

Innovative Technology Strategy in Hong Kong and China of the Asia Industries

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Abstract: This applied research study examines the innovative capabilities of Hong Kong and China by analyzing their positions in global innovation indices and employing strategic framework tools. Utilizing metrics such as R&D expenditure, patent applications, and high-tech exports, we compare key aspects of their innovation ecosystems. Strategic frameworks like strengths, weaknesses, opportunities, and threats (SWOT) analysis and the Object Key Result (OKR) strategic framework are applied to assess strengths, weaknesses, opportunities, and threats in each region's innovation strategies and then reviewed to determine the measurable result as the global innovation index.

Results from the innovation indices reveal that both regions have distinct advantages: Hong Kong benefits from a dynamic financial sector, while China leads in manufacturing and technological investments. Strategic tools like SWOT analysis underscore Hong Kong's potential for growth through partnerships with mainland China, enhancing its innovative capabilities.

In conclusion, this applied research study provides insights into how Hong Kong and China can leverage their respective strengths and collaborate to foster sustainable innovation. The findings suggest that strategic collaborations and policy initiatives could further enhance both regions' global competitiveness in the innovative landscape.

Keywords: Innovation Index, Strategic framework, innovative analysis, public policy.

I. INTRODUCTION

Nowadays, innovative technology is the most important focus in manufacturing. More industries have individual research, development and engineering teams to facilitate the enhancement of automated machinery, AI and advised technology for the enterprise. The manufacturing landscape has undergone a profound transformation driven by the rapid advancement of innovative technologies. As industries strive to enhance productivity, efficiency, and competitiveness, the integration of automated machinery, artificial intelligence (AI), and advanced technologies has become paramount. While the United States and Europe have long been recognized as leaders in manufacturing innovation, Asia has emerged as a formidable player, showcasing remarkable growth and investment in this domain.

Asia, particularly countries like China, Japan, South Korea, and India, has witnessed a surge in the establishment of dedicated research, development, and engineering teams within factories. These teams are focused on harnessing cutting-edge technologies to optimize production processes and drive automation. The region's unique combination of a robust manufacturing base, government support for technological advancement, and a burgeoning startup ecosystem has catalyzed the rapid adoption of innovative solutions.

In contrast, the US and Europe, while historically strong in technological development, face challenges such as labour shortages, regulatory complexities, and the need for modernization of aging infrastructure. However, these regions continue to leverage their established expertise in research and development, fostering collaborations between academia and industry to drive innovation.

This introduction sets the stage for a deeper exploration of how innovative technology growth in Asia compares to that in the US and Europe, highlighting the distinct strategies, investments, and outcomes that characterize each region's approach to modernizing manufacturing. By examining these dynamics, we can gain valuable insights into the future of global manufacturing and the competitive landscape shaped by technological advancements.

A. Statistical Analysis of Innovative Index

Neven Valev [1] has shown that the average for 2024, based on 36 countries, was 32.23 points. The highest value was in Singapore: 61.2 points, and the lowest value was in Laos: 17.8 points. The indicator is available from 2011 to 2024. Below is a chart for all countries where data is available from the sources of Cornell University, INSEAD, and the WIPO.

Innovation Index Asia

Innovations index (0-100), 2024: The average for 2024 based on 36 countries was 32.23 points. The highest value was in Singapore: 61.2 points and the lowest value was in Laos: 17.8 points. The indicator is available from 2011 to 2024. Below is a chart for all countries where data are available.

Measure: points; Source: Cornell University, INSEAD, and the WIPO

Asia

Countries	Innovation index, 2024	Global rank	Available data
Singapore	61.2	1	2011 - 2024
South Korea	60.9	2	2011 - 2024
China	56.3	3	2011 - 2024
Japan	54.1	4	2011 - 2024
Israel	52.7	5	2011 - 2024
Hong Kong	50.1	6	2011 - 2024
UA Emirates	42.8	7	2011 - 2024
Malaysia	40.5	8	2011 - 2024
India	38.3	9	2011 - 2024
Thailand	36.9	10	2011 - 2024
Vietnam	36.2	11	2011 - 2024
Saudi Arabia	33.9	12	2011 - 2024
Qatar	32.9	13	2011 - 2024
Philippines	31.1	14	2011 - 2024
Indonesia	30.6	15	2011 - 2024
Georgia	30.4	16	2011 - 2024
Armenia	29	17	2011 - 2024
Iran	28.9	18	2011 - 2024
Mongolia	28.7	19	2011 - 2024
Kuwait	28.1	20	2011 - 2024

Figure 1: Innovation index (Asia) – Part of Country rankings, Source from the global economy.com and Cornell University, INSEAD, and the WIPO

In Fig. 1, the Innovation index - Country rankings, Source from the global economy.com and Cornell University, INSEAD, and the WIPO, the top 10 countries are Singapore, South Korea, China, Japan, Israel, Hong Kong, UA Emirates, Malaysia, India and Thailand.

Definition: The Global Innovation Index includes two sub-indices: the Innovation Input Sub-Index and the Innovation Output Sub-Index. The first sub-index is based on five pillars: Institutions, Human capital and research, Infrastructure, Market sophistication, and Business sophistication. The second sub-index is based on two pillars: Knowledge and technology outputs, and Creative outputs. Each pillar is divided into sub-pillars, and each sub-pillar is composed of individual indicators. Full reports, data, and documentation are available on the Global Innovation Index.

The goal of the Global Innovation Index (GII) from Soumitra Dutta [2] of the World Intellectual Property Organization (WIPO) is to be a holistic and flexible measure of the innovation happening all around the world today. To achieve this goal, the GII needs to go beyond capturing technological breakthroughs. It also has to account for the pioneering business models and social innovations driving positive change.

The 2024 edition of the GII focuses on social entrepreneurship, a model gaining prominence for its role in spearheading innovation aimed at addressing critical societal challenges. In recent years, an increasing cohort of entrepreneurs has embarked upon ventures that not only strive to achieve meaningful social impact but also to be sustainable through market-based mechanisms. This innovative paradigm presents novel solutions in domains where traditional commercial enterprises have failed.

Singapore takes the lead in 2024 in terms of the number of GII innovation indicators in which it ranks top globally, ranking 1st in the world in 14 out of 78 indicators and overtaking the United States. It leads in Regulatory quality, Policy stability for doing business, ICT access, Logistics performance, Venture capital received, Venture capital investors, High-tech manufacturing and GitHub commits. In Asian middle-income economies China, India, Indonesia and Türkiye surge ahead. Thailand and Vietnam move closer to the top 40. Morocco joins the group of middle-income economies within the GII top 70 that have climbed fastest in the GII ranking since 2013.

For many years, country governments around the world have successfully used the GII to improve their economies' innovation performance and shape evidence-based innovation policies. A survey carried out by WIPO in 2024 showed that 77 percent of WIPO member states were using the GII to improve innovation ecosystems and metrics (up by roughly 20 percent in comparison to 2022, with 91 out of 118 responding member states using the GII), as well as it being a benchmark for national innovation policies or economic strategies across all world regions.

One major benefit of the GII is that it puts evidence and metrics at the core of conceiving, deploying and evaluating innovation policies. A first step brings together statisticians, innovation actors and policymakers to develop a clear understanding of a country's innovation performance. In a second step, the policy discussion turns to leveraging domestic innovation opportunities while at the same time overcoming country-specific weaknesses. Both steps are an exercise in coordination among different public and private innovation actors, as well as between government entities. In a number of countries, the GII has facilitated such a dialogue between these actors.

The WIPO use the PCT patent data set, which consists of approximately 1.3 million patent applications published between 2019 and 2023, containing 4.1 million inventor addresses. For the SCIE, the data set comprises 7.9 million articles published between 2018 and 2022, containing 27 million listed author addresses for working out the GII ranking summary.

From Lola Woetzel and Jeongmin Seong [3], Asia's rapid development as a global technological leader over the last decade is a testament to the power of collaboration. And yet, in much of the world, the tide is turning toward isolationism and protectionism. Indeed, after years of relative openness, rising trade barriers threaten to disrupt global flows of technology and intellectual property. Asia can expand its role in the growing market for digital information-technology services, such as big data and analytics, digital legacy modernization, and "Internet of Things" system design.

B. Hong Kong Innovation Index and trend

The Global Innovation Index captures elements of the national economy that enable innovative activities: (1) Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market sophistication, and (5) Business sophistication. Two output pillars capture actual evidence of innovation outputs: (6) Knowledge and technology outputs and (7) Creative outputs.

The innovation index in Hong Kong in Fig. 2 has a value of 50.1 points as of 2024, a decline from 53.29 points in 2023. In comparison, the world average is 31.57 points, based on data from 132 countries. Historically, the average for Hong Kong from 2011 to 2024 is 55.26 points. The minimum value, 50.1 points, was reached in 2024, while the maximum of 59.4 points was recorded in 2013. See the global rankings or world map for that indicator or use the country comparator to compare trends over time.

Innovation Index: Hong Kong

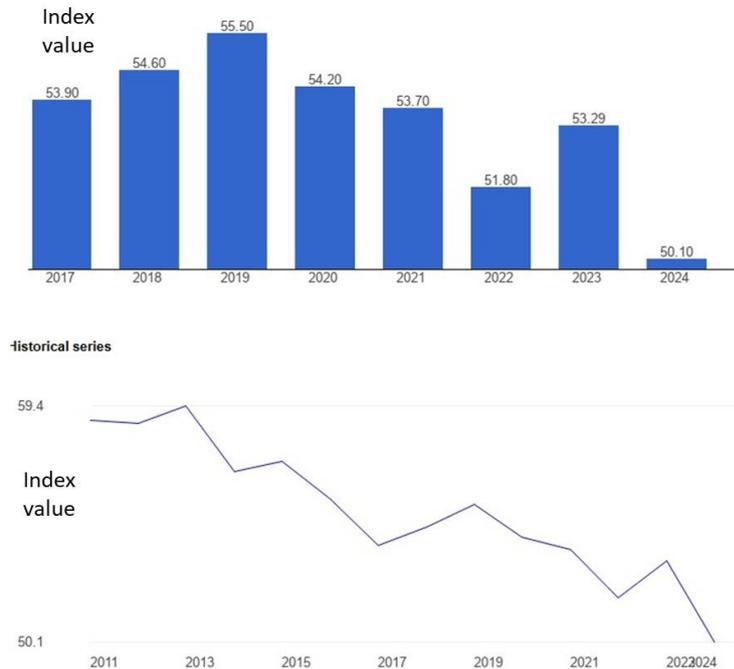


Figure 2: Innovation index in Hong Kong and the historic index

In the context of modern manufacturing, the implications of innovative technology are profound, particularly concerning the growth of automation and engineering technology. From Prof. Ray Wai Man Kong's articles [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15], his team can explore how these advancements are reshaping the manufacturing landscape and driving efficiency, productivity, and competitiveness.

Innovation Index: China

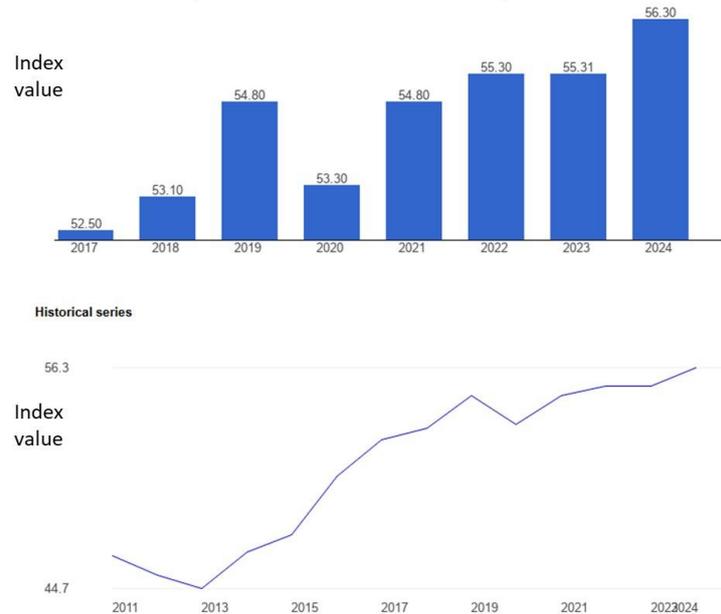


Figure 3: Innovation index in China and the historic index

In Fig. 3, the latest value from 2024 is 56.3 points, an increase from 55.31 points in 2023. In comparison, the world average is 31.57 points, based on data from 132 countries. Historically, the average for China from 2011 to 2024 is 51.19 points. The minimum value, 44.7 points, was reached in 2013 while the maximum of 56.3 points was recorded in 2024.

From Robert D. Atkinson [16], China became the world's manufacturing workshop based on a combination of low costs, a large and rapidly growing domestic market, and aggressive efforts to recruit foreign manufacturers. While that process led to considerable manufacturing decline in the United States, most of it (except for consumer electronics) was in more traditional industries such as plastics, metals, textiles and apparel, toys, and furniture.³ While this was hard on the U.S. workers and communities that lost to China, it did not mean a significant weakening of U.S. techno-economic strength and dual-use (civilian and military) capabilities, particularly in U.S.-headquartered firms. Manufacturers in China have driven to make innovative products and apply the new innovative technology in industrial competitions around the world.

C. Implications of Innovative Technology for the Growth of Automation and Engineering Technology

In the context of modern manufacturing, the implications of innovative technology are profound, particularly concerning the growth of automation and engineering technology. Drawing insights from Prof. Ray Wai Man Kong's article, we can explore how these advancements are reshaping the manufacturing landscape and driving efficiency, productivity, and competitiveness.

1. Enhanced Automation Capabilities

Innovative technologies, such as artificial intelligence (AI), machine learning, and robotics, are revolutionizing automation in manufacturing. These technologies enable machines to perform complex tasks with greater precision and speed, reducing the reliance on manual labour. Prof. Kong emphasizes that the integration of AI into automation systems allows for real-time data analysis and decision-making, leading to smarter manufacturing processes. This shift not only enhances operational efficiency but also minimizes errors and waste, ultimately contributing to higher quality products.

2. Improved Engineering Processes

The growth of innovative technology has significant implications for engineering processes within manufacturing. Advanced simulation tools and digital twins allow engineers to model and test designs virtually before physical implementation. This capability, highlighted by Prof. Kong, accelerates the product development cycle and reduces time-to-market. By leveraging these technologies, manufacturers can iterate designs more rapidly, optimize production processes, and respond more effectively to market demands.

3. Data-Driven Decision Making

The proliferation of the Internet of Things (IoT) and big data analytics has transformed how manufacturers approach decision-making. Prof. Kong points out that the ability to collect and analyse vast amounts of data from connected devices enables manufacturers to gain valuable insights into their operations. This data-driven approach facilitates predictive maintenance, where potential equipment failures can be identified before they occur, reducing downtime and maintenance costs. Furthermore, it allows for continuous improvement initiatives, as manufacturers can track performance metrics and identify areas for optimization.

4. Customization and Flexibility

Innovative technology fosters greater customization and flexibility in manufacturing processes. With advancements in automation and engineering technology, manufacturers can produce smaller batches of customized products without significant increases in costs or lead times. Prof. Kong notes that this capability is essential in today's market, where consumer preferences are rapidly changing. The ability to quickly adapt production lines and processes to meet specific customer needs enhances competitiveness and customer satisfaction.

5. Sustainability and Resource Efficiency

The integration of innovative technologies also supports sustainability efforts within the manufacturing sector. Automation and engineering technologies can optimize resource usage, reduce energy consumption, and minimize waste. Prof. Kong highlights that smart manufacturing practices, driven by innovative technology, contribute to a more sustainable production model. By implementing energy-efficient processes and utilizing renewable resources, manufacturers can not only reduce their environmental impact but also achieve cost savings in the long run.

6. Workforce Transformation

As automation and engineering technologies evolve, so too does the workforce. Prof. Kong emphasizes the importance of reskilling and upskilling employees to adapt to new technologies. While automation may reduce the need for certain manual tasks, it also creates demand for skilled workers who can operate, maintain, and innovate within these advanced systems. Manufacturers must invest in training programs to ensure their workforce is equipped with the necessary skills to thrive in a technology-driven environment.

The implications of innovative technology for the growth of automation and engineering technology are far-reaching and transformative. As highlighted by Prof. Ray Wai Man Kong, these advancements enhance operational efficiency, improve engineering processes, enable data-driven decision-making, foster customization, promote sustainability, and necessitate workforce transformation. Embracing these technologies is essential for manufacturers seeking to remain competitive in an increasingly dynamic and demanding market. By leveraging innovative solutions, the manufacturing sector can drive growth, enhance productivity, and pave the way for a more sustainable future.

II. HONG KONG'S STRATEGY TO DRIVE UP THE INNOVATION INDEX

A. Hong Kong's decline in global innovation rankings

Hong Kong's decline in global innovation rankings, despite its strong performance in innovation inputs, is likely due to a combination of factors. These include a drop in the "output" sub-index, potentially impacted by a lack of investment in research and development, a shift in young people's preferences towards business and medicine over science and technology, and the need for Hong Kong to better leverage its strengths within the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) in south region of China.

Referred to Raymond Yeung [17] from Hong Kong Economy, he suggests that the city's strong infrastructure and resources are not translating into comparable levels of innovation in terms of new products, technologies, or creative output.

1. Weaknesses in Innovation Output:

The Global Innovation Index (GII) includes both "innovation inputs" (like institutions, human capital, and infrastructure) and "innovation outputs" (like knowledge and creativity).

While Hong Kong performs well in innovation inputs, it has been experiencing a decline in the output sub-index.

2. Limited R&D Investment:

Hong Kong has been criticized for not investing enough in research and development (R&D).

This is despite the government committing significant funds to enhance technological research infrastructure and subsidizing R&D activities.

The lack of substantial R&D investment could be hindering the city's ability to translate its strengths into tangible innovation outputs.

3. Talent Gap:

Hong Kong faces a talent gap in the science and technology fields, from the article of Dr Albert Wong [18], a member of CPA Australia's Greater Bay Area (GBA) Committee.

There's a tendency for young people to prefer studying business and medicine over science and technology.

This shortage of tech talent can limit the city's capacity to innovate and compete in the global landscape.

4. The GBA Opportunity:

While Hong Kong is well-positioned to capitalize on the opportunities presented by the GBA development, it needs to actively integrate and collaborate with other cities in the area to leverage its strengths.

The GBA offers a chance for Hong Kong to be at the forefront of the I&T industry and serve as a business platform for internationalizing mainland companies.

However, this requires a strategic approach to ensure Hong Kong can effectively utilize its unique strengths, such as its legal system, intellectual property protection, and professional services, to foster innovation and collaboration within the GBA.

5. Broader Economic and Social Factors:

The global economic environment and intensified competition in technology have also played a role in Hong Kong's innovation performance.

Western countries are actively pursuing policies to support their domestic technology industries, creating a more competitive landscape.

Hong Kong needs to address challenges related to the economy and people's livelihoods, which can impact the government's commitment to innovation and technology development. Hong Kong's innovation ranking decline is a complex issue stemming from a combination of factors. While the city possesses strong innovation input capabilities, it needs to address its weaknesses in innovation output, particularly in R&D, talent development, and strategic integration within the GBA. Furthermore, it needs to adapt to the evolving global landscape of innovation and technology competition.

B. Strategy for driving up the Hong Kong innovation index

Referred to Benjamin Poon and Zhigang Tao [19], Hong Kong is one of the cities in China that moves on from the 'front shop, back factory' model built around low-cost production in China in the past strategy. He recommends the aim instead aiming to become a base for mainland firms managing global operations and developing products targeting the mainland market. The new vision positions Hong Kong as a pivotal base for mainland firms managing global operations and developing products tailored to the mainland market. This shift underscores the importance of innovation in driving sustainable growth and competitiveness.

To achieve a driving up of the innovation index in Hong Kong, Hong Kong is focusing on fostering an environment conducive to technological advancement and innovation. The strategy is required to focus on below factors:

- **Investment in Research and Development (R&D):** Enhancing R&D capabilities to support cutting-edge technologies and encourage startups through incentives and funding opportunities.
- **Collaborative Partnerships:** Building strong collaborations between local companies, academic institutions, and international firms to drive innovation and knowledge exchange.
- **Talent Attraction and Retention:** Implementing policies to attract and nurture global talent.
- **Supportive Regulatory Environment:** Establishing frameworks that protect intellectual property and provide resources for scaling new technologies, including the creation of innovation hubs or tech parks.
- **Leveraging Strengths:** Utilizing Hong Kong's strengths in financial services and international connections to support tech startups and facilitate technology transfers between China and overseas countries.
- **Government Policies:** Developing policies that encourage innovation, protect intellectual property, and provide resources for scaling up new technologies.
- **Differentiation Strategy:** Identifying niche technological areas where Hong Kong can excel, aligning with the mainland market's needs while maintaining its international appeal.
- **Addressing Challenges:** Recognizing potential challenges such as competition from other tech hubs and ensuring a smooth transition that doesn't neglect existing industries or workers.

Hong Kong's strategy for innovative technology growth involves transitioning from traditional manufacturing to strategic roles in global operations and product development targeting the mainland market. This requires a focus on fostering innovation through investments, partnerships, leveraging strengths, and addressing challenges to establish Hong Kong as a leading hub for technological advancement.

C. Enhancing Hong Kong's Innovation Index: A Strategic Approach

In an increasingly competitive global landscape, fostering innovation is crucial for economic growth and sustainable development. The innovation index serves as a benchmark to evaluate a region's innovative capabilities, encompassing factors such as R&D investment, patent filings, and business environment. I explore how Hong Kong can leverage its strategic initiatives across five key areas—infrastructure, talent, capital, technology, and scientific research—to boost its innovation index.

1. Infrastructure Development:

Hong Kong has made significant strides in infrastructure development to support technological advancement and manufacturing. The completion of the first Advanced Manufacturing Centre (AMC) and the Data Technology Hub provides state-of-the-art facilities for clustering tech sectors. The planned second AMC and the expansion into San Tin Technopole further enhance this ecosystem, fostering collaboration among industries and research institutions. These dedicated spaces act as catalysts for innovation by bringing together diverse stakeholders, encouraging knowledge exchange, and promoting joint ventures.

2. Talent Development:

A skilled workforce is essential for driving innovation. Hong Kong's initiatives in talent development include the Reindustrialization and Technology Training Program, which funds staff training in advanced technologies like Industry 4.0. Additionally, the Global STEM Professorship Scheme attracts world-renowned scholars to local universities, enhancing research capabilities and academic excellence. By investing in education and training, Hong Kong ensures a workforce adept at handling cutting-edge technologies, thereby fueling innovation across various sectors.

3. Capital Support:

Financial backing is crucial for nurturing innovative enterprises. The Re-industrialization Funding Scheme provides subsidies for setting up smart production lines, encouraging businesses to adopt new technologies. This support is particularly beneficial for industries such as biotechnology, construction, and electronics, enabling them to invest in R&D and innovation. By offering financial incentives, Hong Kong incentivizes companies to explore high-value-added manufacturing processes and cutting-edge technologies.

4. Technology Promotion:

Promoting the adoption of advanced technologies is pivotal for industrial competitiveness. The Hong Kong Productivity Council plays a vital role by assisting enterprises in transitioning to Industry 4.0 through training courses and smart production line setups. This initiative ensures that industries remain at the forefront of technological advancements, enhancing efficiency and innovation. By integrating digital technologies into manufacturing processes, companies can optimize operations and develop innovative products.

5. Scientific Research:

Strong R&D capabilities are fundamental to long-term innovation. Hong Kong's five R&D centres focus on re-industrialization projects, collaborating closely with industries to commercialize research findings. This synergy between academia and industry accelerates the translation of scientific discoveries into marketable innovations, driving economic growth and technological advancement.

Hong Kong has one of its strategic focuses on the semiconductor industry presents a significant opportunity for innovation growth. With about 60 related companies operating in tech parks and the upcoming Microelectronics Centre (MEC), Hong Kong is poised to become a hub for microelectronics development. The MEC will support the production of high-value products like semiconductors, enhancing the region's technological capabilities and attracting global investment.

While these initiatives are promising, challenges remain. Ensuring that training programs keep pace with rapidly evolving technologies is crucial to maintaining a competitive workforce. Additionally, sustaining sufficient funding for R&D amidst increasing global competition requires strategic planning and resource allocation.

Hong Kong's multifaceted approach to enhancing innovation through infrastructure development, talent cultivation, capital support, technology promotion, and scientific research positions it as a formidable player in the global innovation ecosystem. Hong Kong's public administration has implemented a comprehensive set of policies across infrastructure, talent, capital, technology, and scientific research to enhance its innovative index. By creating supportive environments, investing in human capital, providing financial incentives, promoting advanced technologies, and fostering R&D collaborations.

By focusing on high-value sectors like semiconductors and addressing potential challenges proactively, Hong Kong can significantly improve its innovation index, drive sustainable economic growth and reinforce its status as a global hub for technological excellence from Hong Kong Government Press [20].

III. CHINA'S STRATEGY TO DRIVE UP THE INNOVATION INDEX

A. *China's growth in global innovation rankings*

In recent years, China has made significant strides in climbing the ranks of the global innovation index, emerging as a formidable force in the international arena. This remarkable progress can be attributed to a combination of strategic investments, policy initiatives, and a focus on key sectors that have collectively fostered an environment conducive to innovation. The following essay explores the reasons behind China's growth in global innovation rankings.

1. Increased Investment in Research and Development (R&D):

At the heart of China's innovative surge is its substantial investment in R&D. Over the past decade, China has consistently increased its expenditure on scientific research, aiming to bridge gaps with more developed economies. This financial commitment has enabled advancements across various fields, from artificial intelligence to biotechnology, positioning China as a key player in global technological development.

2. Expansion of Higher Education and STEM Focus:

China's emphasis on education, particularly in STEM disciplines—science, technology, engineering, and mathematics—has been instrumental in cultivating a skilled workforce capable of driving innovation. The expansion of higher education institutions has produced a large pool of graduates equipped with the knowledge and skills necessary to tackle complex challenges and contribute to technological advancements.

3. Infrastructure Development:

Robust infrastructure is essential for supporting innovation. China has made significant investments in building modern research facilities, high-speed internet networks, and advanced transportation systems. These developments have not only facilitated collaboration among researchers but also created an ecosystem that supports the growth of innovative industries and businesses.

4. Supportive Government Policies:

China government has implemented a range of policies designed to encourage innovation. Tax incentives for companies investing in R&D, funding opportunities for startups, and initiatives promoting partnerships between academia and industry have all contributed to a supportive environment for innovative activities. Additionally, the government's emphasis on intellectual property rights protection has further incentivized businesses to invest in creative solutions.

5. Global Collaboration and Knowledge Sharing:

China's participation in international research projects and collaborations has been pivotal in leveraging global knowledge and expertise. By working with other countries on joint initiatives, China has gained access to diverse perspectives and resources, enhancing its ability to innovate and compete on a global scale.

6. Thriving Startup Ecosystem:

The rise of tech startups in cities like Shenzhen and Beijing has created a vibrant ecosystem for innovation. These hubs foster entrepreneurship by providing resources, mentorship, and funding opportunities, enabling startups to develop cutting-edge technologies and business models that contribute to China's innovative landscape.

7. Focus on Strategic Industries:

China has strategically targeted key industries such as artificial intelligence, biotechnology, and renewable energy for growth. By concentrating efforts in these sectors, the country has achieved significant advancements, which not only boost its innovation ranking but also address global challenges like climate change and healthcare.

8. Private Sector Leadership:

The contributions of major private companies like Huawei, Tencent, and Alibaba have been pivotal in driving technological innovation in China. These corporations invest heavily in R&D and have become leaders in developing innovative products and services that compete on the world stage.

China's ascent in global innovation rankings is the result of a multifaceted approach encompassing increased R&D investment, education reform, infrastructure development, supportive policies, global collaboration, a thriving startup ecosystem, strategic industry focus, and private sector leadership. By leveraging these elements, China has successfully positioned itself as a key driver of innovation on the international stage.

B. Strategy for driving up the China innovation index

To drive up China's innovation index, a multifaceted strategy should be implemented across various sectors, including education, research and development (R&D), infrastructure, policy, collaboration, support for startups, emerging technologies, talent retention, cultural change, and sustainability. The following approaches can show the propose how to drive up the China innovation index.

1. Education Reform:

Enhance STEM education by integrating creativity and critical thinking into the curriculum.

Invest in teacher training to equip educators with modern teaching methods that foster innovation.

Research and Development (R&D) Investment:

Increase public and private sector investments in R&D across key sectors such as artificial intelligence, quantum computing, and biotechnology.

Encourage collaboration between academia and industry to ensure practical applications of research.

2. Infrastructure Development:

Expand high-speed internet and transportation networks to support innovation, especially in rural areas.

Build state-of-the-art research facilities to attract top talent and foster cutting-edge projects.

3. Policy Incentives:

Offer tax breaks and grants for companies investing in R&D.

Strengthen intellectual property protection to reward innovators and protect their work.

4. Fostering Collaboration:

Create innovation hubs that bring together universities, research institutions, and businesses.

Promote partnerships between Chinese entities and international organizations to leverage global knowledge and expertise.

5. Support for Startups:

Develop venture capital programs, incubators, and accelerators to nurture new ideas and entrepreneurial ventures.

Provide resources and mentorship to help startups grow and succeed.

6. Focus on Emerging Technologies:

Target investments in emerging technologies like artificial intelligence, quantum computing, and biotechnology to position China as a global leader.

Encourage innovation in these areas through targeted funding and recognition programs.

7. Talent Retention:

Offer competitive incentives and research funding to retain top talent within the country.

Create a welcoming environment for innovators by promoting opportunities for professional growth and collaboration.

8. Cultural Change:

Encourage a culture where risk-taking and experimentation are valued, reducing the fear of failure associated with innovation.

Promote events and programs that celebrate creativity and innovative achievements to inspire future generations.

9. Sustainability Integration:

Integrate green technologies and sustainable practices into innovation strategies to address environmental challenges while boosting the innovation index.

By implementing these strategies comprehensively, China can enhance its innovation ecosystem, increase its innovation index, and make a positive contribution to global technological advancements.

IV. STRATEGIC FRAMEWORK TO SET UP PUBLIC STRATEGY

Referring to the strategic framework from the Top 10 Strategic Planning Frameworks: How to Implement A Corporate Strategy Framework [21], it is a system that provides a detailed approach to creating, executing, and evaluating an organizational strategy. When implemented well, strategic frameworks can help companies align daily team activities with organizational goals. A strategy framework can be chosen during the strategic planning process.

The strategic framework can help to find out the appropriate strategies for the growth of the innovation index. The strategies are included to below tools for analysis of strategy.

- SWOT analysis
- Balanced Scorecard
- PEST analysis
- Objectives and Key Results (OKRs)

The SWOT Analysis is a simple yet powerful tool used to evaluate an organization in below factors.

1. Strengths: Internal factors that give you an advantage over competitors
2. Weaknesses: Internal limitations that hinder your performance
3. Opportunities: External factors that present potential for growth
4. Threats: External factors that could negatively impact your business

The SWOT analysis provides a clear picture of your current market position and helps identify growth areas. SWOT is best used for strategic planning, competitive analysis, and identifying areas for improvement.

The Balanced Scorecard Framework (BSC) is a popular tool for the company. The Balanced Scorecard is a strategic planning and management system that helps organizations translate their vision and strategy into actionable objectives. It uses four perspectives to provide a comprehensive view of organizational performance. These are:

1. Financial: Measures reflecting financial performance, such as profitability and growth
2. Customer: Indicators of customer satisfaction and market share
3. Internal processes: Metrics that reflect the efficiency of internal processes
4. Learning and growth: Indicators of future performance, such as employee training and corporate culture

This tool is best used for performance measurement, strategic alignment, and organizational improvement.

Political, Economic, Social and Technological Analysis (PEST Analysis) is a strategic framework to evaluate the external macro-environmental factors that impact an organization. It helps businesses understand the broader environment in which they operate and informs strategic planning. The components of a PEST Analysis include:

1. Political factors: Government policies, regulations, and stability
2. Economic factors: Economic growth, inflation, interest rates, and currency fluctuations
3. Social factors: Demographics, consumer behavior, cultural trends, and social attitudes
4. Technological factors: Advancements in technology, innovation, and automation

PEST Analysis is ideal for understanding the broader environment, strategic planning, market entry, and adapting to changes.

Objectives and Key Results (OKRs) is a goal-setting framework that helps organizations define goals and track their outcomes. The components of OKRs include:

1. Objectives: Clear, concise goals that provide direction
2. Key Results: Specific, measurable actions that track the achievement of the objective

OKRs are ideal for setting and achieving goals, ensuring alignment toward top priorities, and enhancing engagement.

The Objective Key Results is the appropriate strategic framework for making the analysis. When OKR has been started, the government will quickly see that setting priorities for goals is as difficult as expressing and structuring them. That is why it should not be rushed to push the OKR public administration process to the next stage because the result is showing the process finishes on a quarter basis and make sure everything is ready.



Figure 4: OKR diagram and tools (source from Derrick Nguyen of Medium Company)

For the case study of Hong Kong and China, the key objective result from OKR, including Fig. 4, is an appropriate approach to driving up innovation in the societies. The innovation index is a global innovation measurement to compare the results. The strategy can be set up by the government and supportive parties.

V. CONCLUSION

In recent years, Hong Kong has embarked on a comprehensive strategy to enhance its innovation capabilities by addressing critical areas such as infrastructure development, talent cultivation, capital support, technology promotion, and scientific research. Through initiatives like the Advanced Manufacturing Centre and strategic funding schemes, Hong Kong is transforming into a robust hub for technological innovation. By focusing on high-value sectors like semiconductors and fostering collaboration between industries and academia, Hong Kong aims to not only boost its local economy but also establish itself as a competitive player in the global innovation ecosystem. More scholars are involved in innovative development. The innovative development of automation for the Textile and Apparel industry has been applied to the new research technology from Ray WM Kong [22]. It's a benefit and aligns with the strategy of the Hong Kong Government.

With sustained investment in education, research, and technology adoption, along with proactive strategies to overcome challenges, Hong Kong is poised to achieve significant improvements in its innovation index. This multifaceted approach will drive sustainable economic growth and reinforce Hong Kong's role as a global leader in technological excellence.

China has been actively implementing strategies to enhance its innovation ecosystem, focusing on emerging technologies, talent retention, cultural shifts towards risk-taking, and integrating sustainability practices. To effectively plan and execute these initiatives, strategic frameworks such as SWOT analysis, Balanced Scorecard (BSC), PEST analysis, and Objectives and Key Results (OKRs) are utilized. OKR tool is our focus tool how measuring the result with the relationship of objectives, key factors driving actions and measurable results. These tools help in evaluating internal strengths and weaknesses, external opportunities and threats, aligning financial and operational goals, and setting measurable objectives respectively. By employing these frameworks, China aims to create a comprehensive strategy that aligns with its overall innovation objectives, ensuring sustainable growth and global competitiveness.

The integration of various strategies and the application of strategic frameworks are crucial for achieving a higher innovation index in China. These tools provide a structured approach to evaluate and plan, ensuring that all aspects—internal capabilities and external factors—are considered comprehensively. Continuous evaluation and adaptability are essential as the environment evolves. Collaboration between the government, private sector, and educational institutions is vital for successful implementation. Emphasizing sustainability, emerging technologies, talent retention, and fostering a culture of innovation will be key drivers in elevating China's innovation landscape. This holistic approach not only strengthens current initiatives but also sets a foundation for future advancements, addressing potential challenges while maintaining focus on long-term goals.

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