

Research on Shenzhen's Innovation Capability under the New Development Pattern

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Abstract. This paper explored the motivation, disadvantages and ways for Shenzhen to enhance its innovation capabilities in the context of new development patterns and rapid urbanization. Anchored in the framework of China's new dual circulation policy, the paper examined the multifaceted motivations driving Shenzhen's pursuit of innovation excellence. The analysis underscored Shenzhen's unique advantages, including government policies, geographical positioning, and participation in the Belt and Road Initiative, as catalysts for fostering innovation. However, it cautioned against the challenges posed by rising economic risks and inefficient resource allocation. With a focus on transparency, regional cooperation, talent cultivation, and the comprehensive application of digital technology, the paper proposed strategic measures to bolster Shenzhen's innovation ecosystem. By harnessing the democratizing potential of digital tools, fostering collaboration, nurturing talent, and embracing data-intensive resources, Shenzhen can fortify its position as a global innovation hub while navigating the complexities of a rapidly evolving economic landscape.

Keywords: New development patterns, Belt and Road Initiative, innovation capabilities.

1. Introduction

The innovative development and continuous progress of science and technology are decisive factors in enhancing comprehensive strength. For a country or city, science and technology are the primary productive forces, and innovation is the primary driving force leading the development of science and technology [1]. On 14 May 2020, the Chinese government claimed that China has arrived at a new developing pattern, President Xi proposed a new economic policy called the Domestic-international dual circulation, which prioritized the circulation of goods and services within China, to further reduce reliance on foreign markets, while remaining engaging with the global market. Under this new program, it is highlighted that the Chinese government would support national enterprises, particularly high-tech firms to boost the growth of cutting-edge technology and renewable energy applications to close the technology gaps with other countries. It also notes the importance of the independence of technology powers. Shenzhen, titled "China's Silicon Valley", which has a high concentration of headquarters of high-tech companies like Huawei, ZTE, and DJI Innovations, is notably required to enhance its innovation capability to adapt to the new diagram. Since its establishment as a city, Shenzhen has fully utilized its unique advantages and regional resources, boldly innovating and taking the lead in experimentation. It has transformed from a small fishing village into an internationally renowned city of innovation, paving a path for high-quality development [2]. The paper will discuss the motivations for Shenzhen to increase such abilities.

2. Shenzhen's Motivations to Enhance Innovation Capabilities

2.1. Remain Competence in Global Society

Globally, cities like Boston, New York, and Tokyo, which are on the lists of Innovation Cities 2022, are challenging Shenzhen to its innovation levels and economy. This results in the urgent need for boosting the economic transition of Shenzhen, as well as enhancing the innovation capabilities to remain competent in the global society. Shenzhen, in urgent need, should transform to a knowledge-based economy, attracting more highly educated individuals, to perform in high-tech industries and

provide new ideas for new products. Global changes should also not be neglected, with respect to global economic uncertainties, trade disputes, trade wars, and other challenges, which necessitate that Shenzhen should remain adaptive and resilient to better navigate these changes. ZTE, as a leading technology company in China, was penalized by the US during the trade war. As a result, the U.S. banned American firms from selling parts and software to the company for 7 years. Given the company's reliance on U.S. components, particularly for its smartphones (like Qualcomm chips and Google's Android operating system), this was a potentially devastating blow. In order to avoid such problems from happening again and heavily impacting national enterprises and to keep sustainable economic growth of the city, Shenzhen definitely should increase its innovation level to reduce reliance on foreign countries. In addition, relying on a few sectors is risky. Innovation helps to diversify the sectors to avoid failure and recession in the economy.

2.2. Rising Urban Challenges

The rapid urbanization of the city is increasingly attracting more people to the area. This ultimately leads to rising population pressures, which may cause urban challenges for citizens. In terms of transportation network and development level, there is still a certain gap compared to other first-tier cities nationwide. In terms of recreational facility construction, the infrastructure for recreation is at the national leading level, with certain advantages. In terms of environmental protection facility construction, there is room for improvement in centralized wastewater treatment capacity, household waste collection volume, and the rate of harmless treatment of household waste. From the above existing problems, it can be seen that traffic congestion is still evident in Shenzhen's urban development, the infrastructure development is slow, and there is room for improvement in innovation [3]. The infrastructures have been under pressure, it requires swift expansion of infrastructure like water, electricity, waste management, and telecommunications. Traffic congestion, environmental pollution, energy consumption, and housing problems may be more frequent in Shenzhen. In addition, the rapid growth can lead to social disparities. There can be a significant gap between the wealthy, often employed in the high-tech sectors, and the less affluent, including many migrant workers in the service or manufacturing sectors. Shenzhen's government needs to innovate and push for more and new effective green technologies and smarter city solutions to accommodate more people and solve the problems to lead to a more sustainable future and to improve the quality of life for its residents.

3. Shenzhen's Advantages to Enhance Innovation Levels

3.1. Benefited by Government Policy

Shenzhen's rapid economic growth in the past few decades has been nothing short of miraculous. Shenzhen has been at the forefront of China's modernization, urbanization, and successful economic transformation for the past few decades mainly due to the help of an innovative policy: Reform and Opening up. As China's first Special Economic Zone, under this policy, Shenzhen has prioritized and promoted innovation as a key component to its success. This includes successful implication of the policy, and innovation powers in the clusters of economic activities (mainly the technology parks). The spatial allocation efficiency of high-tech industry agglomeration has a significant impact on the enhancement of urban innovation capability [4]. This city has been highly benefited by the reform and opening up policy in the following aspects: Shenzhen has been granted privileges of supportive government regulatory framework, more investments and easier market access. To further explain, Shenzhen is allowed to be a testing ground for new regulatory frameworks and business models; Shenzhen also encourages the start of new businesses and new ideas; Shenzhen government simplifies the process for starting and operating innovative businesses. For instance, the government reduces bureaucratic red tape for startups and tech companies.

3.2. Geographical Benefits

Shenzhen is located in the Pearl River Delta Economic Zone, with a general pattern of center-surroundings. The Greater Pearl River Delta region, with Guangzhou and Shenzhen as its core, through the interaction of several economic zones, provides great convenience for Shenzhen to access surrounding medical resources, share development information, and collaborate [1]. Obviously, Shenzhen is at the center of the surrounding economic zones, with cities around simultaneously providing flows of migrant workers and shared information to Shenzhen, boosting the industrialization phase of Shenzhen. Significantly, Shenzhen is just next to Hong Kong, a world trade center and a mature metropolis. By studying the economic and political system of Hong Kong, Shenzhen is highly safeguarded to become an innovative city. In addition, Hong Kong also shares a global market and a worldwide base talent pool with Shenzhen. This is predominantly effective in attracting international talented workers, which remains a challenge for Shenzhen and will be mentioned later.

3.3. Belt and Road Initiative

Shenzhen is actively cooperating with countries within the project, including countries in Africa and in Europe. In this process, technology information can be shared and new platforms for communication can be created. Shenzhen can receive support from foreign countries. The BRI can serve as a bridge for international talent to come to Shenzhen and for local talent to collaborate internationally. International top talents gathering at the origin of technological innovation can not only increase the concentration of innovation in the region but also enhance the capability level of industries. This forms a virtuous cycle: 'International top talents promote breakthrough innovations, breakthrough innovations serve cutting-edge industries, and cutting-edge industries attract top talents' [5]. Cross-border educational and research partnerships can lead to new ideas, perspectives, and innovations. In the process, Shenzhen can engage with different countries and markets under BRI presenting unique challenges in terms of local needs, regulatory environments, and consumer behaviors. Addressing these challenges can push Shenzhen-based companies to innovate and adapt. Furthermore, BRI facilitates collaboration between institutions, think tanks, and innovation hubs across countries. This collaboration can lead to shared R&D projects, tech incubators, and accelerators that foster innovation.

4. The Challenges for Shenzhen to Enhance Innovation Capabilities

4.1. Rising Risks for Enhancing Innovation Capabilities

From an external environment perspective, after the subprime mortgage crisis, the global economic downturn has intensified. The rise of trade protectionism and "anti-globalization" behaviors in Europe and America in recent years, coupled with the spread of the COVID-19 pandemic, have imposed constraints on the international flow of open and innovative resources. This is not conducive to the implementation of significant international innovation projects. There's no denying that the innovation processes of countries worldwide are hindered. The negative impact brought about by this will spill over to cities through production networks [6]. Economic bubbles form when the price of an asset, be it real estate, stocks, or a specific technology, rises significantly above its intrinsic or fundamental value. This deviation is often driven by excessive speculation, where investors buy assets not because of their underlying value, but in the hope of the high potential of selling this good at a higher price to other investors. This "greater fool" theory can lead to a self-perpetuating cycle where prices continue to rise as long as there are buyers willing to pay more. Once the bubble bursts out, there is highly likely to be a financial crisis. In this case, the Shenzhen government is the investor who is willing to pay more for enhancing innovation levels. There is a high risk that the innovation levels do not reach the expectation and thus the output may not be able to be sold to other buyers,

leading to a crash in price and failure in the market. In the context of rapid urbanization, especially in Shenzhen, bubbles can form in several ways.

As Shenzhen focuses on enhancing its innovation capabilities, it often attracts significant investments. Venture capitalists, angel investors, and even large corporations may pour money into startups and innovative projects, hoping to get a piece of the next big thing. This rapid influx of capital can lead to overvaluation if it outpaces the actual, demonstrable value being created by these ventures. In addition, enhanced innovation often comes with heightened expectations. The promise of groundbreaking technologies or business models can lead investors and the market at large to speculate on potential rather than proven value. This speculative behavior can inflate the perceived worth of companies or entire sectors, even if they haven't yet turned a profit or demonstrated long-term viability. As the pace of innovation increases, there's pressure on investors and companies to stay ahead of the curve. This can lead to rushed decisions, with companies potentially launching untested products or services and investors backing ventures without a clear path to profitability, all in the name of being 'innovative'.

Another potential risk is that Shenzhen may rely on a few sectors to enhance its innovation levels. Soon, it may become vulnerable to any disruptions or downturns in that industry. This phenomenon is often referred to as having "all your eggs in one basket." If the electronics and hardware sectors face a downturn, whether due to global economic conditions, technological shifts, or increased competition, Shenzhen's innovation levels and economy may suffer. Being heavily reliant on one industry can make a city or country more susceptible to international trade disputes. For instance, tariffs or trade restrictions targeting electronics could disproportionately impact Shenzhen. Particularly under this new developing pattern, Shenzhen is reducing its dependence on foreign suppliers, as Shenzhen heavily relies on electronics sectors, it will soon face the issue of an economic downturn.

4.2. Inefficient Allocation of Resources

Shenzhen, Guangzhou, Beijing, and Shanghai are the four main cities in China, attracting innovative talented workers from all over China. When multiple cities position themselves as the epicenter of innovation, they inevitably compete for the same pool of talent. This means that Shenzhen, despite its historical significance as a hub for tech and innovation, now faces stiff competition from cities like Beijing, Shanghai, and Guangzhou. This can lead to a dilution of talent, with experts, researchers, and innovators spread thin across multiple cities. Ironically, while the intent is to foster innovation, the duplication can stifle it. When multiple cities are working on similar projects or research areas, it reduces the chances of breakthroughs. Instead of pooling resources and expertise to tackle bigger challenges, efforts become fragmented.

The concept of "Duplication of Efforts" in the context of cities vying for the title of innovation hubs can be likened to businesses in a saturated market, all trying to outdo each other with similar products. When cities like Shenzhen, Beijing, Shanghai, and Guangzhou all aim to be the pinnacle of innovation without clear differentiation, they inadvertently step into each other's territories. For example, Shenzhen and Guangzhou might end up investing heavily in similar types of infrastructure, from state-of-the-art research labs to tech parks. This not only means that the country's financial resources are spread thin, but it also results in cities having facilities that might be underutilized due to the sheer availability of similar options elsewhere. For international companies or research institutions looking to collaborate or invest, it becomes challenging to choose a city for partnership when they all offer similar value propositions. This can lead to decision paralysis or even a preference for other countries where resource allocation is more strategic and less redundant.

5. Suggestions

5.1. Provide Transparent Data Analysis

In order to avoid economic bubbles, enterprises should provide their data, which should be open, accurate, and timely disclosure of financial, operational, and other relevant information. This transparency ensures that all stakeholders, including investors, regulators, and the public, have access to the same information, reducing information asymmetry, and the government, if there is no progress, could stop the investment to cut loss in time, to avoid further economic loss. Shenzhen government relies on accurate data to assess the health, performance, and potential of a company. Transparent reporting provides it with the necessary insights to make decisions based on fundamentals rather than rumors or speculation. The government should also stop the rumors from spreading rumors, leading to irrational buying, or selling. However accurate and timely data can counteract this by providing a factual basis for decision-making. Transparent reporting can contribute to market stability by ensuring that asset prices reflect their intrinsic value rather than inflated perceptions. Regular and transparent reporting can highlight potential issues or vulnerabilities in a company's operations or financial health. This can serve as an early warning system for investors and regulators.

5.2. Increase in regional cooperation

An increase in regional cooperation would lead to knowledge exchange, research pooling cultural and social exchange. Shenzhen can share the talent pool with surrounding cities and clusters. It's a dynamic process that, when facilitated effectively, can lead to accelerated innovation, capacity building, and the development of holistic solutions to complex challenges. In this increasingly interconnected world, the ability to share and build upon collective knowledge is a powerful tool for progress. This gathering boosts workshops and conferences, allowing experts from all fields and all cities to come to Shenzhen, to present their findings, discuss new ideas, and collaborate on potential projects. Certainly, Shenzhen is the key component for the Belt and Road Initiative, taking the 'Regional Comprehensive Economic Partnership Agreement' and the construction of global maritime central cities as opportunities, we should build a globally competitive and influential innovation hub city, allocate innovation resources rationally, realize the added value of our own innovation while generating spillover effects of innovation value, and play the integration function of high-innovation-level cities [6].

Shenzhen needs to fully apply its geographical benefit adjacent to Hong Kong and encourage regional cooperation between the two cities, in order to enhance innovation levels. Cooperation between Hong Kong and Shenzhen can, to a certain extent, alleviate the problems existing between the two. Hong Kong can leverage its proximity to Shenzhen and even the mainland to address its weaknesses in manufacturing and the transformation of scientific research results. On the other hand, Shenzhen can further utilize the resources of Hong Kong to enhance its own economic and technological innovation levels, especially by leveraging Hong Kong's international capital, high-end talent, and technological theoretical achievements. Shenzhen can also learn from Hong Kong's advanced systems that are in line with international standards, providing a boost for the innovative development of Shenzhen city [7].

5.3. Focusing on Research and Cultivate New Talents

Talent is the key to enhancing research capabilities. Although Shenzhen is at the forefront globally in some emerging technology fields, it still relies on imported intermediates for core components and high-end chips. These have become the prominent weaknesses in Shenzhen's technological innovation. The fundamental reason is that Shenzhen's basic research lags behind that of innovative cities in developed countries [6]. In recent years, Shenzhen has, on one hand, been introducing superior scientific and educational resources from around the world and attracting global high-end talents. On the other hand, it has been making unconventional plans for the construction of new research and development institutions, innovative platforms, and incubation carriers, nurturing local

innovative enterprises. This has gradually formed a good development momentum of innovation, entrepreneurship, venture capital, and makers, creating a synergistic 'four-innovation linkage' [8]. Shenzhen has changed its focus from attracting international talented workers to cultivating local talents. In comparison to attract more international talents, cultivating local talents is less time-consuming and could save more investments on other aspects. Cultivating talent is a cornerstone for enhancing innovation levels in any society or organization. Talents, in this context, refer to individuals who possess not only the requisite knowledge and skills but also the creativity and critical thinking abilities to push boundaries and think outside the box. When an organization or a country invests in nurturing such individuals, it is essentially laying the groundwork for a culture of innovation. This is because these talents bring fresh perspectives, challenge existing norms, and introduce novel solutions to old problems. Furthermore, a diverse talent pool, with individuals from various backgrounds and disciplines, fosters interdisciplinary collaboration. Such collaboration often leads to breakthroughs, as it combines different areas of expertise to address complex challenges. In essence, by prioritizing talent cultivation, we are not just producing skilled workers; we are creating the innovators and thought leaders of tomorrow who will drive progress and elevate the standards of innovation. Universities and research institutes are the main bodies of basic research in our country and the bases for training talents in basic research. We need to place fundamental theories in a more important position and cultivate comprehensive talents with interdisciplinary backgrounds to meet the requirements of innovative basic research in the new era. Emphasis should be placed on the integration of teaching and research, as well as the integration of teaching and industry. This promotes the unity of talent cultivation and technological innovation, striving to nurture a group of young scientific and technological talents and innovative teams of international standards [9].

5.4. Applying Digital Technology to Enhance Innovation Levels

Data-intensive resources are gradually becoming a key element in technological, product, and industrial innovation, significantly promoting breakthrough innovations in data-intensive areas [10]. Digital technology has fundamentally transformed the landscape of innovation by democratizing access to information and tools, enabling rapid prototyping, and fostering global collaboration. Firstly, the ubiquity of the internet and cloud computing means that vast amounts of data and sophisticated software tools are now available to anyone, anywhere. This democratization has lowered the barriers to entry for innovators, allowing them to access resources previously reserved for large corporations or research institutions. Platforms like GitHub, for instance, allow software developers to share, collaborate, and build upon each other's work, accelerating the pace of software innovation. Similarly, digital design tools and 3D printing technologies enable inventors to quickly turn ideas into tangible prototypes, reducing the time and cost of the innovation cycle.

Moreover, digital technology has facilitated the emergence of global innovation networks, where diverse teams collaborate across geographical boundaries. This global interconnectedness means that ideas can be sourced from a wider pool of talent, leading to more diverse and creative solutions. Platforms like Kickstarter and Indiegogo have also democratized funding, allowing innovators to pitch their ideas directly to the public and secure resources for their projects. Additionally, the rise of online learning platforms, such as Coursera and Udemy, has made specialized knowledge more accessible, empowering a new generation of innovators with the skills they need to bring their ideas to fruition. In essence, digital technology has not only amplified the tools available for innovation but has also expanded the community of innovators, leading to a richer and more vibrant ecosystem of ideas and solutions.

6. Conclusion

As the city forges ahead, it is vital to acknowledge the potential hurdles that lie ahead, demanding adept navigation to fully unlock its innovation potential and for sustainable growth of the city. Despite the challenges, Shenzhen's trajectory toward innovation is buoyed by its distinctive advantages, which

act as propellers for its innovation engine. Government policies inspired by the Reform and Opening Up initiative have nurtured an environment that nurtures innovation, while its strategic geographic position and active engagement in the Belt and Road Initiative present opportunities for cross-border collaboration and knowledge exchange. However, as Shenzhen embraces its transformation, careful consideration is imperative to ensure a balanced approach, avoiding overreliance on certain sectors and guarding against the formation of economic bubbles. As Shenzhen's journey continues, it will remain a leading innovative city in the global society; in addition, its emergence as a vanguard of innovation stands as a testament to the potential for cities to lead the way in shaping a brighter and more prosperous future for all.

The research can be utilized to examine the innovation growth of Shenzhen and to better apply corresponding methods to resolve problems that may occur during the development.

The research lacks data support and factual information, consisting highly of theoretical conclusions, the real-life implication may be more complicated and methods would not fit the reality. In future studies, it may require more in-depth factual examples and investigations to support the claims.

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