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Outward FDI, The Extension of Production Chains and Upgrading of China's GVCs¹

Abstract: Due to lack of key technology and well-known brands, most Chinese firms are locked in "low end" in global production networks. With the "demographic dividend" is gradually disappearing, China's is faced with serious challenges. It is urgent for China to promote the Upgrading of GVCs. In global production networks, the upgrading of GVCs is mainly embodied by the shift from low value-added manufacturing and processing stages to high value-added R&D and marketing stages. In order to enhance China's capacity to create and capture value-added, China should develop a Multinational Diamond Model with China as the core by the extension of production chains driven by outward FDI. At the firm level, Chinese firms should transfer low-end marginal industry or segments of production chains to other developing countries, and be linked to high-end advantageous industries in developed countries. At the government level, China together with other countries should promote facilitation of investment and trade along "One Belt, One Road".

Keywords: Global Production Networks, Outward FDI, Upgrading of GVCs

In the global production networks, the international division of labor is beyond industry and into intra-product. Even in the labor intensive industry, there are capital and technology intensive segments, and in capital and technology intensive industry, there are still labor intensive segments. So, upgrading of industrial structure is mainly embodied by upgrading of GVCs.

¹本文是中国社会科学院基础研究学者项目的阶段性成果，即将发表于 Shigesaburo KABE. "Moving Up the Ladder: Development Challenges for Low & Middle Income Asia" World Scientific Publishing Company, 2015.

1. The Connotation of Upgrading of GVCs

In global production networks, production is no longer limited to traditional manufacturing and processing, and consists of a series of value-added activities. The global production chains can be broadly divided into three elementary phases: the first is about technical aspects including research and development, creative design, technical improvement, technical training and so on; the second is concerned with traditional production aspects such as logistics and procurement, module production, production systems, terminal processing, quality control, packaging and inventory management; the third is related to marketing aspects covering wholesale and retail, advertising and after-sales service.

The distribution of revenue along GVCs is represented visually using a U-shaped graphic which is so called “smile curve”. In general, R&D is often the core of the whole GVCs in producer-driven global production networks, while marketing and brands are usually crucial to the whole GVCs in buyer-driven global production networks. So value captured by the technical phase and the marketing phase are relatively high, and that for traditional production phase is correspondingly low in global production networks.

Depending on the capability to control and manipulate the GVCs, firms involved in global production networks can be classified as global flagships, “higher-tier” suppliers, and “lower-tier” suppliers. Global flagships usually possess strategic assets such as core technologies, marketing channels or famous brands, “higher-tier” suppliers also possess other valuable proprietary assets except for hard-core R&D and strategic marketing, “lower-tier” suppliers normally lack proprietary assets. In global production networks, global flagships dominate the whole value chains, “higher-tier” suppliers are inferior to global flagships but superior to “lower-tier” suppliers, and “lower-tier” suppliers are typically used as “price breakers” and “capacity buffers” which are highly vulnerable to abrupt changes in market and technology.²

Based on the above attributes of global production networks, the connotation of upgrading of GVCs can be defined in terms of promotion of a firms’ position and improvement of capability to create and capture value in global production networks. In existing literature, the upgrading of GVCs covers process upgrading, product upgrading, functional upgrading and inter-sector upgrading in terms of production, or inter-industry upgrading, inter-factorial upgrading, upgrading of demand, upgrading along functional activities and upgrading of forward and backward linkages from the perspectives of industrial system. Although upgrading of GVCs is characterized by its variety, the final destination is to create and capture more value than ever. In global production networks, the upgrading of GVCs is broadly embodied by the shift from manufacturing and processing stages to R&D and marketing stages, and the transition from “lower-tier” suppliers to “higher-tier” suppliers and further to global flagships, the gradient industrial transfer around the world is correspondingly characterized by the gradient transition of all the phases along GVCs in turn.

2. China’s “World Factory” Position in a Dilemma

In global production networks, most Chinese firms are locked in “low end” due to lack of key technology and well-known brands. With the “demographic dividend” is gradually disappearing, China is faced with serious challenges.

²Ernst D. “Digital information systems and global flagship networks: how mobile is knowledge in the global network economy.” Cheltenham: Edward Elgar, 2003.

2.1 Low-End Locking in Global Production Networks

China has been integrated into global production networks as the "Manufacturing Factory of the Globe". From the 1990s to the early 2000s, especially after Deng Xiaoping's southern tour speech, China tried to promote technological progress and upgrading of the value chains by technology spillover of FDI. Under the guidance of thoughts behind FDI policies, local governments competed to attract FDI by a series of preferential policies such as tax exemption, land and resource price concessions, and even provide "super-national treatment" for foreign firms in some areas. Driven by such preferential policies, labor-intensive industries, and labor-intensive processing stages in technology-intensive and capital-intensive industries are transferred from Japan and "four tigers" in Asia to China, and therefore China has been integrated into global production networks.

China is becoming more innovative, but it is not yet an innovation powerhouse. Although China has developed a more conducive ecosystem for entrepreneurship and innovation than ever, there is still much room to improve. Various limiting measures, barriers to entry, and relative fragility of the banking system impede further improvement of productivity and global competitiveness.³ What's more, China's domestic market is large but domestic demand is relatively inadequate, especially human capital and technological readiness can't fully meet the demand of high value-added stages. Compared with the percentage of more than 50% in many developed countries, about one quarter of China's economic growth is attributed to productivity improvement in terms of TFP, and the rest is broadly ascribed to input of factors of production.

Under the circumstances, apart from a few global contract manufacturers such as Huawei and Lenovo, the majority of Chinese firms pursue projects which are small, low-budget and effective quickly in short term, and therefore they play the role of "lower-tier" suppliers, and are locked in "low end" in global production networks. Jason Dedrick et al. (2011) analyze the distribution of value along the global supply chains of iPad and iPhone, and find that China's economy captures a tiny fraction of total value. The main financial benefit to China takes the form of wages paid for the assembly of the product or for manufacturing of some of the inputs, while the price for an iPhone is about 200\$ or so, only \$10 or less in direct labor wages is paid to China workers.⁴

2.2 Severe Challenge Faced with "World Factory"

The reserve of coal, oil, natural gas, and mineral resources cannot meet the tremendous demand of a world factory. As is well known, China acts as the Manufacturing Factory of the Globe in global production networks and therefore consumes a large amount of energy and mineral resources while supplying large numbers of inexpensive products to the world. Although China is a large developing country, but the reserve of coal, oil, natural gas, and mineral resources and so on is inadequate, and natural resource per head is much lower relative to most countries in the world, and China's natural resources cannot meet the tremendous demand of a world factory at all, which means China's current economic development mode is unsustainable. In order to drive China's sustainable development, China has to transfer from a manufacturing-driven economy to an innovation-driven economy.

³ World Economic Forum. "The Global Competitiveness Report 2014-2015." <http://www.weforum.org/reports/global-competitiveness-report-2014-2015>

⁴ Kraemer, Kenneth, Greg Linden, and Jason Dedrick. "Capturing value in Global Networks: Apple's iPad and iPhone." *University of California, Irvine, University of California, Berkeley, y Syracuse University, NY.* http://pcic.merage.uci.edu/papers/2011/value_iPad_iPhone.pdf. Consultado el 15 (2011).

Rising labor costs and aging undermine China's competitiveness of manufacturing and processing sectors. On the one hand, Chinese government has driven up minimum wages, aggressively enforced labor and environmental regulations. According to China's Employment Promotion Plan, the minimum wage in each jurisdiction must be increased at least once every two years, and the twelfth five- Year Plan stipulates an average increase of 13 percent per year. On the other hand, different from developed countries, China has already entered an aging society with lower GDP per capita. In 2014, the number of seniors over 65 has reached about 138.55 million, and the share in the population is 10.1%. However, the China's GDP per capita is just \$7589, ranks 80th in the world. In order to drive China's sustainable development, China has to transfer from a manufacturing-driven economy to an innovation-driven economy.

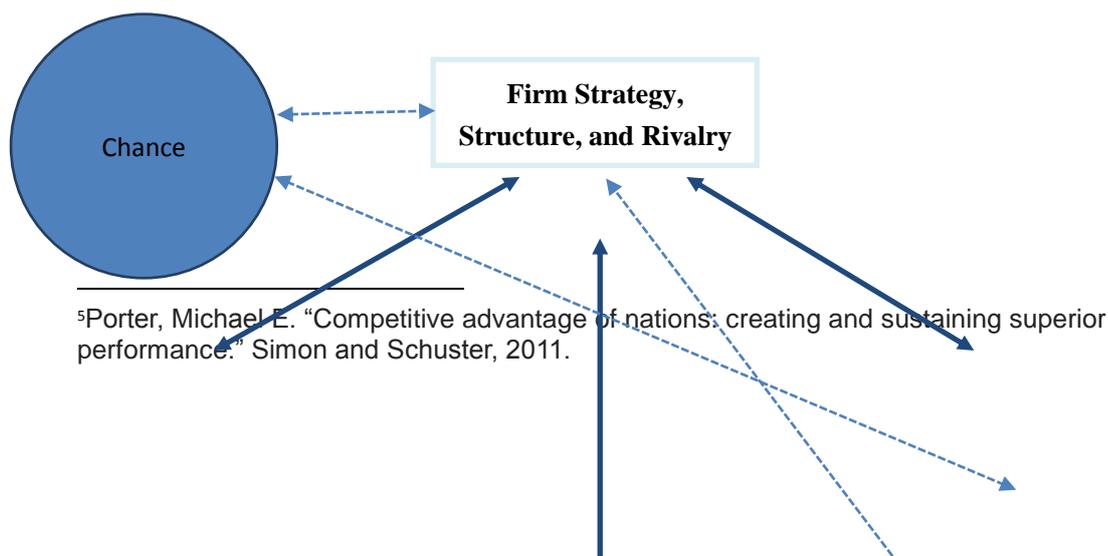
3. The Extension of Production Chains: A Solution to the Dilemma

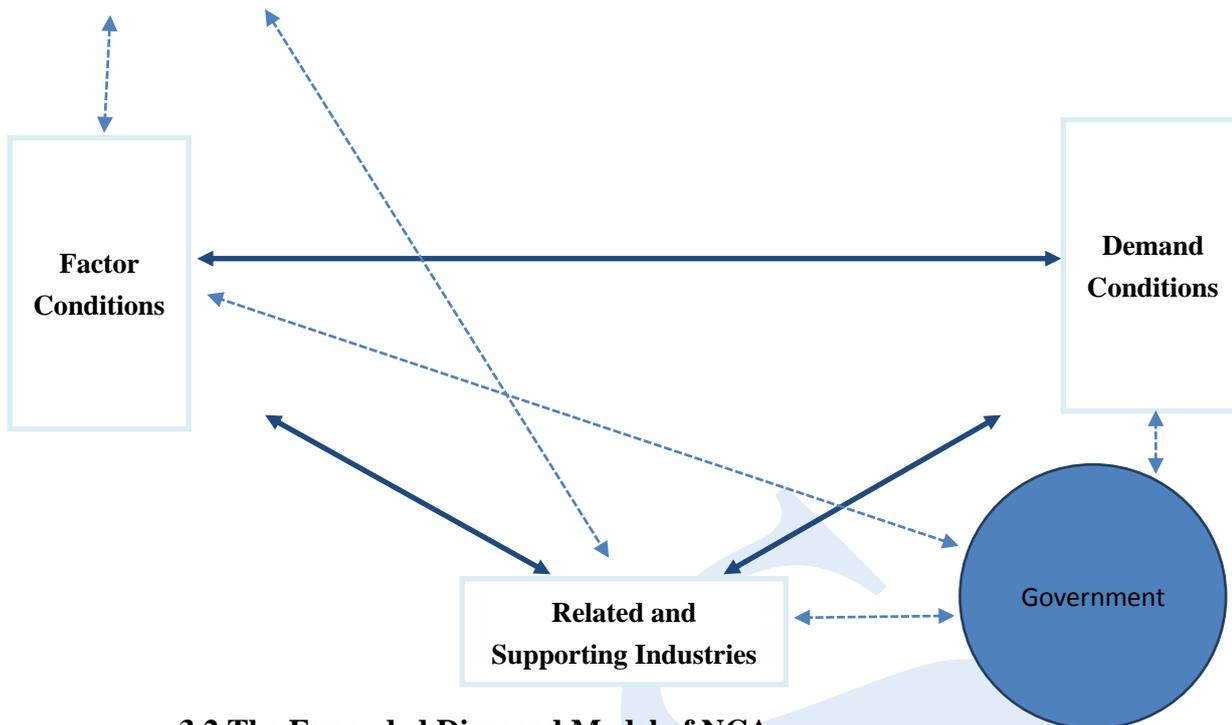
In order to enhance China's capacity to create and capture value-added, China should develop a Multinational Diamond Model with China as the core by the extension of production chains driven by outward FDI.

3.1 The Diamond Model of National Competitive Advantage

Michael Porter, a Harvard University professor, has developed national competitive advantage (NCA) which is represented visually using a diamond-shaped graphic. The Diamond Model of NCA outlines the framework of four interrelated attributes which determine a firm's innovative capability.⁵ The four interrelated determinants are factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry. In addition, the government and chance are just viewed as two exogenous parameters which influence the four determinants of the diamond model. Factors can be further divided into basic factors such as raw-material resources and advance factors such as specialized human capital, and the latter are more important than the former. Demand conditions involve customer needs and wants, a company's capacity and growth rate and so on, especially sophisticated buyers prod companies to innovate faster. Internationally competitive related and supporting industries not only deliver the most cost-effective inputs in an efficient, rapid, and sometimes preferential way, but also provide new ideas and technical interchange which speed up the rate of innovation and upgrading. In addition, the modes choice of establishment, organization and management are usually influenced by national circumstances and context, and especially domestic rivalry often spurs innovation of products and processes as well as improvement of quality and service.

Figure 1 Diamond Model of National Competitive Advantage





3.2 The Expanded Diamond Model of NCA

However, multinational activities have not been taken into account in Porter's Diamond Model. With trade and investment liberalization and facilitation, the barriers to cross-border movement of factors and goods have been reduced or canceled, the process of regional economic integration has greatly accelerated. Therefore, one country's national competitive advantage are also influenced by the four determinants of other countries. Based on the facts, the expanded diamond models have been developed whereby international flows of factors and goods are formally incorporated into the model. For example, Dunning (1993) views multinational activities as a third exogenous variable except for the government and chance⁶; Rugman and D'Cruz (1991) propose the Double Diamond Model and North American Diamond based on the Canada-U.S. Free Trade Agreement⁷; Moon, Rugman and Verbeke (1998) develop the Generalized Double Diamond with both domestic and global factors taken into account to assess the global competitiveness of Korea and Singapore.⁸

3.3 Multinational Diamond Model with China at Its Core

Expanded Diamonds give China clues on how to gain competitive advantage at high value-added stages. As we all know, Porter's Diamond Model is based on the patterns of competitive success in ten leading nations such as the U.S., Japan, and Germany which possess abundant advanced factors and relatively sound national innovation systems. However, China is a developing country, and the four determinants of NCA at value-added stages are far from those of ten leading nations. What's more, China's economic environments can't change overnight due to

⁶ Dunning JH. "Internationalizing Porter's Diamond." *Management International Review*, 1993, 33(2), pp.8-15.

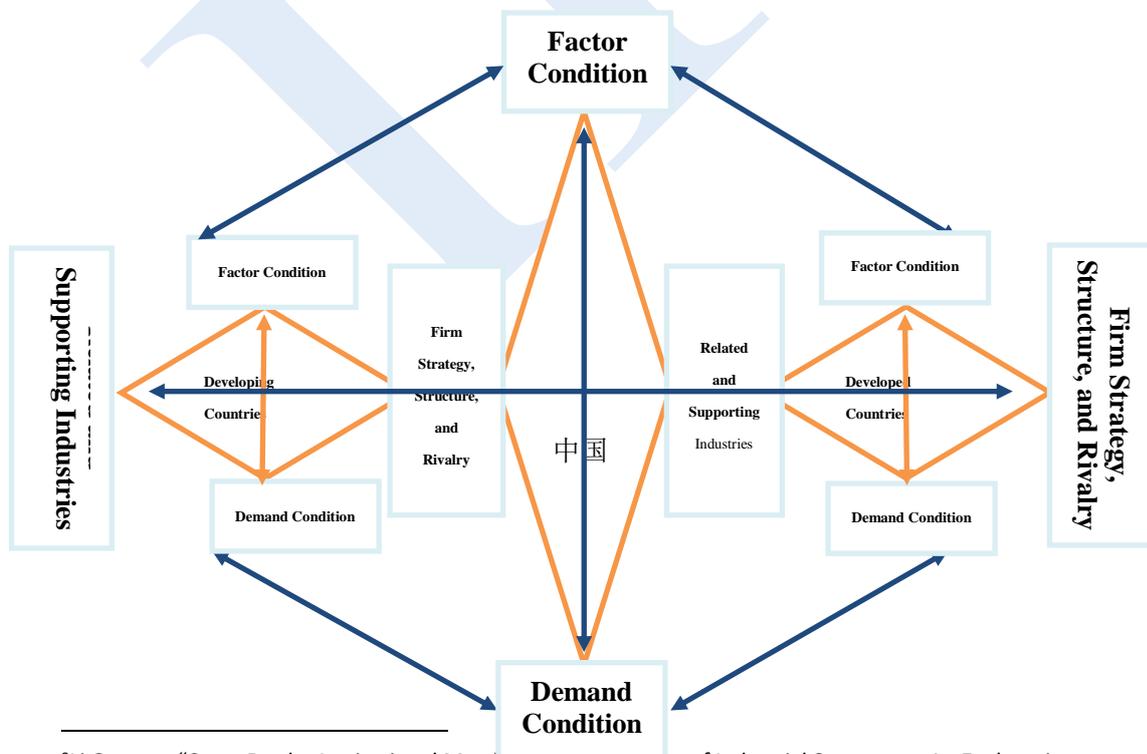
⁷ Rugman, A.M., & D'Cruz, J.R.. "The Double Diamond Model of International Competitiveness: Canada's Experience." *Management International Review*, 1993, 33(2), pp. 17-39.

⁸ Moon, H.C., Rugman, A.M., Verbeke, A.A. "Generalized Double Diamond Approach to the Global Competitiveness of Korea and Singapore." *International Business Review*, 1998, 7, pp.135-150.

path dependence. In view of above facts, China can enhance its own competitive advantage at high value-added stages by means of economic environments of other countries. An alternative way is to pool together complementary factor conditions, demand conditions, related and supporting industries of China and other countries, and to develop a Multinational Diamond Model with China at its core. In the Multinational Diamond Model, China can enhance competitive advantage at high value-added stages based on innovative capability gained in developed countries and resources obtained in developing countries.

The extension of production chains driven by OFDI contributes to development of the Multinational Diamond Model with China at its core. In global production networks, countries are different in economic environments which result in distinct stage-specific competitive advantages. In order to gain competitive advantage at high value-added stages, enterprises from China can make cross-border matching between various production stages and respective corresponding economic environments via outward FDI on a global scale.⁹ On the one hand, through OFDI in developed countries such as the U.S. and Germany, Chinese companies are embedded in production networks of host countries, thereby getting access to globally competitive related and supporting industries, obtaining specialized factors such as talented personnel, patents and well-known brands, and making full use of local innovation systems to meet sophisticated demands; on the other hand, through OFDI in developing countries which are abundant in natural resources and labor, Chinese companies can not only lower the costs of manufacturing and processing stage, but also make room for the development of R & D and marketing stages. In the end, the Multinational Diamond Model with China at its core comes into being through which China is moving upward along the “smile curve”.

Figure2 Multinational Diamond Model with China at Its Core



⁹Li Guoxue. “Cross-Border Institutional Matching and Upgrading of Industrial Structure: An Explanation on Outward FDI from Developing Countries.” *Journal of Central University of Finance & Economics*, 2015, 6, forthcoming.

4. The Ways to Develop Multinational Diamond Model

The development of Multinational Diamond Model with China as the core is essentially the extension of China's production chains with the intention to gain competitive advantage at high value-added stages. To this end, Chinese firms should transfer marginal industry or marginal segments of production chains to other developing countries, meanwhile, make asset-specific investment on marketing and R&D in developed countries. At the government level, China together with other countries should promote facilitation of investment and trade along "one belt, one road".

4.1 Expand Manufacturing and Processing Segments in Other Developing Countries

The expansion of marginal industry or marginal segments of production chains optimizes allocation of resources and improves social welfare. Generally speaking, there are gaps in factor cost, managerial skill, and technical knowledge between China and countries at lower stages of economic development, and therefore a particular industry which is losing competitiveness as a result of rapid changes in factor endowments in China may be a potentially comparatively-advantaged industry in the countries at lower stage. In global production networks, the international division of labor is beyond industry and into intra-product. Under the circumstances, even in the sunrise industry, there are still segments which are losing competitiveness, and therefore expansion driven by OFDI not only involves traditional marginal industries, but also includes marginal segments of production chains. The successful expansion of marginal industry or marginal segments of production chains through OFDI will exploit cheap natural resources and labor of host countries, transfer China's overcapacity, make room for the development of sunrise industry or higher value-added stages transferred from developed countries.

In fact, many developed countries and newly industrialized countries promote upgrading of industrial structure or GVCs by this way. In the 1950s, the United States transferred iron and steel, textile and other industries which were losing comparative advantages to Westdeutschland Japan which were inferior to the U.S. in economy, and focused on emerging industries such as semiconductors, communications equipment and computer. From the 1960s to 1980s, Westdeutschland Japan expanded such labor and natural resources intensive industries to Newly Industrial Economics, and specialized in technology intensive industries such as integrated circuit, precision machinery, automobile, household appliances, and fine chemicals. Since the 1990s, the United States, Germany Japan and other developed countries as well as Newly Industrial Economics have transferred labor intensive industry or low-value added production stages of capital and technology intensive industries to China, India and other developing countries, and they are mainly engaged in R&D, marketing, Brands and so on.

4.2 Make Asset-Specific Investment on R&D and Marketing in Developed Countries

It is vital for Chinese firms to get tacit knowledge from “higher-tier” suppliers or global flagships in order to upgrade CVCs. According to difference in knowledge needed, tasks along global production chains can be further classified into those that require explicit knowledge and those that require tacit knowledge.¹⁰ Explicit knowledge can be expressed in a linguistic, mathematical, or visual symbol, and is often embodied in a standardized—or even outdated—technology or usual routine; while tacit knowledge is deeply rooted in the human body and only can be expressed through action, commitment, and involvement in a specific context and locality, and often provides the fertile intellectual ground for all knowledge management and for the effective performance of an economy¹¹ by which Chinese firms can create and capture more value added.

It is necessary for Chinese firms to be integrated into global production networks of developed countries in order to acquire tacit knowledge. The process of knowledge diffusion and capability formation in the GPNs involves four steps such as socialization (tacit-to-tacit conversion), externalization (tacit-to-explicit conversion), combination (explicit-to-explicit conversion) and internalization (explicit-to-tacit conversion). Chinese firms can achieve combination and internalization of explicit knowledge by the transactions of intellectual property and procurement of equipment, but often suffer export restrictions to high technology. Only by integration into production networks of developed countries, can Chinese firms achieve the socialization and externalization of tacit knowledge.

It is a prerequisite of integration into global production networks of developed countries that Chinese firms have made asset-specific investments. Asset-specific investments on R&D and marketing not only improve the capability of Chinese firms to assimilate tacit and explicit knowledge, but also make Chinese firms functionally and territorially embedded into aspects of the social and spatial arrangements of “higher-tier” suppliers and global flagships. Based on asset-specific investments on R&D and marketing, there is a symbiosis among Chinese firms, “higher-tier” suppliers and global flagships by which relation contracts come into being. In line with the changing requirements of markets, “higher-tier” suppliers and global flagships will actively provide technical literature and technical assistance and share related marketing experience to help Chinese firms meet their requirements.

4.3 Promote Facilitation of Investment among Countries along “One Belt, One Road”

“One belt, one road” is the longest economic corridor with the greatest potential in the world. It involves 65 countries and more than 4 billion people. The development and construction of “one belt, one road” creates a large market. Many countries along “one belt, one road” are abundant in natural resources, but insufficient in capital, human resources and infrastructure. There is great potential for countries along it to cooperate in transportation, finance, energy, telecommunications, agriculture and tourism. Especially, it is reported that many countries in Asia and Europe have indicated their support for China's construction of “one belt, one road”.

¹⁰Polanyi, Michael. “Personal Knowledge: Towards a Post-Critical Philosophy.” Chicago: University of Chicago Press, 1962.

¹¹Ernst, Dieter, and Linsu Kim. “Global production networks, knowledge diffusion, and local capability formation.” Research policy 2002, 31(8), pp.1417-1429.

China's pivotal role helps develop the Multinational Diamond Model with China at the Core."One belt, one road"runs through the whole Eurasia,borders on the Asia-Pacific Economic Circle on the East, and enters the developed European Economic Circle on the West.The Belt and Road initiative covers five areas-policy communication, road connectivity, unimpeded trade, money circulation and understanding between peoples.In order to fully utilize factor conditions, demand conditions, related and supporting industries of Eurasia, China together with other countries along it should further refine theBelt and Road initiative, and formulate specific measureson trade and investment facilitation, infrastructure development,industrial and sub-regional economic cooperation, and financial cooperation.

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