VI. The Impact of Intermediate Goods Import on the Improvement of Enterprise Innovation Ability Among One Belt One Road Countries

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This chapter reviews prior research relevant to the import of intermediate goods, firm innovation, and the relationship between the two. Studies on intermediate goods imports focus on their impact on enterprise productivity, global value chain positioning, and export quality. Research on firm innovation explores various influencing factors, including cross-border mergers and acquisitions, imports of intermediate goods, and digital transformation strategies. The literature linking intermediate goods imports and innovation emphasizes the role of technological spillovers, diversification, and quality improvements. Drawing from these insights, this chapter summarizes key findings and offers policy recommendations aimed at enhancing both the quality and volume of China's intermediate goods imports and strengthening firms' innovation capabilities.

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1 Study background and implication

1.1 Study Background

As one of the world's largest manufacturing countries, China's enterprises are generally involved in the import of intermediate goods in the face of international market competition. Intermediate goods play a vital role in the manufacturing industry, directly affecting enterprises' production efficiency and product quality. However, importing intermediate goods is not only a business decision in the production process but also a topic closely related to enterprise innovation. With the deep integration of the global industrial chain, the impact of intermediate goods imports on the innovation ability of enterprises has become increasingly important. Therefore, an in-depth study of the effects of intermediate goods imports on the innovation ability of Chinese firms clarifies the innovation behaviours and strategies of firms in the global environment better.

1.2 Study Implication

By studying the relationship between the import of intermediate goods and the direct impact on the innovation capacity of firms, we can reveal how firms can improve their competitiveness in the international market by bringing in external resources and knowledge to enhance the quality of products and innovative technologies. An in-depth understanding of the relationship between intermediate goods imports and firm innovation can help the government to guide and formulate relevant policies more accurately. The government can encourage enterprises to strengthen innovation activities and promote industrial upgrading by developing policies to support importing intermediate goods.

Studying the impact of intermediate imports on enterprise innovation helps strengthen cooperation and exchanges among international enterprises. Through in-depth collaboration with foreign enterprises, Chinese enterprises can better integrate into the global value chain and achieve a win-win situation. With the changes in the international economic situation and trade environment, understanding the impact of intermediate goods imports on innovation capabilities enables enterprises to respond more flexibly to changes in the external environment and better adapt to the evolution of the global industrial chain.

Therefore, an in-depth study of the impact of intermediate goods imports on the innovation ability of Chinese enterprises will not only help to improve the innovation level of enterprises but also play a positive role in promoting the government's formulation of industrial policies, promoting international cooperation, and promoting the sustainable development of enterprises.

2 Literature review

2.1 Literature review on intermediate goods imports

Many scholars have researched and analysed the economic benefits of importing intermediate goods from different perspectives. There are many issues related to the impact of intermediate goods imports on firm productivity, global value chains, and export quality in terms of the quality and diversification of intermediate goods imports and the geographical location of imports.

From the perspective of the global value chain of enterprises, Hu et al.(2023) and other studies on intermediate goods imports, independent innovation and enterprise global value chain upgrading pointed out that the import of intermediate products can make the production activities of enterprises enter the downstream links of the value chain and have different impacts on the role of enterprises in different development periods in joining the global value chain. The import of intermediate products and the independent innovation of enterprises will have a "threshold effect" and a "complementary effect" because of the specific value of intermediate product imports. Hao et al. (2022) show that improving the intensification and extensibility of the regional intermediate goods import network of the countries along the "Belt and Road" is conducive to promoting their position in the division of labour in the global value chain. Kee and Tang (2016) pointed out that the import trade of intermediate goods is crucial in enhancing the division of labour in the global value chain of importing countries through technological spillover effects. From the technical level of enterprises, Liu et al.(2023) studied the impact of the liberalisation of intermediate goods import on enterprise innovation from the two stages of technology opening and technology transformation. They concluded that deregulating intermediate products by import is conducive to improving the quality and quantity of enterprise technology opening and technology transformation. Its effect is more evident in high-intensity import enterprises and high-tech industries.

Based on the social network analysis method, Chen and Guo (2023) clarified that the optimisation of the source structure of intermediate goods imports plays a crucial role in the improvement of enterprise productivity in high-tech industries, capital or technology-intensive industries from the perspective of the source of intermediate goods imports and that the optimisation of the structure of import sources other than primary, intermediate inputs has a significant effect on enterprise productivity.

By participating in global procurement, Ethier (1982) enterprises have diversified the types of intermediate products, and the organic complementarity of internal products and foreign imported products enables enterprises to break the shackles of domestic endowments to achieve a rational allocation of resources, thereby improving enterprise productivity. Based on the relevant data on the export competitiveness of the "Belt and Road" countries, Sun (2021) analysed that the larger the import volume of intermediate goods, the more conducive to promoting the production efficiency of enterprises, and it also has a promoting effect on the technical complexity of export products, which indicates that the import of intermediate products by enterprises is conducive to improving the competitiveness of their products. In terms of export products, Song and Zheng (2020) started from the manufacturing industry subdivision to study the import of intermediate products to the export product quality of Chinese manufacturing enterprises. The results showed that intermediate products have a quality improvement effect on the quality of export products through the mechanisms of "competition effect," "knowledge spillover effect," and "intermediate product quality effect." Moreover, the effect on enterprises in the early and growth stages is more prominent. Jiang et al. (2023) study intermediate goods import, geographical agglomeration, and export complexity; importing differentiated products can help enterprises improve the export complexity in learning. Wei et al. (2021) studied the impact of import tariffs on the quality of export products from the level of subdivided industries, and the research showed that the import tariff reduction of intermediate products has a promoting effect on the quality of export products, especially in sectors with large import scale of intermediate products. Song et al. (2019) pointed out that importing intermediate goods affects the quality of export products through competition, knowledge spillover, intermediate mass, and intermediate effects.

However, at the same time, in studying the import benefits of intermediate goods, some scholars have researched and analysed the adverse effects they bring. From the perspective of the technical quality of intermediate goods imports, Liu (2021) discovered that the high technical content of the final goods exported by China's manufacturing industry is mainly due to the risk of a country's dependence on intermediate goods imports caused by the ultra-high imports and may also hurt the domestic value-added rate. Chen et al.(2021) analysed the import of intermediate goods in the manufacturing and service industries. They pointed out that the import of intermediate goods with high technical complexity will exacerbate the risk of a country's dependence on imported intermediate goods and inhibit the capital accumulation of the manufacturing industry. Still, at the same time, importing intermediate goods will help a country's economic development level and improve input and output. Starting from the enterprise category. Linker(2012) addressed that companies far from the forefront of technology will give up independent innovation due to frustration. Then, it will be difficult to absorb the spillover effect of imported R&D. Wei et al.(2020) explored the impact of the quality of imported products on enterprise productivity by distinguishing the types of enterprises and pointed out that the import of high-quality intermediate goods by general trade enterprises and mixed trade enterprises can improve enterprise productivity through technological innovation channels and competitive incentive channels while processing trade enterprises will have the phenomenon of enterprise R&D investment and enterprise productivity decline due to the import of high-quality intermediate goods.

2.2 Review of the literature influencing corporate innovation

In the existing literature, many factors affect enterprise innovation, such as cross-border mergers and acquisitions, enterprise import of intermediate products, and enterprise digital transformation strategy.

Chu et al. (2023) pointed out that cross-border mergers and acquisitions of enterprises have a significant role in promoting enterprises' patents and innovation performance. Jiang et al. (2023) studied the relationship between product diversification, digital transformation, and enterprise innovation performance and the digital transformation and product diversification strategies can significantly improve the innovation performance of enterprises, and product diversification has a promoting effect on digital transformation and innovation performance, especially

in high-tech and high-tech enterprises. Wen et al. (2023) studied the mechanism of research and development internationalisation and enterprise innovation performance in digital transformation. They pointed out that the digital transformation of enterprises promotes the internationalisation of enterprises and the improvement of innovation performance. In terms of imports, Zhang (2023) started with the import of software and information technology services and concluded that the import of software and information technology services has a different effect on the innovation level of enterprises, and the impact on innovation in various industries and other regions is also different. In addition, the internationalisation of enterprises is also a major driving force for enterprise innovation. Liu et al. (2023) study that multinational enterprises can enhance innovation by obtaining foreign technology, talents, and resources through international operation and cooperation. They promote enterprises to increase innovation activities to improve competitiveness and occupy market share through competitive effects. Regarding subdividing imports into intermediate goods, Liu et al. (2018) concluded that diversifying intermediate goods imports can significantly promote the innovation of manufacturing enterprises. The technological innovation ability to manufacture enterprises positively correlates with the international technology spillover effect of intermediate goods imports. Lin et al.(2017) and Hao et al. found that the liberalisation of intermediate goods imports is generally conducive to enterprise innovation, and there are many mechanisms, such as cost-utility, market expansion utility, technology spillover utility, and R&D complementarity to promote the improvement of enterprise innovation. Yoo (2012) pointed out that digital transformation can improve enterprises' ability to innovate independently. At the same time, Chen (2022) pointed out that digital transformation is expected to reduce the cost of debt financing, provide more favourable financial support for enterprises' green innovation projects, and promote the development of enterprises' green innovation.

2.3 Literature review on the impact of intermediate goods imports on firm innovation

Based on many literature studies, intermediate products have a particular influence on enterprise innovation, and scholars at home and abroad have made many summaries on the influence mechanism, including the "product diversification mechanism," "quality mechanism," and "technology spillover mechanism."

From the perspective of technology spillovers, intermediate goods trade is one of the essential carriers of technology spillovers, which can affect the innovation status of final goods through the increase of intermediate import types. Geng et al. (2012), in their study of intermediate goods imports and firms' environmental performance, concluded that intermediate goods imports could bring technology spillovers to firms, thereby improving firms' productivity. Wan (2023) studied the impact of intermediate goods imports on industrial pollution emissions and verified that importing intermediate products promotes technological progress through technological spillovers, thereby improving the production efficiency of enterprises and strengthening the innovation research and development of green technologies and products. Zhang et al. (2023) pointed out that the technological spillover of intermediate products has a good role in promoting the rise of the global value chain status of the manufacturing industry. This effect is because the technological spillover of intermediate products encourages the development of the independent innovation model of enterprises, thus bringing about the rise of the global value chain status. Ji et al. (2023) conducted an empirical study on the internal mechanism of imported intermediate products affecting the innovation of export products through the technological spillover effect, and the technological spillover effect of intermediate goods imports has a significant role in promoting the innovation of export products of enterprises. The participation of intermediate products in the domestic market competition positively affects the research and development of innovative products. Wang et al. (2019) studied the internal mechanism of intermediate product import on the choice of enterprise technological innovation mode. They analysed the impact of the technology spillover effect brought by the import of intermediate products on the technological innovation mode of enterprises affected by the absorption capacity of enterprises. The more robust the absorption power, the more pronounced the effect of the technology spillover effect on enterprise innovation, and the easier it is for enterprises to engage in high-end technological innovation. Yao et al. (2019) studied the mechanism of intermediate goods import and enterprise technological progress. They believed that when Chinese enterprises imported intermediate products, they obtained a spillover effect and encouraged enterprises to choose to carry out research and development and increase investment in research and development. From the mass effect, Keller (2004), through import trade, allows developing countries to learn from advanced technologies and high-quality processes exported from developed countries, improving their product quality and innovation level.

Through empirical regression analysis, Gong et al. (2023) confirmed that improved imported intermediate quality significantly promotes the number of enterprises' patent applications. Through heterogeneity analysis, improving imported intermediate quality in enterprises with export behaviour, general trade enterprises, and enterprises with high export product quality can significantly promote enterprise innovation. Wei et al.(2017) started with the quality of imported goods at the enterprise level under general trade, explored its impact on enterprise innovation, and pointed out that the improvement of the quality of imported products can significantly enhance the innovation ability of enterprises, whether it is imported capital goods or imported intermediate goods, it has a positive impact on the innovation of enterprises. The primary mechanism is to enhance the time for continuous innovation of enterprises by absorbing technology and expanding the market. Wu et al. (2022) examined the mechanism of the influence of enterprise intermediate goods imports on enterprise innovation based on the enterprise level. They pointed out that improving the import quality of intermediate goods can promote enterprise innovation through market expansion effect, enterprise productivity, and human capital level improvement, especially foreign-funded enterprises, advanced enterprises, patent-intensive enterprises, etc., and the effect is more prominent. From the perspective of product diversification, Halpern (2015) pointed out that with the deepening of the liberalisation of intermediate goods trade and the expansion of the scale of imported intermediate goods, the diversification level of intermediate varieties is also increasing, which has an essential impact on enterprise innovation. Li (2020) analysed the influencing mechanism of intermediate goods import diversity, enterprise innovation, and wage level by establishing a model and concluded that the diversification of intermediate goods imports is helpful to promote enterprise innovation because the technology transfer effect brought by the import of core parts and advanced technology intermediate goods from abroad and the digestion and absorption contained in the diversified intermediate goods of domestic enterprises reduce the innovation cost of enterprises, and then promote the innovation and development of enterprises. Li (2019) studied the relationship between the innovation of Chinese manufacturing enterprises and the import of intermediate goods and concluded that the diversification of intermediate goods imports has a positive effect on the binary margin of enterprise innovation, especially the diversification of enterprises with rich types of imported intermediate varieties has a more significant innovation effect on their companies. Importing intermediate goods mainly promotes enterprise innovation through cost saving, quality

improvement, technology diffusion, or R&D substitution. Zhang et al. (2023) explored the mechanism of intermediate goods imports and enterprise innovation from the multi-dimensional perspective of importation, diversification, and sophistication. They pointed out that "the diversification of related intermediate goods imports" is more conducive to enterprise innovation, especially for enterprises whose productivity is close to the frontier of science and technology. The diversification of intermediate goods imports has a more noticeable effect on the innovation promotion of enterprises. In addition, from the perspective of trade liberalisation, Yu (2021) and others believe that developing trade liberalisation can reduce the cost of importing intermediate goods, optimise the production process, and make it easier for enterprises to enter the international market and enjoy economies of scale.

To sum up, the impact of intermediate goods imports on enterprise innovation is generated through many mechanisms, and it is also the willingness of enterprises to enhance their innovation power. First of all, through the increase in the types of imported intermediate products, enterprises also provide more innovation resources for the development of enterprises and increase the input of more raw materials, parts, components, and technologies, which plays a vital role in promoting the innovation and development of enterprises, improving the production efficiency of enterprises, reducing production costs, and providing more funds and resources for enterprise innovation. The diversification of product categories allows enterprises to come into contact with different develop new innovative ideas.

Enterprises can better meet market demand, improve product quality and competitiveness, and provide more opportunities and motivation for innovation. Secondly, by enhancing the import of high-quality intermediate products, enterprises have improved the quality of raw materials and parts required in their production process, and the production of high-quality intermediate products has improved the quality and competitiveness of enterprise products, providing opportunities and motivation for innovation. Importing high-quality intermediate goods can promote technical exchanges and cooperation between enterprises and international advanced enterprises and bring innovative funds and resources to enterprises. The products and high-quality intermediate goods will also enhance the brand image of the company's products, improve consumers' trust and recognition of the company's products, and promote the innovation and development of the enterprise. Finally,

in the technology spillover mechanism, enterprises can get in touch with foreign advanced technologies and processes, technology transfer and diffusion through the import of intermediate goods, to learn and imitate these technologies, and these products can stimulate the innovation inspiration of enterprises, develop new innovative ideas, and achieve the role of enhancing enterprise innovation.

2.4 Summary

First, Throughout the literature at home and abroad, many factors influence enterprise innovation, and the research results on the impact of intermediate goods on enterprise innovation from the perspective of intermediate goods import are also abundant. Through the above literature review, most scholars have an impact on enterprise innovation from the perspective of the import quality of intermediate products, the diversification of imported products, the market expansion effect, the cost-saving effect, the quality improvement effect, the technology spillover effect and the R&D substitution effect of imported products. The study of this paper provides a research basis. Finally, by combing the above literature, it is found that there are some limitations in the methods and contents of previous research, which provides research innovation space for this paper. Most studies on the impact of the import of intermediate goods on enterprise innovation are from the perspectives of technology spillover, mass effect, and product diversification, but the conclusions differ.

Second, In the past, empirical research methods were mainly used to analyse the relationship between intermediate imports and firm innovation by constructing econometric models. However, these studies often needed more data availability and sample selectivity. Therefore, this paper attempts to use new data sources and research methods, such as using the data level of firms or conducting case studies, to explore the impact of intermediate goods imports on firm innovation.

Last, The existing studies mainly focus on the direct impact of intermediate goods imports on firm innovation but rarely explore how intermediate goods imports affect firm innovation. Therefore, this paper can conduct a more in-depth study from the perspective of the mechanism of action and analyse how the import of intermediate goods affects the innovation behaviour of enterprises through technology spillovers and quality effects.

3 The status of China's intermediate goods imports and enterprise innovation

3.1 Definition of import of intermediate goods

By the United Nations BEC Classification methodology, we adopt a more objective and relatively uniform classification by further subdividing trade data into capital goods, intermediate goods, and consumer goods according to the different purposes for which the products are used, with particular consideration of primary products such as foodstuffs, raw materials, pre-processed products, and components, which constitute an essential part of intermediate imports. This classification helps to eliminate the subjectivity that can be introduced when classifying products based on their name while being more in line with the requirements of the System of National Accounts (SNA). Through such segmentation, we have a more comprehensive understanding of the structure of imported products, which leads to a more accurate analysis and understanding of the impact of international trade on different sectors and levels. This relatively unified statistical system allows us to study more deeply the effect of imports of various categories of products on economic development, industrial structure, and innovation capacity.

Table 1: BEC classification

SNA category	BEC Code	Description
Primary products	111	Primary food and beverages for industrial use
	21	Primary industrial goods that are not classified
	31	Primary fuels and lubricants
Semi-finished products	121	Processed food and beverages for industrial use
	22	Unclassified processed industrial products
	322	Other fuels and lubricants
Parts and components	42	Capital goods, parts and accessories
	53	Transportation of spare parts for equipment

3.2 The scale of intermediate goods imports

Since China acceded to the WTO in 2001, the total import of intermediate goods has shown an apparent growth trend, and its proportion in the overall import trade is relatively high and tends to be stable, highlighting the critical position of intermediate goods imports in China's trade system. One of the main reasons for this trend is that after China acceded to the WTO, it gradually lowered the level of

international tariffs, thereby reducing import costs and promoting domestic enterprises to continue to increase imports of diversified intermediate goods.

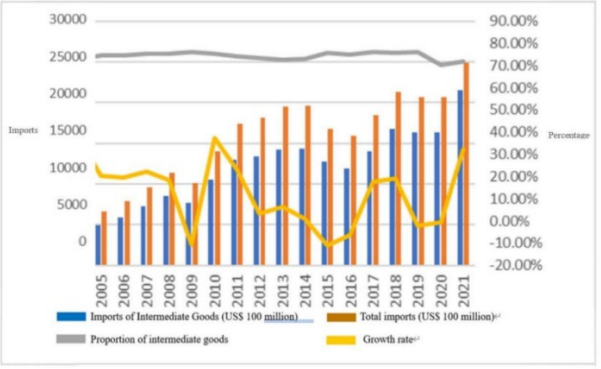

Figure 1: China's imports of intermediate goods and total trade imports from 2000 to 2021
Source: UN COMTRADE database

From 2001 to 2014, imports of intermediate goods continued to grow, and despite the impact of the financial crisis in 2009, they recovered rapidly the following year. However, since 2014, China's economic structural transformation and industrial policy adjustment have impacted many traditional manufacturing industries, which has led to a significant decline in domestic import demand for intermediate goods, which has been declining for two consecutive years. The recovery of the global economy has promoted increased global consumer demand. However, due to the impact on the worldwide supply chain, the decrease in consumer demand and the decline in product prices, China's intermediate goods imports have decreased significantly.

However, with the continuous optimisation of China's economic structure, the improvement of consumer demand and the improvement of the government's opening up to the outside world, China's imported goods began to improve significantly in 2017. The import value of intermediate goods reached a record high of 1,613.225 billion US dollars in 2018. In 2020, affected by the new crown epidemic in 2019, the global supply chain was impacted, consumer demand declined, trade frictions increased, and the total import volume of intermediate goods and imports showed a downward trend. In 2021, with the gradual resumption of work and production, the import value of intermediate goods will show an upward trend.

Behind this economic phenomenon are the complex changes in China's import trade, which are closely related to factors such as the global financial situation, industrial restructuring, and international trade environment.

3.3 Types of intermediate goods imported

As a key component between raw materials and final consumer goods, the evolution of the import structure of intermediate goods intuitively reflects the transformation of China's economic development mode and the adjustment of China's position in the international division of labour. Figure 2 shows the changes in the import structure of intermediate goods in China from 2005 to 2020. From 2005 to 2008, primary products, semi-finished products and parts showed a steady growth trend, reflecting the rapid development of China's economy. However, the shock of the 2009 global financial crisis has dampened this growth trend somewhat. With the alleviation of the subsequent impact of the crisis, China has adjusted its import strategy and increased the procurement of primary products from European and American countries, resulting in significant changes in the internal structure of imported intermediate goods. The share of primary products increased sharply, while the share of semi-finished products decreased slightly. Imports of primary, semi-finished products and components declined between 2014 and 2016, mainly due to the weakening global economy.

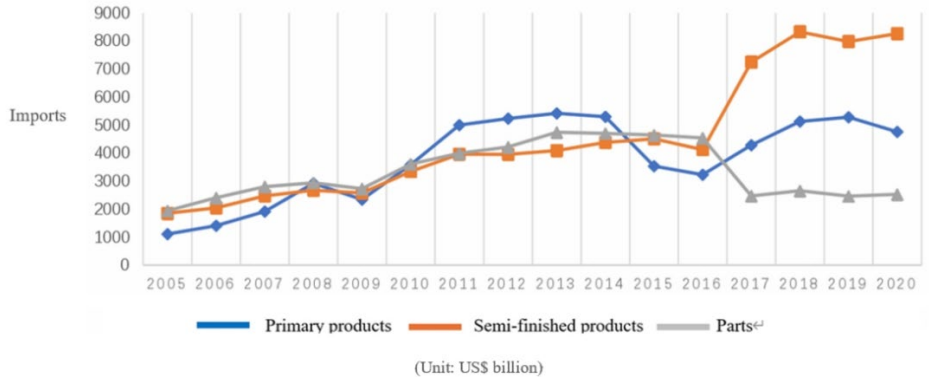

Figure 2 China's total imports of intermediate goods from 2005 to 2020
Source: UN COMTRADE database

The lack of growth momentum in European and American countries and the sluggish demand in the international market have led to a corresponding decrease in China's total imports of intermediate goods. At the same time, domestic economic development has entered a normalised situation, facing downward pressure on the economy, and domestic and international demand is insufficient, especially the slowdown in the growth rate of imports of bulk commodities.

Between 2016 and 2020, the import value of China's primary and semi-finished products increased significantly, while the import value of spare parts decreased slightly. This trend is affected by the Sino-U.S. trade friction and China's independent innovation policy, resulting in the total import of capital goods and other components from 406.279 billion US dollars in 2016 to 195.877 billion US dollars. At the same time, the total import value of primary products increased from 323.31 billion US dollars to 476.374 billion US dollars, and the import value of semi-finished products also increased from 412.926 billion US dollars to 822.653 billion US dollars. China has been developing processing trade for a long time, mainly focusing on the processing and assembly of capital goods parts and components with low technical content. However, this practice restricts enterprises from obtaining core technologies, which restricts China's technological innovation and is not conducive to China's high-end extension of the global value chain. Since 2019, the new crown epidemic has restrained the import of primary products in China, and imports have a significant downward trend. Since 2016, China has begun to promote supply-side structural reforms to encourage the construction of a manufacturing power. With the introduction of several innovation policies and the implementation of the two plans of Industry 4.0 and Made in China 2025, China has encouraged the development of an advanced manufacturing industry, especially the independent innovation ability of local parts and components, which has been significantly improved. As a result, China has reduced its imports of low-tech components. However, China's domestic energy resources cannot meet the strong demand for production scale, especially the demand for non-agricultural primary products such as copper ore, iron ore and crude oil has increased significantly, resulting in the continuous growth of the import amount of intermediate products in the primary products. Semi-finished products are mainly used in the food processing and textile industries, which are intermediate inputs with low technical content and are less affected by Sino-US frictions from 2016 to 2020, and the import value has increased significantly. This change reflects China's continuous adjustment

in international trade to adapt to the development of the global supply chain and improve the technical level of the domestic manufacturing industry.

3.4 The basic situation of Chinese enterprise innovation

After China acceded to the World Trade Organization (WTO), it gradually integrated into the global value chain. It plays a role that cannot be ignored in the international division of labour. In the early stage, due to the relatively low level of innovation in China, coupled with the fact that economic growth mainly depends on factor input and investment, the investment in R&D and innovation is relatively limited. Hence, the process of improving innovation ability is relatively slow. With the rapid growth of China's comprehensive national strength, the advantages of factors such as the demographic dividend that it relied on in the early stage have gradually weakened, and China has steadily adjusted its economic growth strategy to be innovation-driven, forming an economic growth model with innovation as the core, thereby significantly improving its innovation ability. Figure 3 illustrates the evolution of the number of patent applications in China between 2000 and 2018, from 25,346 in 2000 to 1393815 in 2018, an increase of 5,399% year-on-year.

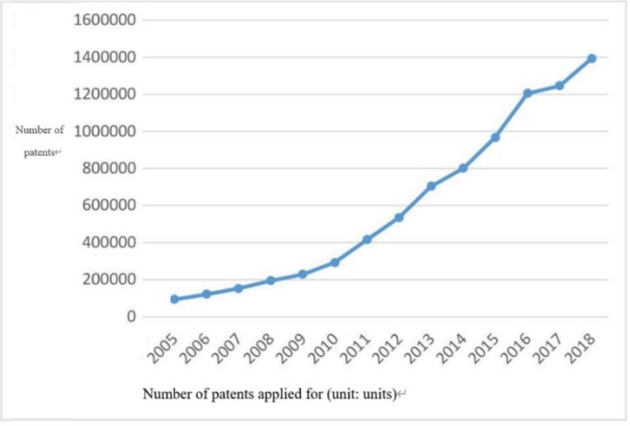

Figure 3: The number of patent applications filed in China from 2000 to 2018
Source: UN COMTRADE database

This explosive growth trend reflects the significant improvement in China's innovation capabilities. China's economy has gradually shifted from a growth model that relies on factor inputs and low-cost labour to a growth model that relies on

scientific and technological innovation, intellectual property rights, and high-value-added industries. This innovation-driven approach to economic growth has enabled China to participate more effectively in global value chains, laying a solid foundation for sustainable economic development. It also shows that China's role in the worldwide economy gradually changes from that of a manufacturing provider to that of a technology and innovation leader.

3.5 Specific characteristics of Chinese enterprise innovation

From the data on enterprise innovation patents in Figure 4, patent-related indicators showed a significant upward trend in the sample year. First, the number of enterprises with patents increased rapidly between 2000 and 2007, from 348 to 1,029, while the number of enterprises with patents at the end of the sample was nearly three times that of the early year of the sample. This shows that more and more companies are beginning to realise the importance of innovation and actively participate in patent application activities. Second, the total number of patents also experienced a significant increase in the sample year, from 2,447 patents in 2000 to 19,789 patents in 2007, an increase of about eight times. This means that the intensity of innovation activities of enterprises as a whole has increased significantly, and the importance of intellectual property rights has increased. At the same time, the average number of patents per enterprise has also increased with the rapid growth of the total number of patents, from an average of 0.6548 patents per enterprise in 2000 to an average of 2.7213 patents per enterprise in 2007. This shows that enterprises' average level of innovation has improved, and the investment and efforts of enterprises in innovation have achieved apparent results. This innovation trend is in line with the expectations of this article.

With the development of trade liberalisation, the rapid growth of China's economy and the gradual improvement of the position of Chinese enterprises in the global value chain, the development concept of enterprises has changed from the initial factor-driven to innovation-driven. Although there is still a problem of "low-end lock-in" as a whole, the number of innovative enterprises with technology content is increasing, and their proportion in the overall innovation activities of enterprises is increasing. The company has gradually evolved from the primary product processing stage, where the concept is to complete the task as much as possible, to the innovation-driven stage, constantly striving for progress. This positive

innovation trend has dramatically increased the innovation output of enterprises and injected new vitality into high-quality development. Therefore, it can be concluded that enterprises' investment in innovation activities is gradually increasing, the cost of innovation is slowly rising, and the weight of innovation is increasing.

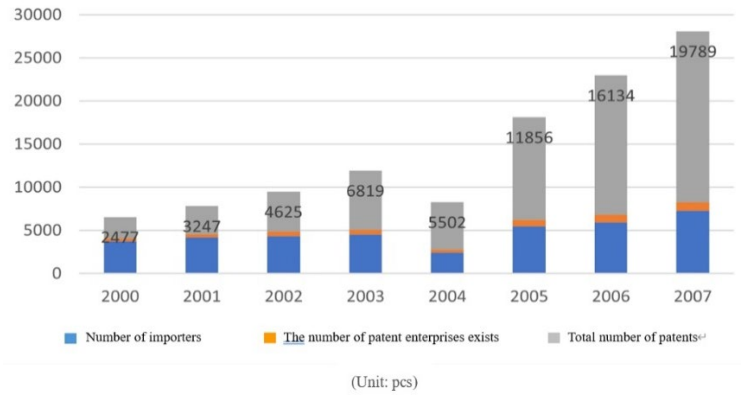

Figure 4 Enterprise innovation patents from 2000 to 2007
Source: UN COMTRADE database

4 Conclusion and recommendation

The import of intermediate goods has many influencing mechanisms on firm innovation, including product diversification, quality improvement and technology spillovers. These mechanisms have had a positive impact on enterprises' innovation activities. Judging from the data on patent filings, Chinese companies have shown explosive growth in innovation, especially after 2000. The number of enterprises, the total number of patents, and the average number of patents per enterprise all show a significant increasing trend, indicating that the input and output of Chinese enterprises in innovation activities have increased significantly.

The total import value of intermediate goods is essential in China's economy, showing a fluctuating growth trend. The international trade environment, the global economic situation, and the adjustment of China's policies have all impacted the import of intermediate goods, especially in the context of China's structural economic transformation in recent years.

Strengthen technology spillover mechanisms, encourage enterprises to acquire advanced technology and knowledge through intermediate product imports, and establish technology spillover mechanisms to transform these technologies into local innovation. Supporting SME innovation and developing policies to support SMEs, reduce innovation costs, promote participation in international innovation cooperation, and improve their position in global value chains. Promote innovation-driven development, further increase investment in innovation, strengthen the construction of R&D infrastructure, formulate incentive policies, and promote the transformation of enterprises from factor-driven to innovation-driven. Optimise the import structure of intermediate goods, according to domestic demand and industrial development, optimise the import structure of intermediate goods, reduce the dependence on low-tech parts and components, and increase the import of high-tech intermediate products.

In turn, the future development direction of China's intermediate goods imports and enterprises should be in-depth research on the innovation mechanism and further in-depth study on the impact of intermediate goods imports on the innovation mechanism of enterprises, including the differences in different industries, enterprise scales and technical levels. Strengthen international innovation cooperation, promote the in-depth cooperation between Chinese enterprises and international enterprises and scientific research institutions, promote the sharing of international innovation resources, and improve China's position in the global innovation network. Promote digital transformation, further study the impact of digital technology on enterprise innovation performance given the relationship between digital transformation and enterprise innovation, and provide scientific guidance for enterprises to improve their digital level. Pay attention to environmental protection and sustainable development, strengthen the consideration of environmental protection and sustainable development factors in the research of intermediate goods import and enterprise innovation, and promote the development of enterprises in the direction of green innovation and sustainable development. These recommendations and future development directions are aimed at further promoting the innovation of Chinese enterprises, improving their position in the global value chain, and promoting sustainable economic development.

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