

Innovative Partnership: Forging a New Growth Point of Global Partnership Network

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In recent years, innovation has played an important role in China's process of building a global partnership network. Since 2013, China has established an "innovative strategic partnership" with Switzerland,¹ and an "innovative comprehensive partnership" with Israel.² China have jointly proposed an "innovative partnership of mutual benefit" with Germany,³ a "China-UK innovative partnership" with the United Kingdom,⁴ and a "future-oriented new-type cooperative partnership" with Finland.⁵ Portugal, Spain, Czechia, Russia, Brazil, the United Arab Emirates, and Singapore have also actively responded to China's offer to initiate innovation-centered cooperation, highlighting various elements of innovation in each of their joint statements on partnership. By focusing on innovative cooperation, China promotes the establishment of more equal and balanced partnership, and enriches the connotations of a global network of partnerships. This effort is of great significance for building a new type of international relations and a

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1 "Joint Declaration between the People's Republic of China and the Swiss Confederation on the Establishment of an Innovative Strategic Partnership," <https://www.news.admin.ch/news/message/attachments/43593.pdf>.

2 "Joint Statement between the People's Republic of China and the State of Israel on Establishing an Innovative Comprehensive Partnership," March 21, 2017, http://www.xinhuanet.com/politics/2017-03/21/c_1120668765.htm.

3 "Program of Action for China-Germany Cooperation: Shaping Innovation Together," October 11, 2014, http://www.xinhuanet.com/world/2014-10/11/c_1112772707.htm.

4 "China-UK Joint Statement on Building a Global Comprehensive Strategic Partnership for the 21st Century," October 22, 2015, http://www.xinhuanet.com/world/2015-10/22/c_1116911370.htm.

5 "Joint Declaration between the People's Republic of China and the Republic of Finland on Establishing and Promoting the Future-Oriented New-type Cooperative Partnership," April 6, 2017, https://www.fmprc.gov.cn/mfa_eng/wjdt_665385/2649_665393/t1451732.shtml.

community with a shared future for mankind.

Three Approaches to Building Innovative Partnership

According to the report delivered at the 19th National Congress of the Communist Party of China, “China has actively developed global partnerships and expanded the convergence of interests with other countries.”⁶ In the process of building a closer global network of partnerships, which is one pillar of China’s diplomatic agenda, the concept of innovation-based and development-focused partnership construction has come into being. At present, China’s approaches to building innovative partnerships can be categorized into three main types.

Promoting innovation factors

This generally means that China and its partner countries have confirmed the strategic role of innovative cooperation in their bilateral relations. Examples include China’s “innovative strategic partnership” with Switzerland and its “innovative comprehensive partnership” with Israel. The nations selected for this type of innovative partnership are generally recognized as innovation-oriented countries. The focus of cooperation is to promote the one-way inflow of innovation factors, including innovative enterprises, talents, knowledge and mechanisms. Switzerland is a case in point, as the country has been consistently ranked at the top of the global innovation index for many years, and has the highest number of patents per capita in the world. Moreover, Switzerland was not only one of the first Western countries to recognize and establish diplomatic relations with the People’s Republic of China, but also the first among the world’s top 20 economies, and the first continental European country, to recognize the full market economy status of China and to conclude a free trade agreement

6 Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era,” People’s Publishing House, 2017, pp. 59-60.

with China. In terms of its characteristics, as the first innovative partnership promoted by China, the Sino-Swiss innovative strategic partnership mainly aims at achieving groundbreaking transformation and jointly improving each country's innovative capabilities, while pursuing exemplary roles in key areas. This bilateral strategic partnership on innovation focuses on areas where Switzerland has developed exceptional innovative capabilities, such as ecological and environmental protection, financial cooperation, and high-end manufacturing. In 2016, the Swiss Agency for Cooperation and Development and the Yantai Municipal Government signed a memorandum of cooperation to promote the sustainable development of China's urbanization with low-carbon city projects. In 2017, the China Construction Bank opened a branch in Zurich, successfully establishing a renminbi clearing house in the world's largest offshore financial center. The two countries have also established a practical cooperation platform for scientific and technological innovation, to actively promote the synergy of China's manufacturing development planning and Switzerland's "Industry 4.0," while providing a major channel for linking together technologies regarding intelligent manufacturing and the digital economy.

Israel is one of the world's most innovative countries, with 825,000 full-time equivalent R&D personnel. Its civilian R&D expenditure accounts for 4.5 percent of its GDP, which makes it one of the OECD countries with the highest per capita R&D spending. Compared with the Sino-Swiss cooperation on innovation, the China-Israel "innovative comprehensive partnership" focuses on building multi-level platforms. In May 2013, the two countries established an intergovernmental economic and technological cooperation mechanism, and in May 2014 a joint committee for their innovation cooperation was set up. The two countries have achieved remarkable results collaborating in the fields of life sciences, agriculture, new energy, water treatment, and environmental protection. In 2017, China invested US\$16 billion in Israel, mainly in the areas of artificial intelligence, advanced computer technology, and sophisticated manufacturing. Related Chinese companies have also started to invest in Israel and establish R&D

centers. In October 2018, Chinese Vice President Wang Qishan and Israeli Prime Minister Benjamin Netanyahu co-chaired the fourth meeting of the China-Israel Joint Committee on Innovation Cooperation, and signed the China-Israel Action Plan on Innovation Cooperation (2018-2021). This plan states that “both sides will strengthen practical cooperation in civilian fields, such as exchange programs for youth technological personnel, joint laboratories, international technology transfer centers, innovation parks, and innovation cooperation centers. Efforts will be made to explore a new model of cooperation from R&D to application in industries, and from innovation to entrepreneurship; and to build a series of cooperation platforms for innovation and entrepreneurship.”⁷ In recent years, China has not only promoted the establishment of an innovation cooperation mechanism with Israel, but has also encouraged relevant local governments to participate in the cooperation, for which the Yangtze River Delta region is one example. Secondary cooperation platforms for the innovative partnership have been established in Changzhou, Hangzhou, Shanghai and other places. These platforms include the China-Israel Changzhou Innovation Park and the China-Israel Innovation Hub (Shanghai), which are listed in the abovementioned action plan on innovation cooperation; the Sino-Israeli Cross Border Incubation Park and the Sino-Israeli IT Innovation Park in the Hangzhou Economic and Technological Development Area; and the China-Israel International Innovation Park, which is a national-level program planned by Zhejiang Province. As of 2018, the China-Israel Changzhou Innovation Park had gathered 81 Israeli and Sino-Israeli cooperative enterprises, which makes it leading the country not only in number, but also in terms of richness of cooperative formats.⁸ The China-Israel innovative comprehensive partnership has achieved remarkable results in exploring cooperation models and building platforms.

7 “Joint Statement between the People’s Republic of China and the State of Israel on Establishing an Innovative Comprehensive Partnership.”

8 “Changzhou to Build a High-Level Industrial City and Enhance Innovation Environment,” May 19, 2019, <http://js.people.com.cn/n2/2019/0519/c360301-32953525.html>.

Expanding cooperation areas

In this type of partnerships, innovation cooperation has not yet occupied the central position in China's relations with the countries concerned, but substantive content and development goals have been agreed upon. This type of approach to building innovative partnerships is mainly aimed at advanced economies with leading technological prowess. The relevant countries have advantages in certain areas of technological innovation, but they lack a market which can create a scale effect and provide an application environment, two factors which China can offer. There is room for both sides to conduct innovation cooperation in a coordinated manner. For example, China and Germany have proposed an "innovative partnership of mutual benefit." China and the United Kingdom have jointly put forward a plan to establish a bilateral innovative partnership. China and Finland have established their "future-oriented new-type cooperative partnership." China and Japan have created a mechanism for innovation cooperation.⁹

In 2014, China and Germany jointly unveiled the Program of Action for Cooperation, with the theme of "Shaping Innovation Together," initiating the development of an innovative partnership within the framework of a comprehensive strategic partnership. In 2015, Germany announced the "China Strategy (2015-2020)," its first strategy directed at a partner country for scientific research cooperation. In 2016, the Ministry of Science and Technology of China released its "Shaping the Future through Technology Innovation: Germany Strategy," emphasizing that China and Germany share common responsibilities in tackling global challenges and meeting the requirements of the new industrial revolution. In April 2016, Germany hosted the Sino-German Innovation Conference, which became the largest and most extensive exchange platform for scientific and technological innovation cooperation between the two countries. Recent years has witnessed the completion of

9 "China and Japan Sign a Memorandum of Understanding on Establishing China-Japan Innovation Cooperation Mechanism," Ministry of Commerce of China, October 26, 2018, <http://english.mofcom.gov.cn/article/newsrelease/significantnews/201810/20181002801063.shtml>.

several innovation cooperation platforms, such as the Sino-German (High-End) Equipment Manufacturing Industrial Park in Shenyang, and the Taicang Sino-German Advanced Manufacturing Technology International Innovation Park. In 2018, China's first overseas technology center, the Sino-German Hi-Tech Park was established in Heidelberg, Germany, which serves as a base for Chinese institutions to attract foreign talents and investment, thereby achieving transnational collaborative development. In addition, in 2017, China and the United Kingdom officially released the Joint Strategy for Science, Technology and Innovation Cooperation, which became the first of its kind between China and another country.¹⁰ Long-term cooperation mechanisms in personnel training and cooperative research have been formed through the China-UK Innovation Program, the "Science Bridge" Program, and the Newton Fund. In particular, the Newton Fund has supported a total of more than 460 scientific and technological innovation cooperation projects.¹¹ Furthermore, China's scientific and technological innovation cooperation with the European Union has become a core part of the China-EU comprehensive strategic partnership. In June 2017, China and the EU signed an Administrative Agreement between the Ministry of Science and Technology of China and the European Commission on a co-funding mechanism for the period of 2018-2020 to support collaborative research and innovation projects under joint flagship initiatives and in other areas, providing the guidance and basis for the two sides to carry out inter-governmental scientific and technological innovation cooperation.

Exploring innovation potential

This type of partnerships mainly refers to various forms of cooperation between China and relevant countries involving innovation to some extent, whereas innovation cooperation does not yet occupy a significant position in the landscape of bilateral ties, leaving extensive room for improvement. The

10 "China and the UK Unveils New Joint Strategy for Science, Technology and Innovation Cooperation," Embassy of the People's Republic of China in the United Kingdom of Great Britain and Northern Ireland, December 10, 2017, <https://www.mfa.gov.cn/ce/ceuk/chn/zygx/kjll/t1521410.htm>.

11 Zhang Min, "New Developments and Trends of China-EU Scientific and Technological Innovation Partnership," *Regional Economic Review*, No.5, 2018, p.30.

main targets for such innovation partnerships are emerging market countries, and the cooperation patterns take into account both two-way and one-way flows of innovation factors. For example, China and Russia jointly established the China-Russia Innovation Dialogue Mechanism, and have formulated the 2019-2024 China-Russia Innovation Cooperation Work Plan (Roadmap). China has also established the China-Brazil Innovation Dialogue and other mechanisms with Brazil. Compared with traditional high-innovation areas such as the Nordic region, the countries making up the core of the Belt and Road Initiative in Eurasia, such as Russia, Kazakhstan and Ukraine, are ranked in the middle of the global innovation index. However, those countries have inherited the Soviet Union's strong industrial technology, and can count on their abundant talent reserves in the fields of basic science, aerospace, nuclear energy and biotechnology. Russian scientists have played a leading role in basic scientific research topics, such as heavy magnetic fields, mathematical millennium puzzles, and super-heavy elements. Since 2013, the number of articles which Russian scientists published in international authoritative journals such as *Science*, *Nature*, and *Proceedings of the National Academy of Sciences of the United States of America*, has increased by nearly 40 percent, and they account for about 0.8 percent of the total number of the articles published in those publications. Ukrainian scientists have an excellent reputation in basic science and applied technology in biomedicine, medical devices and welding. The above-mentioned countries all believe that China's market potential, demand for technology and talent, and capacity for absorbing innovation factors will provide them with ample development opportunities. In their opinion, deepening and enriching their partnerships with China can increase their own global influence.

Motivations for Building Innovative Partnerships

One of the focal points of China's diplomatic efforts under new historical conditions is how to enrich and develop the connotations of building a global network of partnerships, as expressed in the formulation that "on

the premise of adhering to the non-alignment principle, we make friends and form a partnership network across the globe.”¹² Chinese President Xi Jinping has pointed out that it is necessary to “make full use of international innovation resources, open up diversified cooperation channels ... and strengthen innovative partnerships.”¹³ The establishment of innovative partnerships is not only in line with China’s new principles of “innovative, coordinated, green, open, and shared development,” but also an essential implication of building a closer global partnership network.

Following new trends in international technological and industrial development

A new round of industrial revolution brought about by scientific and technological progress has spurred changes in global production and value chains. Artificial intelligence, big data, quantum communications, and the digital economy have profoundly transformed the features of many industries. Breakthroughs in digital and computing capabilities have pushed humankind into a new stage of development. To keep up with the pace of this new technological revolution, a country is forced to upgrade its innovation capabilities. Learning from and absorbing the innovation achievements of others provides a shortcut for catching up. The development of innovative partnerships is win-win cooperation with complementary advantages, and this approach will help both parties in the field of new technologies. At the same time, new technologies, while reshaping the global political, economic, and social structures, have also brought new challenges to the sovereignty, security, and development interests of countries worldwide, requiring the concerted efforts of all countries to find solutions.

The improvement of innovation capabilities can promote the evolution of a country’s economic development to a more sophisticated division

12 “Central Conference on Work Relating to Foreign Affairs Held in Beijing,” *People’s Daily*, November 30, 2014, p.1.

13 “Xi Jinping: Improving Innovation Capability of Key Core Technologies to Provide Strong Scientific and Technological Support for China’s Development,” *Xinhua*, July 13, 2018, http://www.xinhuanet.com/politics/2018-07/13/c_1123123961.htm.

of labor, a more reasonable structure and a more advanced form. It is a significant indicator of a country's specific competitive advantages and overall competitiveness. In particular, exploration in basic science and technological breakthroughs can change the balance of power and competition among countries. The innovative partnership highlights countries' common views based on future-oriented innovation and development, and makes competition complementary or coordinated to tackle common challenges of humanity, such as future development, food security, energy security, human health and climate change. The construction of innovative partnerships will also help improve a country's governance capabilities, and optimize a country's planning, allocation and investment of resources regarding innovation. By stimulating scientific and technological collisions and enhancing technological inventions, the building of innovative partnerships can boost a country's strategic interests. In this process, state actors, sub-state actors, non-state actors, and individuals will shift their basic aspirations of development to "shared construction, shared access, and shared ownership," avoid and restrain existing contradictions in politics, military, economy and trade, and redefine the ways to perform competition and cooperation between countries.

Fulfilling needs of building an innovative nation

Historically, innovation has catalyzed three industrial revolutions. On the eve of the fourth industrial revolution, science and technology has once again become the primary factor of productivity. For a long time, Western countries have been a major hub of innovation factors, and they claim the right to regulate the world's economy, trade, finance, technology and market. With the increasing importance of knowledge-driven innovation as an element of economic growth, countries are engaged in more immediate competition to gain development advantages. Global powers with technological, market, environmental, and strategic advantages are able to develop global networks based on various aspects of innovation, control the direction of major-power competition, and reshape the global industrial, value and interest chains, so as to seize development opportunities and the

right to become an influential international voice.

In 2016, China issued the Outline of the National Strategy of Innovation-Driven Development, which highlighted an innovation-driven development strategy.¹⁴ In the process of China's two-step construction of a modern socialist power, development inevitably requires building network links with the world's foremost innovative countries, cities and other actors, and forging common platforms where global innovation can be gathered and shared. When innovative elements are adopted to strengthen the building of partnerships between countries, and even promote the construction of regional innovation networks, a direct improvement of the nations' overall competitiveness will be achieved.¹⁵

Enriching connotations of global innovative partnerships

The construction of a global network of innovation partnerships reflects the current themes and tasks of China's diplomacy. During the 70-year history of the People's Republic of China, China's diplomacy has adhered to the principle of independence, and has actively developed and established various partnerships. In the course of different historical periods, China has been pursuing different strategic goals, and has accordingly changed the forms and connotations of its views on partnerships, reflecting China's changing judgments on the theme of the era: from "war and revolution" to "peace and development." China's diplomatic strategic goals are subordinate to and serve the country's overall national strategy. At present, these goals support the efforts to achieve the "two centenary goals." Building a new type of international relations is an essential strategic objective for China's diplomacy. Specifically, it includes actively developing global partnerships, complying with the basic national policy of opening up to the outside world, and adhering to the concept of global governance characterized by broad

14 "Understanding the Outline of the National Strategy of Innovation-Driven Development." State Council Information Office of China, May 24, 2016, <http://www.scio.gov.cn/34473/Document/1478594/1478594.htm>.

15 The Royal Society, "New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power," January 2010, https://www.aaas.org/sites/default/files/New_Frontiers.pdf.

consultation, joint contribution and shared benefits.¹⁶

According to the report delivered at the 19th CPC National Congress in October 2017, innovation is the primary driving force behind development; it is the strategic underpinning for building a modernized economy.¹⁷ In the future, innovation will also underpin the competitiveness of countries around the world. China has made it clear that its national innovation system is open, and that efforts should be made to raise the internationalization of its technological innovation in all aspects.¹⁸ Actively planning for and utilizing international innovation resources have become increasingly momentous tasks for China's diplomacy when coordinating domestic and external situations, domestic and overseas markets, and the differing types of rules between home and abroad. Establishing innovative partnerships extends the innovative development strategy of the domestic agenda to global partnership efforts, and helps closely connect technologies, information, talents, economies and intellectual properties.

Challenges in Building Innovative Partnerships

At present, the world is undergoing “profound changes unseen in a century,” and the United States and other Western countries have openly proclaimed China to be their main competitor.¹⁹ Western civilization's leading position in the global economy, politics, military and ideology is experiencing a relative decline. In an increasingly “divided” world against the background of globalization, the “crisis of mentality and order” in human society has led to the rise of various extreme political thought and the “division” of the global society.²⁰ The rise of populism, the resurgence of protectionism, the

16 Yang Jiemin, *Major-Country Diplomacy with Chinese Characteristics: Theoretical Exploration and Practical Innovation*, World Affairs Press, August 2019, p.147.

17 Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era,” p.31.

18 Wang Zhigang, “Speed Up Efforts to Build an Innovative Country,” *People's Daily*, December 7, 2017, p.7.

19 Zhang Yuyan, ed., *Yellow Book of International Politics: Annual Report on International Politics and Security (2018)*, Social Sciences Academic Press, January 2019, p.2.

20 Li Youmei and Wang Dan, “Seeking Cooperation in a Fractured World: Understanding Transformational Sociology in the Cause of Building a Community of Shared Future for Mankind,” *Social Science Front*, No.5, 2018, p.227.

predominance of anti-globalization ideas, the development of separatism and the emergence of a global terrorist threat have a direct impact on the connotations, level and progress of global partnership building. For those countries that have the dual status of being “a partner” with China and “an ally” with the United States, one of the major issues to be addressed at present is how to maintain a pragmatic and flexible stance and balance policies toward both countries. Furthermore, the world is facing the challenge of defining all aspects of “partnership” more clearly, distinguishing the functions of a “partner” and an “ally,” and shaping relationships of “coexistence” and “compatible competition” between the two identities.

First, the United States and the West have put in place scientific and technological blockades against China. Taking into account the comparative changes in strength between China and the United States and the accompanying adjustment of their respective strategies and policies, the prelude to strategic competition between the two has already begun. Such intensity and extent of frictions have never been witnessed before in the post-Cold War era.²¹ In the process, the United States has not only unilaterally restricted its cooperation with China in terms of scientific and technological innovation, but has also pressured its allies to do the same. In May 2018, the United States Trade Representative, the European Commissioner for Trade, and the Minister of Economy, Trade and Industry of Japan issued a tripartite statement, condemning what they said was the mandatory transfer of technology for foreign companies and the acquisition of sensitive information and trade secrets through cyber intrusion, and agreed to take effective measures to stop such policies and practices.²² Since then, the three parties have held several rounds of talks to reaffirm their respective positions and directions of action, and proposed reaching consensus with other trading partners on this issue. The United States has also put pressure on its allies

21 Wu Xinbo, “Competition-Oriented US China policy and Transformation of Sino-American Relations,” *China International Studies*, No.3, 2019, p.20.

22 “Joint Statement on Trilateral Meeting of the Trade Ministers of the United States, Japan and the European Union”, Office of the United States Trade Representative, May 31, 2018, <https://ustr.gov/about-us/policy-offices/press-office/press-releases/2018/may/joint-statement-trilateral-meeting>.

to contain Chinese technology companies. Australia and New Zealand for example, as members of the “Five Eyes Alliance,” have banned Huawei’s 5G equipment under pressure from the US,²³ and the British government is currently evaluating the national security implications in connection with Huawei.²⁴ Japan has also followed the lead of the US and banned Huawei and ZTE from participating in government contracts.²⁵ In addition, the United States has also directly interfered with China’s ongoing efforts of building innovative partnerships. US political and academic circles have repeatedly expressed concerns about the China-Israel innovation cooperation. Trump even suggested that should Israel continue to strengthen its cooperation with China, US-Israel security cooperation would be negatively affected.²⁶ In response to Chinese companies’ investment in Sino-Israeli joint projects such as the Port of Haifa, the US has demanded starting an “agreement review” and even threatened to cancel the US-Israel intelligence sharing.²⁷ The US Rand Corporation suggested in a report that Israel, as a preeminent US ally, should refer to the US experience and set up a review mechanism for China’s investment, and stated that China-Israel high-tech cooperation poses a challenge to the United States.²⁸ With Sino-US competition becoming more frequent and complicated, relevant Israeli high-tech companies, when cooperating with China, will face project reviews, personnel restrictions or technology bans which the United States imposes on

23 “New Zealand Joins Australia in Banning Huawei”, *The Sydney Morning Herald*, November 28, 2018, <https://www.smh.com.au/business/companies/new-zealand-joins-australia-in-banning-huawei-20181128-p50iz5.html>.

24 “Where is Huawei Banned from Working on Critical Networks?” *The Guardian*, April 19, 2019, <https://www.theguardian.com/technology/2019/apr/19/where-huawei-is-banned>.

25 “Japan Effectively Bans China’s Huawei and ZTE from Government Contracts, Joining US,” *The Washington Post*, December 10, 2018, https://www.washingtonpost.com/world/asia_pacific/japan-effectively-bans-chinas-huawei-zte-from-government-contracts-joining-us/2018/12/10/748fe98a-fc69-11e8-ba87-8c7facdf6739_story.html.

26 “Trump Said to Warn PM Security Ties Could Suffer due to Israel-China Relations,” *The Times of Israel*, April 14, 2019, <https://www.timesofisrael.com/trump-said-to-warn-pm-security-ties-could-suffer-due-to-israel-china-relations>.

27 Dan Arbell, “What Do Israel’s China Ties Mean for Its Relationship with the US?” International Institute for Strategic Studies (IISS), May 8, 2019, <https://www.iiss.org/blogs/analysis/2019/05/israel-china>.

28 “The Evolving Israel-China Relationship,” RAND Corporation, 2019, https://www.rand.org/content/dam/rand/pubs/research_reports/RR2600/RR2641/RAND_RR2641.pdf.

specific technologies. How to make affected countries maintain a pragmatic stance within the Sino-US dispute and strike a balance between being a partner and an ally will become key issues in innovative partnership building.

Second, there has yet to be a correct understanding of China's actual demand and supply capacity. The fundamental goal of building innovative partnerships is to create a good external environment for China's macro development, and to use its own comparative advantages to positively introduce innovation resources of relevant countries into specific fields. Externally, although most countries accept the criteria for China's innovative partnership building, the countries involved still differ greatly from China in ideology, development mode, international role and diplomatic stance. Although countries like Switzerland and Israel have strong innovation capabilities, they are quite different from China in terms of economic and political strengths, which can make them worried that their core interests and resource advantages could be marginalized in specific aspects such as agenda setting and pattern designing. Domestically, during the implementation phase, innovative partnership building may experience the following problems: exclusive competition caused by construction of similar innovation platforms in China; inefficient homogenization in scientific and technological research and development, technology transfer, and product transformation; a one-sided understanding that scale and quantity are the only valid criteria to measure the value of the innovative partnership; and a lack of innovation cooperation principles that are derived from actual conditions, oriented to actual interests, and based on actual needs.

Third, there are phenomena such as “technology silos” and innovation fragmentation. The phenomenon of “technology silos” commonly occurs in the process of innovative development for late-developing countries. In 2018, there were more than 1.54 million patent applications for inventions in China.²⁹ But the high number of patent applications did not create a direct technological advantage, and this divergence resulted in the decoupling of

29 “State Intellectual Property Office: 1.542 Million Chinese Invention Patent Applications Filed in 2018,” *China News*, January 10, 2019, <http://www.chinanews.com/cj/2019/01-10/8725350.shtml>.

scientific innovation from technological progress in practical applications. The imbalance between knowledge and technological growth on the one hand and increase of innovation output and applications on the other may explain why the innovation results are often divorced from actual needs. Similarly, participants of innovation cooperation are usually trapped in the dilemma to operate more independently or coordinate more closely with others. When investing in overseas innovation projects, enterprises, as the main actor, often encounter non-market intervention by local actors or risk spillover of their core technologies. As the government can hardly play any central role in specific innovation cooperation projects, this may lead to innovation fragmentation in building innovative partnerships.

Approaches to Innovative Partnership Building

In the era of information and globalization, science, technology and knowledge are powerful resources whose importance have increased significantly. Before the advent of the information age, international actors often relied on their control of borders and the military to occupy and manage resources such as raw materials and labor force. However, at present, intellectual property and technical standards have become the means to control knowledge and technological resources. Developed countries have established the current global intellectual property and technical standard regime, and they dominate the system of technological division of labor as well as the order of wealth flows. By contrast, developing countries are positioned as “energy suppliers,” “assembly factories” and “technology consumers” in this labor division system. Some of these countries have become followers of technology through secondary innovation and independent innovation. However, these technology followers have very limited options when participating in the industrial division of labor. One option is to establish another set of standards themselves, and the other is to submit to the constraints imposed by the powerful actors in the system.³⁰

30 Yang Jian, *The Power and Wealth of Digital Frontier*, Shanghai People’s Press, August 2012, p.101.

For a long time to come, China's scientific, technological and economic ties with major developed countries are expected to be disrupted by certain international geopolitical forces. When major developed countries begin to implement various degrees of containment policies against China's technological progress, China should effectively work to build an innovation-based network of global partnerships, and forge a multi-dimensional layout of international cooperation, according to the inherent logic of the international innovation chain and the distribution characteristics of its constituent links, elements and resources.

First, China should make optimal use of international projects and regional cooperation mechanisms to build an innovation-generating network. The key to effectively advancing innovative partnerships is to improve the innovation-generating and agenda-setting capabilities, which are embodied in five major aspects: knowledge production and accumulation, resource coordination and allocation, research output commercialization and promotion, technological breakthrough and guidance, and industrial agglomeration and diffusion. Moreover, an innovation-generating network requires the capabilities to conduct cross-border intellectual property transactions and integrate the usage of relevant financial services, while institutional guarantees are necessary for convergence with prevailing international rules.

Through innovative partnerships, efforts should be made to organize the implementation of international major scientific programs and projects, and actively participate in global scientific and technological collaborative innovation, to enhance China's profile in global innovation cooperation and competition. A small number of leading innovative entities can play an important role in global industrial competition. However, in the new industrial revolution that combines biological, physical and digital technologies, innovation is becoming increasingly complex. No scientific research institution or enterprise can single-handedly be responsible for all the innovation links and processes; instead, they need to be complemented through international division of labor and cooperation. In whole-

industrial-chain innovation, the advantages of the system is of decisive significance.

Innovative partnerships are also a main channel for China to participate in and initiate negotiations on international rules, helping guide the development of new technologies and industries in a direction conducive to solving major global problems. So far, China and the global innovation-leading countries have established multilateral and bilateral cooperation mechanisms for scientific and technological innovation, such as the APEC Policy Partnership on Science, Technology and Innovation (PPSTI) and the BRICS Science, Technology and Innovation Ministerial Meeting. Countries on the Eurasian continent are China's main innovation partners and a key region for the construction of the Belt and Road Initiative. Based on active participation in the construction of regional value, industrial and interest chains, building innovative partnerships will help establish a "linear innovation model" ranging from basic research to applied research, and technological development, production and operation. In this way, innovation entities can be connected, forming "an open, dynamic and balanced system, created by interaction between innovation entities within a certain space-time range and the innovation environment, through material circulation, energy exchange and information flow."³¹

Second, China should properly use its market advantages to attract innovation elements from bilateral partners. This involves being familiar with the strategic layouts and prioritized development directions of the partner countries, arranging for priorities of partnership construction, determining the positions and policy visions for realizing common innovation goals, and defining the roles and interaction modes within innovation entities such as countries, regions and innovation hub cities.

One of the top issues in building innovative partnerships is to make use of the resources and experience of the "high innovation index

31 Zhao Chengcheng and Qin Jiawen, "Characteristics of the Development of Innovative Ecosystem in the United States and Its Revelation," *World Regional Studies*, No.2, 2017, p.34.

countries” in innovative development, and improve the government’s institutional guarantees concerning strategic guidance, industrial policies, information integration, performance evaluation of investment in research and development, market failure correction mechanisms, supervision of the monopolies in new markets, and creation of an open soft environment for innovation. A national “innovation roadmap” could also be formulated. For example, a group of small and medium-sized countries, represented by the Nordic states, have the capability to generate new technologies, but they do not have the complete capabilities of engineering or business model creation; nor do they have a large industrial or market scale. In comparison, China is one of the main drivers for the maturity and application of globally leading technologies. When the two parties cooperate, their respective advantages would complement each other.

Under bilateral innovative partnerships formed through high-level exchanges, and multilateral platforms established as part of a top-level design, China could expand its sharing of innovation elements with existing partners, and forge close ties with these countries in the areas of science and technology, information, talents, economy and intellectual property. Moreover, cross-border flow of innovation elements could be encouraged. Collaborative innovation could be promoted among industries, universities and research institutes in the global production system. Deep integration of science and technology with industry and finance could be enhanced. There could also be dialogues on innovation strategies, innovation trends, national innovation system construction, technology transfer, and mass innovation and entrepreneurship. An innovation chain would thus be formed as a result of mutual coordination among scientific and technological talents, breakthroughs, finance and output commercialization.

Third, China should pursue science and technology diplomacy to create an innovation ecosystem. The concept of an “innovation ecosystem” originated from the governance of corporate innovation development, that is, to create “the collaborative arrangements through which companies combine their individual offerings into a coherent, customer-facing

solution.”³² Some scholars believe that the scope of this system can be expanded to cover the whole world to form an innovation system with the characteristics of a natural ecosystem, based on patent licensing, collaborative research and development and standardization of technical cooperation.³³ In this process, with enterprises or other innovation institutions as the main entities, an innovation system characterized by collaborative supporting and co-evolution would be established. While an innovation ecosystem is being constructed, efforts should be made to identify those innovation elements that may cause explosive, interlocking, fissile and other revolutionary changes, sort out and organize the discrete and scattered innovation elements in a systematic way, stimulate the market vitality, innovative combination and research activities of the elements, and promote the global diffusion of knowledge and technology from different aspects. This innovation ecosystem would serve as an important channel to promote globalization and benefit all countries.³⁴

The innovation ecosystem created by innovative partnerships surpasses the narrow sense of innovation in conventional thinking. It integrates the knowledge innovation emphasized by scientists, the technological innovation stressed by technical experts, the economic attributes highlighted by entrepreneurs, and the spiritual attributes conceptualized by politicians. It clearly defines the importance of innovation elements in driving human progress and national development, guiding the construction of the international agenda and system, and restricting the rivalry and competition among great powers, and will set an example of promoting a new type of international relations and a community with a shared future for mankind. 🧩

32 Adner Ron, “Match Your Innovation Strategy to Your Innovation Ecosystem,” *Harvard Business Review*, Volume 84, Issue 4, 2006, pp.98-107.

33 Zhang Lifei, “Review on Coupled Theory of Innovation Ecosystem in Hi-Tech Industry,” *R&D Management*, No.3, 2009, pp.70-75.

34 IMF, “WorldEconomicOutlook, CyclicalUpswing, StructuralChange,” April 2018, <https://www.imf.org/en/Publications/WEO/Issues/2018/03/20/world-economic-outlook-april-2018>.