sup>16</sup> Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Douglas Zhihua Zeng Ed.). Washington, D.C.: The World Bank.

## EVOLUTION

Around the early 1970s, the area around San Francisco and San Jose became especially known as a hub for the semiconductor sector. In 1971, journalist Don Hoefler coined the term “Silicon Valley” in *Electronic News*.<sup>17</sup> Some well-known tech companies such as Apple and Oracle were founded there in the 1970s. In the 1980s, Silicon Valley had become the widely accepted center of the computer industry.<sup>18</sup> In the 1990s, more renowned internet-related companies such as eBay, Google, and Yahoo were established there. In the late 1990s, Silicon Valley took advantage of the internet revolution and commanded its leadership in information technology.<sup>19</sup>

At the outset of the SEZ’s establishment, the zone was set to focus on the electronics industry. Many electronics manufacturing and processing facilities relocated from Hong Kong to Shenzhen. Founded in 1986, the Shenzhen Electronics Group Company initiated China’s first electronic parts supply market, nurturing entrepreneurship in Shenzhen. In the 1980s, Shenzhen mainly specialized in processing consumer electronics such as telephones, televisions, radio, and calculators. In 1992, the Shenzhen municipal government started implementing the minimum wage policy.<sup>20</sup> In the early 1990s, the Shenzhen government recognized that the city was losing cost advantages compared with other Chinese cities and decided to upgrade its industry to center in high-tech electronics. The municipal government strategically focused on nurturing five industries including PCs and software, telecommunication, microelectronics, optical-electro-mechanical integration, and new materials.<sup>21</sup> In the 2000s, Shenzhen established its information and communication technology (ICT) industry. Assembling and possessing electronic computers and producing telecommunication equipment activities mainly occurred in the Bao’an District, whereas software design was concentrated in the Nanshan District.<sup>22</sup> Subsequently, Shenzhen has become an indispensable part of the global consumer electronic production networks.

<sup>17</sup> AnnaLee Saxenian (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press, p. 31.

<sup>18</sup> Corey Protin, Matthew Stuart, and Matt Weinberger, “Animated timeline shows how Silicon Valley became a \$2.8 trillion neighborhood,” *Business Insider*, May 30, 2017, <http://www.businessinsider.com/silicon-valley-history-technology-industry-animated-timeline-video-2017-5>.

<sup>19</sup> Manuel Castells (2000). *The Rise of the Network Society (Second Edition)*. Malden: Blackwell.

<sup>20</sup> Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). “China’s First Special Economic Zone: The Case of Shenzhen,” *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhihua Zeng Ed.). Washington, D.C.: The World Bank.

<sup>21</sup> Wenying Fu, Javier Revilla Diez, and Daniel Schiller (2012). “Regional Innovation Systems within a Transitional Context: Evolutionary Comparison of the Electronics Industry in Shenzhen and Dongguan since the Opening of China,” *Journal of Economic Surveys*, 26(3): 534–550.

<sup>22</sup> Cassandra C.Wang, George C.S. Lin, and Guicai Li (2010). “Industrial Clustering and Technological Innovation in China: New Evidence from the ICT Industry in Shenzhen,” *Environment and Planning A*, 42(8): 1987–2010.

# HISTORICAL DEVELOPMENT

## TRANSFORMATION

In the last two decades, Silicon Valley has emerged as the world leader in high-tech industries. Several innovative companies—Airbnb, Facebook, Tesla, Twitter, and Uber, to name a few—have strategically situated themselves in the region. This centralization shows Silicon Valley’s ability to foster an ecosystem ripe for entrepreneurial and innovative activities.

After 2000, Shenzhen has become a global manufacturing hub for a variety of electronic products such as laptops and mobile phones. However, Shenzhen is still best known for its shanzhai practice. The city has put further efforts in upgrading its industries and encouraging entrepreneurial activities to channel the region’s excessive creativity in copying products at knockdown prices. It has become apparent that the city is aiming to lead in innovation in technology in China and beyond. In 2000, the Shenzhen municipal government established the Shenzhen Overseas Chinese High-Tech Venture Park within the Shenzhen High-Tech Industrial Park (SHIP) to attract overseas Chinese scholars and students to start their businesses (particularly in the high-tech industries) in Shenzhen. The city even started cultivating its cultural industries in an attempt to promote creativity. In 2009, Shenzhen was designated as a “City of Design” in the “Creative City Network” by the United Nations Educational, Scientific and Cultural Organization (UNESCO). Since around the mid-2010s, echoing the Chinese central government’s initiative in encouraging entrepreneurship and innovation, Shenzhen has been more actively transforming itself from an original equipment manufacturer (OEM) center to a technology and innovation hub by cultivating its indigenous innovation capacity.

# DRIVERS OF ECONOMIC SUCCESS: A COMPARATIVE APPROACH

Many scholars have used various theoretical frameworks including international and comparative development theory, regional science and urban economics (RSUE), new economic geography (NEG), and the study of institutions to study economic development for cities and regions. The development theory compares the differences in the impact of various dimensions such as capital and labor mobility and institutions on economic performance across countries. Both the RSUE and NEG emphasize the importance of production factors including capital, labor, and knowledge to economic development. Nonetheless, RSUE posits that these factors of production are highly mobile whereas as NEG holds an opposite view and emphasizes the importance of industrial agglomeration. The institutional approach examines how rules/laws and actors (i.e., individuals and organizations) shape economic development.<sup>23</sup>

Despite their different angles, these theoretical approaches cover some common ground including the roles of capital, labor, universities and research institutes, innovation and entrepreneurship, and cultures and institutions in determining the economic outcomes of cities and regions. Through these lenses, this section compares the similarities and differences between the Bay Area and Shenzhen and identifies the key factors contributing to their rise as innovation hubs and their economic prosperity.

## CAPITAL

The main funding source at the early stage of Silicon Valley's establishment came from military contracts. By the early 1970s, venture capital (VC) replaced military funding as the major source for financing startup activities.<sup>24</sup> A key factor in Silicon Valley's early success is that many members of venture capital firms had their roots in the electronics industry and thus could make sound investment decisions.<sup>25</sup> Venture capital has been an essential part of

<sup>23</sup> Michael Storper, Thomas Kemeny, Naji P. Makarem, and Taner Osman (2015). *The Rise and Fall of Urban Economies: Lessons from San Francisco and Los Angeles*. Stanford: Stanford University Press.

<sup>24</sup> AnnaLee Saxenian (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press.

<sup>25</sup> Manuel Castells (2000). *The Rise of the Network Society (Second Edition)*. Malden: Blackwell.

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Silicon Valley's innovation and entrepreneurial activities. As Ferrary and Granovetter put it, "understanding Silicon Valley's complexity and the hidden functions of VC firms can help policy-makers who try to create innovative clusters."<sup>26</sup>

Unlike the case of Silicon Valley, military funding was not the main source driving Shenzhen's early economic development.<sup>27</sup> Instead, foreign direct investment (FDI) played a vital role in fueling Shenzhen's initial economic growth. In particular, the FDIs from Hong Kong and Taiwan played a key role in spawning the early formation of Shenzhen's electronic industry. Facilitated largely by China's economic reform in the late 1970s, when Shenzhen gained its municipal status and was designated as a SEZ, the city has been experimenting with an approach blending market-oriented and planned economic features together for its economy. Shenzhen focused on attracting FDI to the city at the early stage of its establishment. To achieve this goal, Shenzhen offered preferential policies such as tax benefits to lure foreign investors.<sup>28</sup> In addition, businesses there were allowed to operate under fewer restrictions compared with those in other Chinese cities.

To better attract FDI, Shenzhen was a pioneer for China's financial reforms. In 1982, Hong Kong-based Nanyang Commercial Bank opened a branch in Shenzhen and became the first ever foreign financial institution with a presence in China.<sup>29</sup> In 1985, Shenzhen SEZ set up a foreign exchange transaction center.<sup>30</sup> In 1987, China's first bonded area, the Shatoujiao Bonded Zone, was established to attract FDI.<sup>31</sup> In 1990, China's first stock exchange—Shenzhen Stock Exchange—had its debut in the city. All these efforts have led Shenzhen to become one of the leading recipients of private foreign funding in China. From 1980 to 2015, the amount of foreign capital actually utilized by the city increased from \$0.028 billion to \$6.5 billion per year.<sup>32</sup>

Shenzhen has long been attempting to cultivate its high-tech industries. In 2000, the city set up an International High-Tech Equity

<sup>26</sup> Michel Ferrary and Mark Granovetter (2009). "The role of venture capital firms in Silicon Valley's complex innovation network," *Economy and Society*, 38(2): 355.

<sup>27</sup> Although the founder of Huawei, Zhengfei Ren, was the former engineer of China's People's Liberation Army, Sun (2009) argues that this private company received very little funding from China's military.

<sup>28</sup> Frank Holmes, "China's New Special Economic Zone Evokes Memories Of Shenzhen," *Forbes*, April 21, 2017, <https://www.forbes.com/sites/greatspeculations/2017/04/21/chinas-new-special-economic-zone-evokes-memories-of-shenzhen/#655dca3976f2>.

<sup>29</sup> Shenzhen Daily, "Foreign Banks' Business Booming in Shenzhen," July 27, 2005, <http://www.china.org.cn/english/BAT/136255.htm>; Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhihua Zeng Ed.). Washington, D.C.: The World Bank.

<sup>30</sup> Charles W. Hultman (1990). "China's Regional Foreign Exchange Transaction Centers: Market Orientation in a Modified Planned Economy," *Journal of Asian Economies*, 1(2): 309–317.

<sup>31</sup> Shenzhen Customs, "Special Supervision Areas," <http://www.customs.gov.cn/publish/portal109/tab31372/>.

<sup>32</sup> Data for 1980 and 2015 are from Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhihua Zeng Ed.). Washington, D.C.: The World Bank and NBS Survey Office in Shenzhen (2016). Shenzhen Statistical Yearbook, Beijing: China Statistics Press, respectively.

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Transaction Center that specifically intended to facilitate high-tech equity transactions in China.<sup>33</sup> In 2007, the Shenzhen Venture Capital Services Platform (SZ VCP) of Shenzhen High-Tech Industrial Park (SHIP) was established.<sup>34</sup> Around the mid-2010s, the Chinese central government set a policy mandate to promote entrepreneurial and innovation activities that target high value added industrial sectors. Shenzhen has also joined this movement by cultivating innovation-based industries such as biotechnology, FinTech, and new energy, and by encouraging startup activities. To support these, the Chinese central government recently launched a \$1.5 billion startup VC fund to cultivate innovation-driven sectors.<sup>35</sup>

## MIGRATION AND TALENT

For more than a century, the U.S. has been a nation where people are free to migrate of their own will. On top of a high rate of domestic migration from other regions in the nation, California in particular has been a melting pot consisting of a variety of ethnic and racial groups with various backgrounds and talent.

Historically, the hukou, or household registration system, in China classifies its citizens into two categories—urban and rural population. This institution determines where people can live and work and what benefits and opportunities they can get. Despite the constraint on mobility, at the early stage of the SEZ's development, the contrast in freedom, lifestyle, and income motivated many people to take the risk to flee from Shenzhen to Hong Kong even though the border control was initially tight. This control was not largely relaxed until Deng Xiaoping's visit in 1987. He recognized that the differences of economic development between Hong Kong and Shenzhen gave many young men the desire to flee from Shenzhen to Hong Kong.<sup>36</sup> Although the flow of people at the onset of Shenzhen's establishment was fairly constrained and made the city more homogeneous, Shenzhen has been the gateway for Chinese flight to Hong Kong.

<sup>33</sup> Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhuhua Zeng Ed.). Washington, D.C.: The World Bank.

<sup>34</sup> SHIP Venture Capital Services Platform, "Introduction of Platform," <http://vc.shipsc.org/vcen/index.asp?bianhao=6>.

<sup>35</sup> Johan Nylander, "Shenzhen launches US\$1.5b startup VC fund," *Asia Times*, February 21, 2017, <http://www.atimes.com/article/shenzhen-launches-us1-5b-startup-vc-fund/>.

<sup>36</sup> Ezra F. Vogel (2017). "Foreword," *Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City* (Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach Eds.), Chicago and London: The University of Chicago Press, p. XI.

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Once Shenzhen became more developed, many people from the rest of China strived to move to Shenzhen in search of better jobs, better business opportunities, and to enjoy a modern lifestyle. Although people used to be required to obtain permits to enter the SEZ, people found loopholes to sneak into the SEZ.<sup>37</sup> Gradually, Shenzhen has been relaxing its limit on movement imposed by hukou and allowing more people to work in the city. Since the 1980s, young Chinese graduates with ambition and vision have flocked to the city. As such, Shenzhen has not had a shortage of talent even though it did not have homegrown prestigious educational institutions like the Bay Area had. Shenzhen today not only continues its legacy as a magnet for domestic migrants, it attracts global talents as well. Human capital flowing into Shenzhen through both formal and informal conduits is recognized as the key for Shenzhen's economic success.<sup>38</sup> Modern Shenzhen is a melting pot with a diverse demographic profile. A majority of its residents are from outside of the region.

Dajian, the largest civilian consumer drone or UAV maker in the world, is headquartered in Shenzhen. The founder is a graduate of Hong Kong University of Science and Technology (HKUST) and a Hong Kong resident. Now he is running his rapidly expanding company in Shenzhen. By choosing Shenzhen as its hub, the manufacturer must have recognized the talent pool, local component producers, and access to technologies in the city. In the city of Shenzhen, where the formal presence of any renowned universities and the research and development (R&D) base are not as well situated as others in China, talent from elsewhere becomes the most critical asset the city can rely on—this talent brings knowledge, creativity, and relationships with them to the region. In addition, a 2015 report released by the Ant Financial, a Chinese FinTech company, regarding the destination of recent university graduates showed that the outflow of college graduates from Wuhan to Shenzhen was number one in the nation.<sup>39</sup> These recent stories show the fact that Shenzhen has been attracting many of the best and brightest from all of China.

<sup>37</sup> Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach (2017). "Introduction: Experiments, Exceptions, and Extensions," *Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City* (Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach Eds.), Chicago and London: The University of Chicago Press, p. 5.

<sup>38</sup> The Economist, "Welcome to Silicon Delta: Shenzhen is a Hothouse of Innovation," April 8, 2017, <https://www.economist.com/news/special-report/21720076-copycats-are-out-innovators-are-shenzhen-hothouse-innovation>.

<sup>39</sup> msn.com, "Wuhan Proposed Housing Subsidy to Retain Talent. College Graduates Settling in Wuhan Tripled over the Past Year," [https://www.msn.com/en-us/money/news/%E6%AD%A6%E6%BC%A2%E5%87%BA%E4%BD%8F%E6%88%BF%E5%84%AA%E6%83%A0%E7%95%99%E4%BA%BA%E6%89%8D-%E7%95%A2%E6%A5%AD%E7%94%9F%E8%90%BD%E6%88%B6%E6%AF%94%E5%8E%BB%E5%B9%B4%E5%90%8C%E6%9C%9F%E5%A2%9E%E9%95%B7%3E5%80%8D/ar-BBFrlqp?li=AA54s7&ocid=spartandhp020523be484e98b&ds=AVG&v=4.3.7.452&lang=en&pr=fr&d=2016%2F01%2F06+18%3A57%3A03&cmpid=0116tb](https://www.msn.com/en-us/money/news/%E6%AD%A6%E6%BC%A2%E5%87%BA%E4%BD%8F%E6%88%BF%E5%84%AA%E6%83%A0%E7%95%99%E4%BA%BA%E6%89%8D-%E7%95%A2%E6%A5%AD%E7%94%9F%E8%90%BD%E6%88%B6%E6%AF%94%E5%8E%BB%E5%B9%B4%E5%90%8C%E6%9C%9F%E5%A2%9E%E9%95%B7%3E5%80%8D/ar-BBFrlqp?li=AA54s7&ocid=spartandhp020523be484e98b&ds=AVG&v=4.3.7.452&lang=en&pr=fr&d=2016%2F01%2F06+18%3A57%3A03&cmpid=0116tbar-BBFrlqp?li=AA54s7&ocid=spartandhp020523be484e98b&ds=AVG&v=4.3.7.452&lang=en&pr=fr&d=2016%2F01%2F06+18%3A57%3A03&cmpid=0116tb) (in Chinese).

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In summary, the Bay Area has been open to migration and immigration. On the other hand, Shenzhen initially had a tight control on labor and residential mobility. Nonetheless, the tightness of border control varied over time and thus many people were able to gain residency in the city. Ironically, the central government's early tolerance of informal and illicit practices helped the accumulation of capital and knowledge.<sup>40</sup> Over time, Shenzhen has gradually been opening its door for migration and this initiative has helped Shenzhen to acquire a thicker and more diverse workforce. If there is a shared value between the two cities that helped foster the growth of the two regions, it would be the openness of the society and the ability to attract talent. Shenzhen is perhaps the only city in China that is built by "outsiders." This cohort call themselves "Shenzhen Ren" (a literal translation is Shenzhen person). Almost all the talent and laborers that helped build the technology clusters are from all over China. Whereas in the Bay Area, high-skill workers are often drawn from the global talent pool. The two city-regions are more like "sister" cities in that regard.

## UNIVERSITIES AND RESEARCH INSTITUTES

A number of studies find that the presence of strong research universities and institutes is associated with the formation and development of high-tech clusters.<sup>41</sup> As discussed in Section II, Stanford University played a key role in the formation of Silicon Valley. In addition to Stanford University, the Bay Area is also home to many universities anchored by the University of California, Berkeley. It is argued that these academic institutions are essential sources to the local talent supply. These institutions are critical to the cultivation of innovation capacity and the growth of the Bay Area.

In contrast, when Shenzhen emerged from being the "factory of consumer electronic goods," it had no strong research universities or institutes. Shenzhen University was founded in 1983 as one of the earliest academic institutions in Shenzhen. Later, Shenzhen

<sup>40</sup> Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach (2017). "Introduction: Experiments, Exceptions, and Extensions," *Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City* (Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach Eds.), Chicago and London: The University of Chicago Press, p. 16.

<sup>41</sup> See AnnaLee Saxenian (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press and Timothy Bresnahan and Alfonso Gambardella (Eds.) (2004). *Building High-Tech Clusters: Silicon Valley and Beyond*. Cambridge: Cambridge University Press, for examples supporting this view. A study done by Neil Bania, Randall W. Eberts, and Michael S. Fogarty (1993). "Universities and the Startup of New Companies: Can We Generalize from Route 128 and Silicon Valley?" *The Review of Economics and Statistics*, 75(4): 761-766.

Polytechnic was founded in 1993 and more Chinese renowned academic institutions such as Peking University and Tsinghua University all based their satellite campuses in Shenzhen. Despite these efforts, Chen and Kenney (2007) argue that universities and research institutes did not contribute to the formation of Shenzhen's IT cluster.<sup>42</sup> In 2012, the Chinese University of Hong Kong also established a base in Shenzhen, demonstrating Shenzhen's continuing efforts to bolster its research and development capacity.

## INNOVATION AND ENTREPRENEURSHIP

Given its low production costs, Shenzhen became a global processing and assembly center for such products as mobile phones and other commercial communication gears. However, many electronic devices have been copied and tweaked in Shenzhen (particularly in the Huaqiangbei area). This has made Shenzhen a city notorious for its shanzhai (pirating) practices.<sup>43</sup> In addition, the competition from other low-cost cities has also gradually eroded Shenzhen's cost advantage.

To cope with these challenges, Shenzhen has been trying to upgrade its industries. In fact, by the second half of the 1980s, Shenzhen had attempted to nurture innovation and entrepreneurial activities by encouraging high-tech professionals to become shareholders of private enterprises.<sup>44</sup> Since the 1990s, the high-tech industries have started taking off and Shenzhen's municipal government has been trying to bolster the city's technological innovation capacity and high-tech industries. One of the key strategies in fostering high-tech industries was to establish industrial areas such as the Shenzhen High-Tech Industrial Park (SHIP) (founded in 1996). These industrial parks typically provide their customers with low-cost spaces and readily available equipment as well as streamlined administrative services to help jumpstart small tech-oriented businesses. In 2000, the Shenzhen municipal government established the Shenzhen Overseas Chinese High-Tech Venture Park in SHIP to attract overseas Chinese students to start their businesses in Shenzhen. This park

<sup>42</sup> Kun Chen and Martin Kenney (2007). "Universities/Research Institutes and Regional Innovation Systems: The Case of Beijing and Shenzhen," *World Development*, 35(6): 1056–1074.

<sup>43</sup> Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach (2017). "Introduction: Experiments, Exceptions, and Extensions," *Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City* (Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach Eds.), Chicago and London: The University of Chicago Press.

<sup>44</sup> Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhihua Zeng Ed.). Washington, D.C.: The World Bank.

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provides entrepreneurs with physical infrastructure and services in financing, consulting, training, networking, and marketing.<sup>45</sup>

In 2010, the State Council of the People's Republic of China promulgated a directive to cultivate strategic emerging industries (SEIs) including energy-efficient and environmental technologies, next generation information technology (IT), biotechnology, high-end equipment manufacturing, new energy, new materials, and new-energy vehicles (NEVs).<sup>46</sup> In 2016, the State Council further announced a new plan to keep nurturing SEIs with particular focus on five pillar industries including IT, high-end manufacturing, biology, green and low carbon, and digital creation.<sup>47</sup> Shenzhen has also been actively echoing the central government's policies. For instance, the Shenzhen Municipal Government has been supporting the development of electric vehicles. Many police cars, taxis, and buses in Shenzhen are all electric vehicles manufactured by BYD, a company that is headquartered in Shenzhen.

In addition to cultivating these high value added industries, Shenzhen has recently pushed for innovation and entrepreneurial activities. In particular, Shenzhen is trying to create more makerspaces where entrepreneurs can design, prototype, and create manufactured products. The complete and low-cost supply chain for electronics manufacturing provides Shenzhen with huge advantages in innovation and entrepreneurial processes. Shenzhen, a capital for hardware, has a complete ecosystem with all kinds of suppliers that can offer easy and timely access to low-cost equipment and parts for all stages of electronics production and has attracted about a thousand startup accelerators to the city.<sup>48</sup>

Shenzhen's persistent efforts in bolstering its high-tech industries and innovation capacity are reflected in statistics. In 2001, the value of exports of the high technology industry was \$11.4 billion. This number jumped to \$140.3 billion (more than 12 times higher) by 2015. From 2004 to 2015, the city's number of Patent Cooperation Treaty (PCT) international patent applications increased 40 times

<sup>45</sup> Shenzhen Overseas Chinese High-Tech Venture Park, <http://www.szchuangye.com/forum/forum!forum.do?forumId=54>.

<sup>46</sup> The US-China Business Council (2013). "China's Strategic Emerging Industries: Policy, Implementation, Challenges, & Recommendations," <https://www.uschina.org/sites/default/files/sei-report.pdf>.

<sup>47</sup> The State Council, The People's Republic of China, "China Issues Plan to Develop Strategic emerging industries," December 29, 2016, [http://english.gov.cn/policies/latest\\_releases/2016/12/19/content\\_281475520183484.htm](http://english.gov.cn/policies/latest_releases/2016/12/19/content_281475520183484.htm).

<sup>48</sup> Bloomberg, "Why China's Silicon Valley Is a Magnet for Tech Millennials," February 23, 2017, <https://www.bloomberg.com/news/articles/2017-02-24/why-china-s-silicon-valley-is-a-magnet-for-tech-millennials>; Wade Shepard, "A Look Inside Shenzhen's High-Tech Empire," *Forbes*, July 14, 2016, <https://www.forbes.com/sites/wadeshepard/2016/07/14/a-look-inside-shenzhens-high-tech-empire/#15a043f54f36>.

from 331 to 13,308.<sup>49</sup>

The coordinated policies and initiatives from both the central and the local governments play significant roles in bolstering Shenzhen's innovation and entrepreneurial activities. Nonetheless, recent studies in a book edited by O'Donnell et al. argue that many early reformers and grassroots innovators took risks to carry unauthorized initiatives to achieve innovative breakthroughs.<sup>50</sup>

## CULTURES AND INSTITUTIONS

In comparing Route 128 in the Boston area and Silicon Valley, Saxenian argues that the openness, the culture of collaboration, and the informal interaction between firms and talented professionals play key roles in the success of Silicon Valley.<sup>51</sup> These factors also helped the Bay Area cope with the challenges from the tech bubble burst in the early 2000s. The rebirth of the Bay Area technology cluster after the tech bubble burst made the region stronger as a leader both in the technology world and in broader regional economic development. The regional cluster evolved from being the leader in design and engineering to become a content and programming producer, furthering the integration of technologies and considerable content for users.

Unlike Silicon Valley, Wang et al. find that there is no significant relationship between the spatial agglomeration of firms in Shenzhen's information and technology (ICT) industry and their innovative performance.<sup>52</sup> This is because there is a lack of interest in interaction among firms in the industrial clusters. As a result, the innovation of most firms mainly comes from their internal R&D activities rather than from technology transfer or knowledge spillover.

Although the designation of SEZ gave Shenzhen a relatively high level of autonomy compared with other Chinese cities, Shenzhen was not quite an open economy at its early stage. Nevertheless,

<sup>49</sup> Shenzhen Statistics Bureau and NBS Survey Office in Shenzhen (2016). *Shenzhen Statistical Yearbook 2016*. Beijing: China Statistics Press.

<sup>50</sup> Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach (2017). "Introduction: Experiments, Exceptions, and Extensions," *Learning from Shenzhen: China's Post-Mao Experiment from Special Zone to Model City* (Mary Ann O'Donnell, Winnie Wong, and Jonathan Bach Eds.), Chicago and London: The University of Chicago Press.

<sup>51</sup> AnnaLee Saxenian (1994). *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Cambridge and London: Harvard University Press.

<sup>52</sup> Cassandra C. Wang, George C.S. Lin, and Guicai Li (2010). "Industrial Clustering and Technological Innovation in China: New Evidence from the ICT Industry in Shenzhen," *Environment and Planning A*, 42(8): 1987-2010.

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the dramatic contrast in lifestyle and economic developmental status between Hong Kong and Shenzhen gave the city impetus to be more open and be more receptive to institutional changes.<sup>53</sup> One of the key factors leading to Shenzhen's current success is its ongoing restructured and streamlined administrative institutions. For instance, the city has been reforming its industrial and economic management systems since 1981.<sup>54</sup>

The ability of these regions to transform perhaps stems from the open culture and intense competition on the enterprise level and/or the ability of the government administrators to quickly retool policies to accommodate new economic and corporate needs.

<sup>53</sup> Yiming Yuan, Hongyi Guo, Hongfei Xu, Weiqi Li, Shanshan Luo, Haiqing Lin, and Yuan Yuan (2010). "China's First Special Economic Zone: The Case of Shenzhen," *Building Engines for Growth and Competitiveness in China: Experience with Special Economic Zones and Industrial Clusters* (Zeng, Douglas Zhuhua Zeng Ed.). Washington, D.C.: The World Bank.

<sup>54</sup> *Ibid.*

# CONCLUSION

Prestigious education institutions such as Stanford University played a key role in spawning Silicon Valley whereas Shenzhen had no such endowment at its early developmental stage. Both city-regions have been known for their electronics industries. Yet the Bay Area has been the global innovation frontier. On the other hand, Shenzhen began with low-cost manufacturing, later copycatted electronic products, and currently strives to nurture indigenous innovation capacity. The Bay Area operates within a market economy whereas Shenzhen situates in a socialist market economy that is a hybrid of a planned and market economy. The developmental pathways of the Bay Area clusters and the Shenzhen high-tech economy cannot be more different in orientation, pace of development, utilization of private funding, and lastly, the roles of government in the process of building these regional economies. As such, it is difficult to draw on the success of these two economies too broadly to define sets of policies or practices in “making” a successful high-tech economy. However, the success stories of these city-regions can shed light on how disadvantaged economies like Shenzhen in its early years can grow into a technology heavyweight despite an obvious lack of an R&D base at the outset, and further how mature leaders like the Bay Area can reinvent themselves and continue to lead despite intense global competition.

The main purpose of this paper is twofold. First, it compares key factors contributing to both the Bay Area and Shenzhen’s economic success. Second, it evaluates to what extent the strategies they used can be replicated. This paper examines factors including capital, labor/talent, universities and research institutes, innovation and entrepreneurship, and cultures and institutions. It shows that an open policy that allows free flow of capital and labor contributes to a flourishing environment for innovation and entrepreneurship. The role played by universities and research institutes may not be

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necessary for the formation of a tech cluster at its early stage of establishment. Yet, these educational and research institutes are essential to long-term economic development. However, necessary and sufficient number of human capital and talents are essential in the formation of robust clusters. Within a market economy like the Bay Area, innovation and entrepreneurship arise spontaneously. In a semi-market economy like Shenzhen, although policies that encourage innovation and entrepreneurial activities play some role, institutions that allow free flow of capital and talent and streamlined administrative processes for businesses would matter more.

Are their experiences replicable? Governments around the world may try to pull funding, attract talent, establish or strengthen universities and research institutes, craft policies that encourage innovation and entrepreneurship, and shape the culture and institutions. However, as numerous cases have demonstrated, Silicon Valley cannot be easily replicated. Even within China, not all SEZs can achieve the same success as Shenzhen did. This is because many of these aspects have to be mature enough and have to be in the place simultaneously. In addition, just like the case of Shenzhen, some innovation was achieved somehow by luck through breaking the formal institutions or rules. If a government really would like to create another Bay Area or Shenzhen, the best bet may be to provide businesses with streamlined and transparent rules and services to facilitate a spontaneous and open ecosystem for innovation and entrepreneurial activities.

# ABOUT US

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