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(Full Paper)

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ABSTRACT

Supply chain finance (SCF) has the unique advantage of being close to the "Belt and Road" industrial chain. It can meet the investment and financing needs of the "Belt and Road" construction projects, improve the quality and efficiency of the financial services of the "Belt and Road" construction projects, promote the cooperation of the "Belt and Road" industry chain and build a global supply chain production and financing ecology. Comprehensively considering the operating conditions of the "Belt and Road" construction and the impact of digital technology on SCF, the "Belt and Road" SCF model is proposed. In terms of process design and key point layout, an innovative reconstruction of the "Belt and Road" SCF model based on debt asset pledge, movable property pledge and intangible asset pledge is carried out. Further, in view of the problems in the current digital SCF to support SMEs to participate in the construction of the "Belt and Road", such as inadequate comprehensive supply chain financial services, insufficient coordination of digital technologies, and asymmetric information between banks and enterprises, etc. We propose path design of the trinity of "government promotion, market leadership and social co-governance" of the "Belt and Road" SCF.

Keywords: Supply chain finance, digital technology, Belt and Road

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INTRODUCTION

In the past 40 years of reform and opening up, SMEs have experienced from small to large, from weak to strong in China. They have made rapid development under the guidance of national policies and supervision, and become an important driving force for economic growth in China. At present, with the downward pressure of domestic economy and weak economic growth, many SMEs have excess capacity and increased inventory. They need to participate in the global value chain through open cooperation and achieve long-term sustainable development in a broad international market. The "Belt and Road" initiative to implement the "going out" strategy of SMEs is not only an attempt to get rid of the insufficient domestic market demand, but also provides new opportunities for them to make full use of global production factors, optimize resource allocation, better product upgrading and enterprise transformation. However, in the face of the huge pressure of international market competition, the lack of capital has become a major bottleneck for SMEs to "go out" development. The low level of domestic financial risk management and control and weak financial synergy effects are the current outstanding issues of financial support for enterprises participating in the "Belt and Road" initiative. Meanwhile, most of the "Belt and Road" initiatives are developing countries with diverse cultural systems, complex political and economic conditions, and huge infrastructure investment needs. Many countries have difficulty in providing necessary financial services to local-invested Chinese companies.

SCF is a financing mode that uses the energy diffusion effect of advantage resources of the core enterprise in the industrial chain to break through the weak credit of many SMEs in the chain, and it is a financing way tailored for SMEs. After Time and Wiliams-Timme (2000) proposed to pay attention to the financial performance of supply chain management earlier, foreign scholars explored the theory of supply chain finance from the perspectives of applying innovative financial solutions and optimizing supply chain decisions (Wuttke *et al*., 2013; Kouvelis & Zhao, 2012). Supply chain finance is an innovation in the two fields of supply chain and finance. Therefore, the international representative concept of supply chain finance includes two research perspectives: financial orientation and supply chain orientation. The former focuses on the financial attribute and considers that supply chain finance is a financial scheme provided by financial institutions, which aims to speed up the liquidity of funds in the supply chain (Euro Banking Association,2014), increase the availability of funds and reduce the cost of funds (Li *et al*., 2020). The latter emphasizes the collaborative role of supply chain members, extends the boundary of supply chain finance to financial solutions, and also includes supply chain processes and fixed asset financing collaborative solutions (Pfohl & Gomm, 2009). For example, Pfohl and Gomm (2009) define supply chain finance as a process in which two or more organizations including external service providers in the supply chain plan, supervise and control the funds among organizations effectively in order to create value together. The impact of financing channel selection on supply chain performance is one of the key research contents of supply chain finance. Kouvelis and Zhao (2012) studied the capital constrained retailer's preference for financing from banks and suppliers. The results show that in the structurally optimal trade credit contract, the retailer can get a financing interest rate lower than the bank's loan interest rate, and can improve the overall efficiency of the supply chain by increasing the number of orders. Tunca and Zhu (2018) show that buyer intermediary

financing, which transfers the risk from the supplier to the buyer, can significantly improve channel performance and benefit both sides of the supply chain. Domestic scholars based on the financing problems of SMEs, mainly from the perspective of supply chain finance mode innovation (Su & Zhong, 2017), risk governance (Su & Lu, 2015) and economic consequences (Dou & Zhu, 2014).

SCF has developed from the traditional offline SCF stage to the Internet SCF stage in China. With the development of the new generation of information technology, it has begun to enter the digital SCF stage. In recent years, with the advancement of science and technology and the opening of national policies, under the impact of the wave of digital economy, the Internet of Things, blockchain, big data and other technologies continue to develop and apply, and China's SCF has achieved rapid development. Wang (2016) classified the "1+n" mode of supply chain finance dominated by commercial banks, supply chain finance 2.0, and supply chain finance of core enterprises and logistics companies from the perspective of characteristics, sources and evolution paths of supply chain finance participants. The rapid application and development of emerging information and communication technologies, such as artificial intelligence, big data, blockchain, cloud computing, Internet of things, provide a highly innovative development path and means for supply chain operation, and directly lead to the change of management mode in many fields such as supply chain management (Ben-Daya, Hassini, & Bahroun, 2019). Li *et al*. (2020) proposed that the accelerated development of financial technology provides more possibilities and tools for supply chain financial model innovation and risk management. Digital SCF is an in-depth integration of digital technology and industrial ecology and modern finance. It has endowment characteristics such as high-level information sharing, diffuse credit transfer and digital risk control which can realize logistics, information flow, business flow and capital flow. Integration, breaking through the single-loop credit transmission limitations of traditional SCF, realizing the visual management of risks and the efficient operation of capital flows, which can meet the requirements for high-quality financial services for SMEs participating in the construction of the “Belt and Road”. Therefore, SCF must become an important financial model for the construction of the “Belt and Road” with its endowment advantages that closely fit the industry chain. This paper intends to innovate the “Belt and Road” supply chain financial service model based on the analysis of the strategic essentials of developing the “Belt and Road” SCF, and to combine the “Belt and Road” SCF service model with the current digital era. The development dilemma faced by finance is building a “Belt and Road” SCF development path.

THE STRATEGIC ESSENCE OF DEVELOPING “BELT AND ROAD” SCF

Digital SCF is the product of traditional SCF embracing digital technology. As shown in figure 1, due to the application of big data, cloud computing, Internet of Things, blockchain and other technologies, digital SCF presents a complex network structure, and the participants in the platform are infinitely expanded. The operation structure of upstream and downstream node enterprises in supply chain is no longer limited to the traditional chain organization, forming an energy coupling cluster network organization. The supporters of supply chain financial activities, such as government, financial institutions and logistics, also reflect the crisscross interest-related relationship, and expand more service channels through platform space. In the complex network system, the platform of SCF plays the role of a neural hub and grasps the coordination of business flow, capital flow, logistics and information flow (hereinafter referred to as “four flows”) in supply chain operation. It is familiar with the operation key points of supply chain system, and timely provides various supporting services including finance for the fund deficient enterprises in the platform. Therefore, the enterprises focus on the development of core competitiveness, which is conducive to the improvement of the competitive advantage of supply chain.

Financial cooperation is not only an important part of the construction of the “Belt and Road” initiative, but also an important supporting force for advancing the “Belt and Road” initiative. The related investments along the “Belt and Road” have high-risk and high-yield characteristics. How to turn high-risk and high-return investments along the line into international products, promote the interconnection of funds, and achieve substantial results in financial cooperation along the line is an important issue that all sectors of society should pay attention to. With the support of digital technology, SCF will be accompanied by high-level information sharing, breaking through the bottleneck of traditional SCF in terms of service cost, operational efficiency, risk management and control, and time and space leaps. The innovative development of the “Belt and Road” SCF has the following strategic significance:

Meeting project investment and financing needs

The economic entities in the countries and regions along the “Belt and Road” are mainly private SMEs. Financing difficulties limit the participation of SMEs in the construction of the “Belt and Road” and international development. The inherent shortcomings of SMEs and their weak position in market competition have prevented commercial banks from scientifically and comprehensively assessing overseas investment projects of SMEs, and the phenomenon of "prudent lending" is very serious At present, driven by the digital economy and financial technology, SCF is undergoing a transition from traditional credit to digital finance. The digitalized “Belt and Road” SCF of “internationalization + digital technology + industrial ecology + modern finance” is deeply integrated, which can provide high-quality financial support for China's SMEs' export-oriented development. SCF is no longer limited to the assessment of the financial situation and asset status of individual SMEs. It is more an overall credit assessment of SMEs from the perspective of the entire industry chain. Many advantageous resources improve the credit system and risk control system of the entire supply chain, and meet the investment and financing needs of SMEs participating in the construction of the “Belt and Road” through the SCF model such as pledge of debt assets, pledge of real estate, and pledge of intangible assets.

Improving the quality and efficiency of financial services

The infrastructure construction projects in countries along the "Belt and Road" have large capital requirements and long construction cycles, which will generate a large amount of accounts receivable and prepaid accounts, resulting in a decrease in the cash turnover rate and the efficiency of the use of funds throughout the supply chain. However, under the influence of the penetration of a new generation of technology, SCF can comprehensively apply the deep mining functions of big data and cloud computing, the intelligent library management and remote positioning functions of the Internet of Things, the encryption and traceability functions of the blockchain, and the automatic risk control and credit functions of artificial intelligence have realized precise services for participating enterprises in the "Belt and Road" initiative, and revitalized accounts receivable and prepaid accounts of SMEs, intangible assets such as and intellectual property rights of science and technology SMEs. In terms of financing time, financing speed and service accuracy, the quality and efficiency of financial services are comprehensively improved to ensure the coordination of production and operation of SMEs and financial services. Under the service of digital SCF, SMEs can quickly obtain financial services at an affordable price, gain business opportunities at a faster rate in the construction of the "Belt and Road", and seize the international market.

Promoting cooperation in the "Belt and Road" industrial chain

China and the countries along the route have established overseas economic and trade cooperation zones, among the first 19 overseas economic and trade cooperation zones in the country. Four companies including Wuxi Hongdou Group, Guangming Group, Yiduo Investment Development Group and Huatai Investment Real Estate Investment Co., Ltd. have invested in Cambodia's Westport Special Zone, which has developed into a model project of the National Overseas Economic and Trade Cooperation Park. The Eastern Industrial Park of Ethiopia, jointly invested by Zhangjiagang City Yonggang Group and Qiyuan Group, is an important vanguard of Jiangsu's layout in Africa. Some countries or regions along the "Belt and Road" have advantages in energy and labor, and are highly complementary to the industrial structure of SMEs inside China. SCF uses its advantages of being close to the industry chain and uses financial service management to bring SMEs closer Industrial chain relationship with countries along the route. In particular, under the integration of digital technologies such as the Internet of Things, big data, and blockchain, the participants in the SCF platform have been infinitely expanded, and more upstream and downstream node companies in the supply chain of countries along the route have participated in the construction of the "Belt and Road", sharing information such as capital flow, logistics, business flow and information flow in the supply chain operation will greatly promote the economic exchanges and close cooperation between SMEs inside China and enterprises in countries along the route.

Building a global supply chain production and financing ecology

While participating in the construction of the "Belt and Road", SMEs apply SCF to the real economy, at the same time prevent and control financial risks, promote the overall supply chain to go out, and promote the development of domestic and foreign industries, achieve cooperation between domestic and foreign enterprises and build a global supply chain production and financing ecology on the basis of promoting the upgrading of the real economy. With supply chain innovation and application under digital technology, SCF will accelerate industrial integration, promote SMEs and industries along the "Belt and Road" to actively participate in the global division of labor and cooperation, and provide services for the "Belt and Road" smooth trade, facilities connectivity, and financial finance to create conditions for the smooth service of the "Belt and Road" trade, connectivity of facilities, and financing. As the "Belt and Road" initiative develops in depth, digital SCF will continue to dig deeper into the industry, use various digital technologies to obtain information, prevent financial risks, provide credit services for enterprises, and ease the financing difficulties for SMEs participating in the construction of the "Belt and Road" to promote the organic integration of global industrial innovation and financial innovation.

MODEL INNOVATION THE "BELT AND ROAD" SCF UNDER THE BACKGROUND OF DIGITAL TECHNOLOGY

The model innovative of the "Belt and Road" SCF can better provide project investment and financing services for participating enterprises in the construction of the Belt and Road in China, promote global industry chain cooperation, and build a global supply chain production and financing ecology. In this section, considering the convergence of digital technologies such as the Internet of Things, blockchain, big data and cloud computing, we will innovate and reconstruct the "Belt and Road" SCF model based on debt pledge, movable property pledge and intangible asset pledge from process design and key control points to promote digital SCF services to SMEs participating in the Belt and Road Initiative.

The "Belt and Road" SCF Model Based on Credit Pledge

The "Belt and Road" SCF based on the pledge of credit is a financial service for SMEs participating in the construction of the "Belt and Road" to apply for loans from the SCF platform using the debt assets such as accounts receivable or prepaid accounts as collateral. mode. Its operation design is shown in Figure 1.

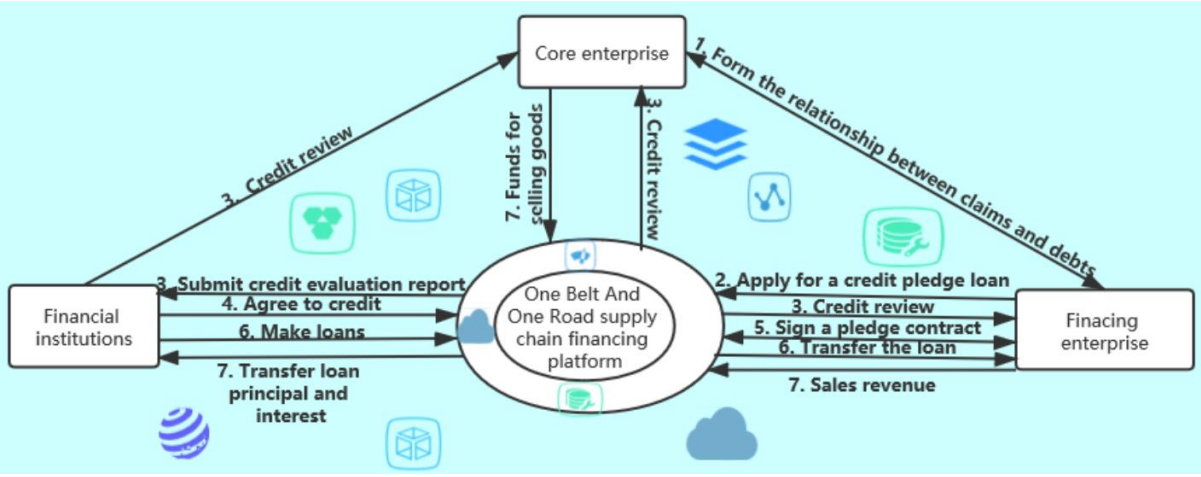

Figure 1: Process of the “Belt and Road” SCF mode based on credit pledge

The main process is as follows:
① SMEs participating in the construction of the “Belt and Road” act as financiers to form debt and debt relationships with core enterprises;
② Financing companies apply for loans from the platform by virtue of pledge of creditor's rights;
③ Based on digital technologies such as big data and blockchain, the platform inspects business transactions and operating conditions between financing companies and core companies, evaluates the solvency and credit rating of financing companies, generates credit evaluation reports, and submits them to financial institutions ;
④ Financial institutions combined with the online credit report of financing companies provided by the platform and related credit records from logistics or other departments for comprehensive evaluation, and combined with the Internet of Things, blockchain, cloud computing and other technologies to confirm the creditor's rights and estimate the value of them and make credit decisions accordingly;
⑤ Based on the credit decision-making report made by the financial institution, the platform signs the credit pledge loan contract with the financing enterprise and feeds back it to the financial institution;
⑥ According to the pledge loan contract, the financial institution transfers the funds to the platform capital settlement center and transfers it to the financing enterprise.
⑦ Supply chain enterprises allocate the sales revenue as a source of repayment to the platform payment settlement center to repay the principal and interest to financial institutions.

The key to the effective operation of the “Belt and Road” SCF model based on the pledge of credit rights lies in three points. One is the authenticity of the credit and debt relationship between the upstream and downstream enterprises in the supply chain participating in the construction of the “Belt and Road”; the second is the quality of the pledged debt assets themselves; the third is the self-repayment of the future sales revenue of supply chain enterprises. "Belt and Road" SCF must achieve the risk control of the above three key points with the support of digital technology. First of all, big data technology can capture every transaction scenario of upstream and downstream enterprises in the supply chain, ensuring the authenticity of the relationship between claims and debts based on real trade activities between enterprises, and the distributed bookkeeping technology of the blockchain can also guarantee the claims authenticity, and the receivable claims or prepaid confirmed equity can be split and circulated among platform companies, which will not only expand the credit enhancement of platform companies, but also provide more guarantee for the authenticity of debt assets. Secondly, the quality of the debt assets mainly depends on the debtor’s operating status and credit level. Under the synergy of big data and cloud computing technologies, the platform can quickly obtain the debtor’s transaction status from the huge database, and draw the image of the debtor, clarify the overall status of the debtor through various association and coupling relationships, quickly evaluate the value of the debt asset, and provide information for the financial institution to make credit lines and interest rate levels. Finally, the use of intelligent contracts to complete online automatic approval and allocation of funds, and based on the system closed self-compensation system to achieve supply chain enterprises sales revenue back to financial institutions.

The “Belt and Road” SCF Model Based on Pledge of Movable Property
In the “Belt and Road” SCF operation based on movable property pledge, financing companies apply physical current assets, such as raw materials, inventory commodities, etc., as pledges to financial institutions to apply for loans. Based on the results of the platform's use of various digital technologies to implement dynamic monitoring and value estimation of the movable property pledges owned by the enterprise, financial institutions make credit decisions. Financing companies use the inflow of funds from future sales as a source of repayment. Its operation design is shown in Figure 2.

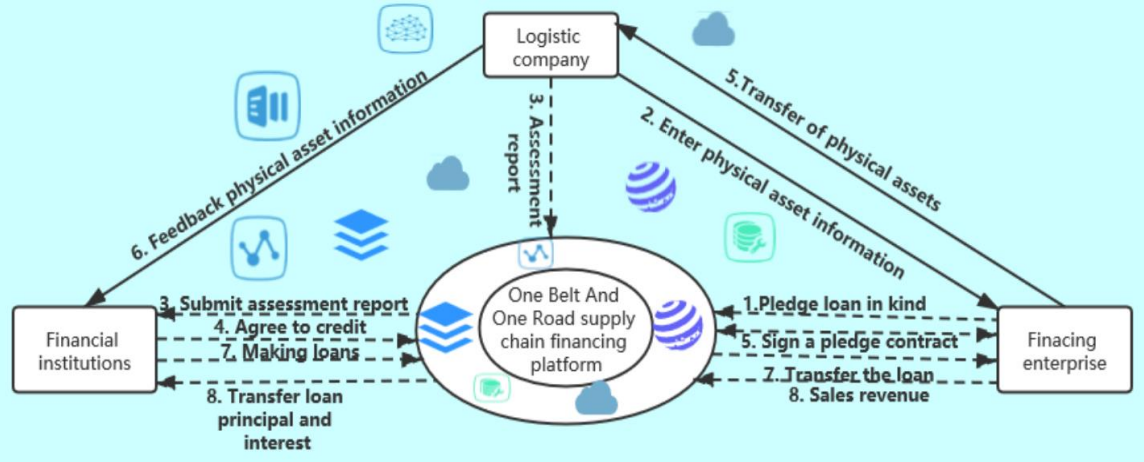

Figure 2: Process of the "Belt and Road" SCF mode based on physical charge

The main process is as follows:
① Financing enterprises participating in the construction of the "Belt and Road" submit financing applications to the platform by virtue of their own movable property;
② With the help of big data, Internet of Things and other technologies, the platform will record the movable property information used by the financing companies to pledge into the supply chain financial system through the standardized interface between the platform and third-party logistics companies;
③ The platform uses a variety of digital technologies such as the Internet of Things and cloud computing to accurately locate the quantity and quality of physical assets such as raw materials and inventory commodities, and makes real-time value evaluation of movable property according to market dynamics, and provides evaluation certificates to financial institutions;
④ The financial institution makes a comprehensive evaluation of the credit status of the financing enterprise in combination with the information feedback of other credit reference systems, and makes credit decision accordingly;
⑤ The platform signs a movable property pledge loan contract with a financing enterprise, and feeds back it to the financial institution;
⑥ The third-party logistics checks and accepts the movable property pledge, and applies the Internet of Things, cloud computing and other technologies to perform dynamic monitoring and real-time evaluation of the movable property status throughout the process, providing real-time data for financial institutions to lend;
⑦ The financial institution allocates funds to the financing enterprise through the platform payment settlement center based on the comprehensive information provided by the platform and the movable property pledge loan contract.
⑧ The financing enterprise allocates the inventory sales revenue as the source of repayment to the platform payment settlement center, and repays the principal and interest to the financial institution.

Based on the "Belt and Road" SCF model of movable property pledge, the key controls to be done include the monitoring and value evaluation of movable property, the effectiveness of movable property pledges and the repayment of future sales revenue. Under the influence of digital technology, "Belt and Road" SCF can realize visual management from the aspects of warehousing and logistics, and improve the flexibility of SCF intelligent services. The Internet of things is conducive to access to the underlying business information, broaden the information collection channels, and can be used for inventory pledge financing mode (Wang, Yu, & Wang, 2019). With the support of the huge Internet of Things system, the "Belt and Road" SCF platform can visually manage the real estate pledges of financing companies in real time and accurately through real-time warehousing management. The platform can quickly make value assessments based on market demand, which can convert offline objects into online data, to solve the problem of difficult and expensive evaluation of the value of cross-regional and cross-border movable property pledges for Chinese SMEs and companies from other countries along the Belt and Road. Meanwhile, based on the real transaction information, the platform can use the formed big data, Internet of Things and other technologies to confirm the ownership of movable property, and through the Internet of Things video monitoring and frequency radio technology to complete the alarm and 24-hour monitoring of the inventory location transfer, lack of quantity and quality damage to ensure the effectiveness of the movable property pledge. Finally, through the intelligent collection system, to ensure that the financing enterprise's movable property sales income will automatically repay debts and complete the recovery of funds.

The "Belt and Road" SCF Model Based on Pledge of Intangible Assets

The core concept of the operation of the digital SCF model based on the intangible asset pledge is that the financing enterprise relies on the pledge of the future income rights of the intangible assets from the transferee company to obtain loans from financial institutions. This model is mainly suitable for innovative SMEs participating in the construction of the "Belt and Road". Such enterprises have a large number of intangible assets such as patents and proprietary technologies. They have the characteristics of "light capital and heavy technology". The operation of the model requires the platform to set up a certain

introduction mechanism, introducing government departments such as intellectual property trading centers and intangible asset evaluation institutions. Its operation design is shown in Figure 3.

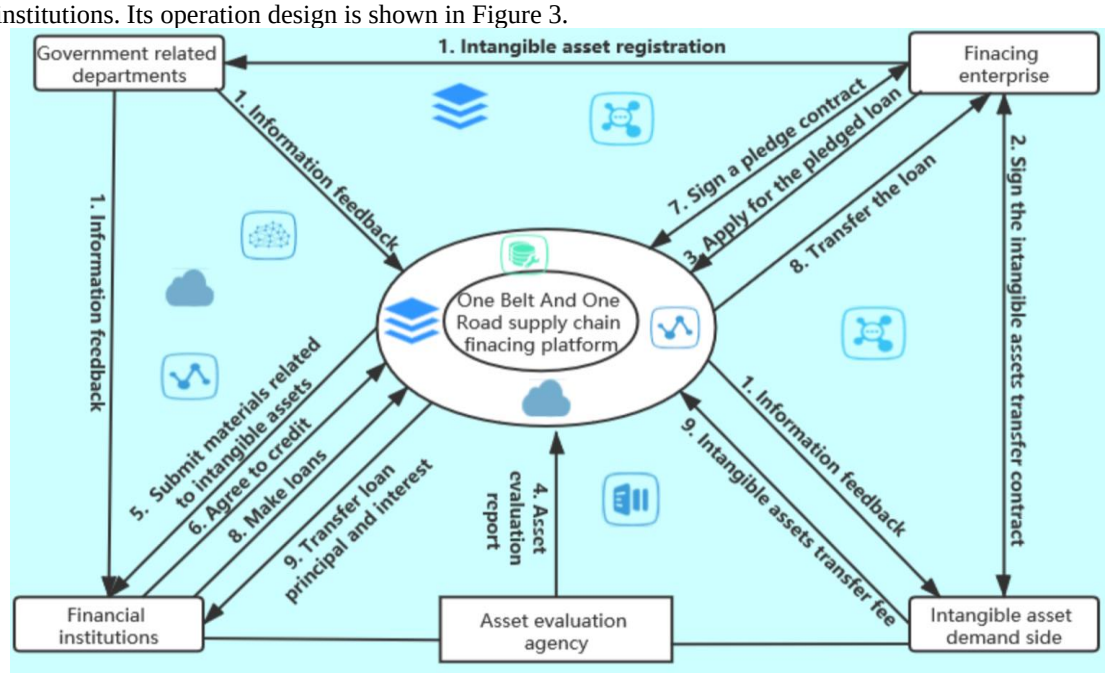

Figure 3: Process of the "Belt and Road" SCF mode based on intangible asset pledge

The main process is as follows:

① The financing enterprise registers the intangible assets to be transferred for use right in the intellectual property trading center, which releases information through the "Belt and Road" supply chain financial platform and feeds it back to the technology demand side;

② The technology demander and the financing company agree on the rights and obligations of both parties and the transfer fee for the right to use, and sign an intangible asset transfer contract;

③ The financing enterprise makes a financing application to the platform by virtue of the future income right formed by the transfer of intangible assets;

④ The platform entrusts an asset evaluation institution with corresponding qualifications to conduct a comprehensive evaluation of the intangible assets' ownership, application prospects, future income and other related matters, and obtain an asset evaluation report;

⑤ The platform submits the documents related to the transfer of intangible assets, including the transfer contract of the two parties of the intangible asset transaction, the value assessment report of the intangible asset income right, etc., to the financial institution;

⑥ Based on the evaluation results submitted by the platform and the contract signed by both parties of technology supply and demand, the financial institution will conduct a comprehensive evaluation of the credit status of the financing enterprise and make a credit decision based on the transaction information obtained by the platform's big data;

⑦ Based on the credit decision report sent by the financial institution, the platform signs an intangible asset pledge loan contract with the financing enterprise and feeds it back to the financial institution.

⑧ Financial institutions allocate loans to financing enterprises through the platform payment settlement center according to the intangible asset pledge loan contract;

⑨ The technology demander will repay the financing enterprise loan to the financial institution through the platform settlement center according to the amount agreed in the contract.

This mode combines intangible asset pledge loans and SCF organically, using SCF's intangible asset use rights to transfer income and self-paying repayment to solve the problem of insufficient guarantee of intangible asset pledge loans and reduce the risk of financial institution loans. During the operation of the model, the key control points for financial institutions to make credit decisions include the pledge of future income rights of intangible assets and repayment of transfer fees for use rights of intangible assets. First of all, with the support of the "Belt and Road" SCF platform, the intangible asset appraisal agency based on the big data deposited by the platform to realize the confirmation of intangible assets and ensure that the ownership of intangible assets is not disputed. Secondly, the newly-increased profit created by the transferee using the intangible assets transferred by the financing party is an important source for the financing enterprise to charge the intangible asset usage fee, and also an important guarantee for the financial institution to obtain the return of funds. This requires the intangible asset appraisal agency to be able to use a variety of digital technologies to integrate and scientifically and reasonably assess the recipient's operating conditions and the future benefits and risks of using the intangible assets, accurately estimate the transfer value of the intangible asset use rights, and make credit lines and interest rate decisions for financial institutions to provide a reliable basis. Finally, the self-compensation fund return system of the SCF ensures that the transferee will repay the bank the intangible asset transfer fee that the financing enterprise should charge through the platform settlement center.

THE DILEMMA FACING THE "BELT AND ROAD" SCF UNDER THE BACKGROUND OF DIGITAL TECHNOLOGY

At this stage, the development of China's "Belt and Road" SCF has just started, the application of digital technology is not yet mature, and the infrastructure construction is insufficient. In practice, it is also faced with many restrictions in law, supervision and products, which restricts the quality and efficiency of the SCF to the enterprises participating in the "Belt and Road" initiative.

Insufficient comprehensive management services

During the construction of the "Belt and Road", developing countries along the Belt and Road are the majority, and there are differences in trade policies, resulting in poor circulation of goods and investment channels in cooperation between SMEs and enterprises along the Belt and Road. Commercial banks have long been engaged in financial work and have advantages in financial services and risk management. However, they have shortcomings in controlling supply chain business links, developing supply chain customer groups, and information technology applications; The core enterprises in the supply chain have natural advantages and conditions in controlling the supply chain business processes, and their disadvantages are financial resources and risk control management. During the construction of the "Belt and Road", SMEs lacked the support of a powerful information service platform integrating finance, logistics, credit and other services, which affected the collection and risk assessment of investment and financing information of countries along the "Belt and Road". In turn, it affects the investment and financing decisions of SMEs participating in the "Belt and Road" construction. If the superior resources in the SCF ecology can be gathered into the SCF platform through alliances and integrated with the support of digital technology to promote the comprehensive management capabilities of the SCF. As a result, the quality and efficiency of "Belt and Road" supply chain financial services will be improved to a greater extent.

Insufficient collaborative application of digital technology

With the rapid development of digital economy and the proposition of the "new infrastructure" strategy in China, SCF is inseparable from the integration and support of digital technologies such as the Internet of Things, blockchain, big data, and cloud computing. In recent years, with the development of big data technology and the promotion of modern logistics, e-commerce and other industries, business volume of the domestic SCF has increased rapidly year by year. However, the new generation of technologies such as blockchain, artificial intelligence, cloud computing, and the Internet of Things have high application difficulty factors, especially the integration of multiple technologies is more difficult. At present, the participants in the construction of the "Belt and Road" are still unable to fully apply various emerging technologies to all modules of the SCF platform. At the same time, the application costs of emerging technologies are high, requiring high labor costs and infrastructure construction costs. The participants in the "Belt and Road" SCF are also unable to bear the technical costs required for the full development of SCF. Core modular service, good interface and highly complementary resources are three important components of digital platform (Spannoletti, Resca, & Lee, 2015). However, many countries and regions are involved along the "Belt and Road", and the level of financial technology and information technology in various countries or regions varies. There are deviations in the technical application standards of different participants, the data exchange standards are not uniform, and the interface standards between various service ports vary greatly. These will also affect the service quality and effectiveness of the "Belt and Road" SCF.

Asymmetric information between banks and enterprises increasing risks

At present, during the construction of the "Belt and Road", many core enterprises in energy, infrastructure, manufacturing and other key industries have established cooperative relations with commercial banks, but different countries or cross-border regions have increased Information asymmetry between commercial banks and downstream enterprises of the supply chain in key industries. As a result, it is impossible to accurately grasp the financial status, operation management and other information of domestic SMEs and foreign supply chain upstream and downstream enterprises cooperating along the Belt and Road. This will also lead to the inability to effectively interconnect information flow, capital flow and logistics, increase the credit risk faced by financing, and limit the application scope of digital SCF in the construction of the "Belt and Road". SMEs and core enterprises along the "Belt and Road" initiative usually cooperate. These will make it more difficult for the domestic SCF business model to be more mature to be promoted and applied in the construction of the "Belt and Road".

Insufficient infrastructure investment

SCF to support the construction of the "Belt and Road" will inevitably require the deployment of financial institution outlets in the countries along the route. However, factors such as policies, market conditions and enterprise levels in different countries and regions have limited the speed of the overseas outlets of Chinese banks. At the same time, there is insufficient investment in financial infrastructure such as the offshore RMB market and payment settlement system along the "Belt and Road". Multinational companies face barriers to overseas capital operation and foreign investment exchange, foreign banks participating in the domestic inter-bank bond market, as well as overseas development of Chinese-funded enterprises. These problems have restricted the opportunities for domestic banks to "go global" and the quality of service provided by the SCF to the construction of the "Belt and Road". Driven by the digital economy, new generation of informatization technology has developed rapidly in China. Industries such as e-commerce and modern logistics are in a leading position in countries around the world. Convenient mobile Internet has also provided a solid technology and scenario foundation for the development of industrial chain finance. However, these infrastructures that support the development of SCF have lagged behind in the

developing countries along the “Belt and Road”, which has affected the scope of SCF's overseas promotion and the space for further upgrades.

PATH OF INNOVATION DEVELOPMENT OF “BELT AND ROAD” SCF UNDER THE BACKGROUND OF DIGITAL TECHNOLOGY

At present, digital SCF is in its infancy in China, and there are still many problems in supporting SMEs to participate in the construction of the “Belt and Road” initiative. To promote the high-quality services of digital SCF for SMEs participating in the construction of the “Belt and Road”, in view of the current difficulties in the application of digital SCF, we propose to formulate reasonable strategies from three aspects: top-level government design, market-leading level and social co-governance in this section.

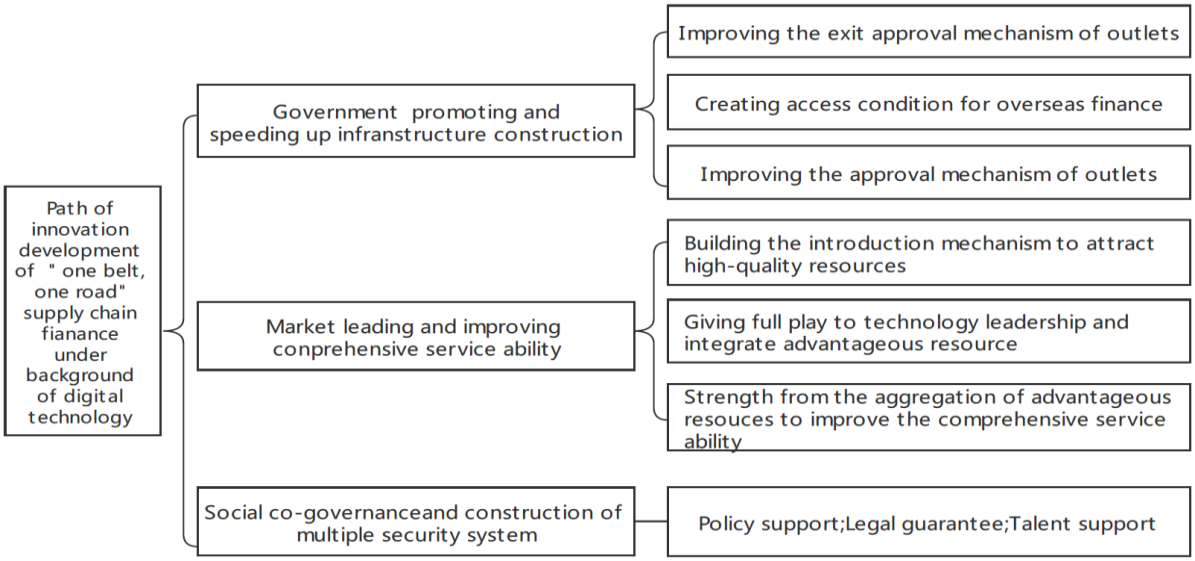

Figure 4: The path of innovation development of the “Belt and Road” SCF

The government promoting and speeding up the infrastructure construction

In order to realize the high-quality services provided by SCF to enterprises participating in the “Belt and Road” construction, the government should increase investment and accelerate the infrastructure construction of SCF. First, improving the exit approval mechanism of outlets. Regulators should build an approval mechanism for establishing overseas branches of commercial banks, securities institutions, insurance companies, etc. In accordance with the internal requirements and external environment of the “Belt and Road” SCF operation, a financial exit approval system suitable for the “Belt and Road” development strategy was formulated to guide and regulate the establishment of domestic financial institutions in countries and regions along the “Belt and Road”. Second, create access conditions for overseas finance. It is necessary to strengthen communication with the governments and regulatory authorities of countries along the “Belt and Road”, create a friendly financial “access” environment, and promote the distribution of outlets along the “Belt and Road” by various domestic financial institutions. It is necessary to encourage domestic banks to cooperate with overseas banks to develop local currency accounts, currency exchange points, and mutual agency banks to create various conditions for the development of “Belt and Road” SCF services. Third, give full play to the synergy effect of SCF service ports. It is necessary to integrate and apply a variety of digital technologies between overseas domestic banks, build a high-level information sharing platform, and form synergies in various service ports such as investment project selection, corporate credit enhancement, and financial risk control to jointly promote the "Belt and Road" Innovative development of SCF.

Market leading and improving comprehensive service ability

The development of the “Belt and Road” requires more intelligent, accurate and low-risk financial services. To meet the needs and goals of market development, a strong supply chain financial information platform should be built with the support of digital technology to achieve the promotion of comprehensive supply chain financial service capabilities. First, build an introduction mechanism to attract quality resources. Under the market leadership, a reasonable access mechanism is set up to gather institutions with superior resources in the area of customer acquisition, capital, credit and risk control into the supply chain financial platform to enrich high-quality port resources to improve the comprehensive service capacity of the SCF. Second, give full play to technological leadership and integrate superior resources. Under the synergy of digital technology, improve the cross-border integration of high-quality resources with financial, insurance, logistics and other institutions, and improve the corresponding supporting facilities, promote the comprehensive efficiency of the advantageous resources in various fields and the in-depth development of cross-border integration as well. Thirdly, aggregate the advantageous resources to improve the comprehensive service capabilities. Through digital technology to integrate various industries, various system departments, and various enterprise channels, and promote high-quality participation of all parties in the supply chain for in-depth and extensive cooperation. Use ICT technology to empower the supply chain, build a diversified service architecture, integrate internal services with external company service function modules, achieve high compatibility, high integration

configuration, high availability, enhance the credit of SMEs. Reduce the risk of financial loans, give full play to the scale benefits of SCF, and provide high-quality financial services to more small, medium and micro enterprises participating in the construction of the "Belt and Road" initiative.

Social governance to build multiple guarantee systems

The "Belt and Road" SCF needs to build a guarantee system from various aspects such as policies, resources, and regulatory guarantees, and promote the quality and efficiency of the "Belt and Road" SCF through social co-governance. First, policy support. Policy support is one of the major engines for the innovative development of supply chain financial models(Dou, & Zheng, 2019). In recent years, the Ministry of Industry and Information Technology, the China Banking and Insurance Regulatory Commission, the Central Bank, and the National Development and Reform Commission have issued more than 10 guidance policies about SCF. Local governments at all levels have responded actively, issued incentive policies, and provided target guidance. These have become the driving forces for the development of SCF. Second, legal protection. The "Belt and Road" SCF is still in the initial development stage, and there is a large room for adjustment in the formulation of relevant laws and regulations. The cross-border participants of SCF put forward higher requirements on the coverage of laws and regulations. Therefore, it is necessary to improve the laws and regulations system from the top-level design, and to continue to follow up the laws and regulations by the relevant departments; not only to improve and standardize the third-party depository system of funds, to control financial risks, but also to improve the collateral monitoring regulations, to control the risk of collateral. At the same time, the government and industry regulators need to introduce sound business management methods to ensure the legitimacy of the platform's service providers. In the context of digitization, we must also pay attention to improving data privacy protection, and make more detailed and reasonable requirements on the legality and compliance regulations of data use, protect the privacy of all parties and the legality of electronic contracts, and provide a good legal environment for development of the "Belt and Road" SCF. Third, talent support. The innovation and development of "Belt and Road" SCF is inseparable from the support of professionals. Therefore, focusing on training compound talents who are also proficient in international business, information technology, supply chain management and finance is an urgent problem that needs to be solved.

CONCLUSION AND INSPIRATION

We first analyze the strategic significance of development of the "Belt and Road" SCF. Then, considering the impact of digital technology, the model of the "Belt and Road" SCF based on credit pledges, movable property pledges and intangible asset pledges has been innovatively reconstructed from the perspective of process design and key control points. Further, we discuss the development dilemma faced by the "Belt and Road" SCF under the current digital technology background, and design innovation development path of the "Belt and Road" SCF from the perspectives of top-level government design, market-led level and social co-governance. We propose the development of the "Belt and Road" SCF can meet the investment and financing needs of "Belt and Road" construction projects, can improve the quality and efficiency of "Belt and Road" construction projects, and can promote the cooperation of the "Belt and Road" industry chain and the establishment of a global Supply chain production and financing ecology. We think the key control points for the effective operation of the "Belt and Road" SCF model based on the pledge of claims include: the authenticity of the debt and debt relationship between upstream and downstream enterprises in the supply chain participating in the construction of the "Belt and Road", and the quality of the pledged debt assets themselves and self-repayment of supply chain companies' future sales revenue. The operation of the "Belt and Road" SCF model based on movable property pledge should be paid attention to the three aspects of controlling the movable property monitoring and value evaluation, the effectiveness of movable property pledges and the repayment of future sales revenue. The operation of the "Belt and Road" SCF model based on the intangible asset pledge must strengthen the control of the intangible asset's future income right pledge and intangible asset use right transfer fee repayment. At present, the development of the "Belt and Road" SCF may face the problems of insufficient comprehensive service capabilities, insufficient application of digital technology, asymmetry of bank and enterprise information, and insufficient infrastructure investment. We propose realization path of the "Belt and Road" SCF of the trinity of "government promotion, market leadership, and social co-governance" in this paper.

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