To Explore the Application of Computer Technology in Reservoir Completion Development from the Perspective of Dynamic Analysis

Lijuan Pan\textsuperscript{1,2}, Jiaxue Li\textsuperscript{3,*}, Wu Long\textsuperscript{1,2}, Jie Sun\textsuperscript{3} and Jie Su\textsuperscript{3}

\textsuperscript{1}SINOPEC Northwest Company of China Petroleum and Chemical Corporation, Xinjiang, China
\textsuperscript{2}Key Laboratory of Enhanced Oil Recovery in Carbonate Fractured-vuggy Reservoirs, CNPC, China
\textsuperscript{3}China university of petroleum (Beijing) @ Karamay, Xinjiang, China

*Corresponding author e-mail: 2019592146@cupk.edu.cn

Abstract. In recent years, reservoir cooperation and exchange between countries and regions with a Shared economy based on dynamic analysis has made some progress, but on the whole, there are still some problems in reservoir completion opening up. China should actively integrate into the construction of sharing economy, seek reservoir cooperation in a wider range, further optimize reservoir completion trade structure, innovate reservoir investment pattern, expand reservoir technology exchange space, increase policy support, and strive to build a new pattern of reservoir completion opening to the outside world.

Keywords: Sharing Economy, Reservoir Resources, Opening, "Go Out"

1. Introduction
In March 2015, the National Development and Reform Commission, the Ministry of Foreign Affairs and the Ministry of Commerce jointly issued the Vision and Actions for Jointly Building the Silk Road Economic Belt and the 21st Century Maritime Silk Road, proposing to "expand the field of mutual investment and carry out in-depth cooperation in fields such as agriculture, forestry, animal husbandry and fishery, agricultural machinery and well completion production and processing in oil reservoirs"\textsuperscript{[1-3]}. The first central document of 2018 stressed the need to "build a new pattern of reservoir opening" and "deepen reservoir completion trade relations with countries and regions along the One Belt And One Road"\textsuperscript{[4-6]}. Under the sharing economy initiative, China's active participation in international reservoir cooperation is an inevitable choice for improving reservoir completion competitiveness and opening to the outside world, as well as an urgent need for promoting reservoir completion supply-side structural reform and implementing the rural revitalization strategy, which is conducive to further accelerating the construction of strong modern reservoir province in China.

2. Development process of integrating reservoir completion resources into the construction of sharing economy

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.

Published under licence by IOP Publishing Ltd.
2.1. Reservoir completion exports continue to grow rapidly.

The continuous improvement of the gathering and drainage capacity of The China-Europe freight train (Zhengzhou) has brought great development opportunities for reservoir completion export in China. China will accelerate the upgrading of reservoir technical standards, further optimize reservoir structure and increase the added value of reservoir completion. China and sharing economy, countries and regions along the reservoir completion closer cooperation in the trade, export reservoir completion optimize structure, high value-added, high benefit reservoir completion are entering the international market, reservoir completion export base development regionalization, clustering, standardized step by step, are shown in Table 1 below is the our country reservoir completion information on export countries in the world:

| Country   | 2017  | 2018  | 2019  | 2020  |
|-----------|-------|-------|-------|-------|
| China     | 14.92 | 14.92 | 14.92 | 14.92 |
| India     | 1.29  | 1.29  | 1.29  | 1.29  |
| EU28      | 1.29  | 1.29  | 1.29  | 1.29  |
| USA       | 1.29  | 1.29  | 1.29  | 1.29  |

Table 1. Summary of the current situation of reservoir completion exports under the sharing economy.

As shown in Figure 1, according to customs statistics, reservoir completion exports in 2017 reached 14.92 billion yuan, up 16% year on year. In the first two months of 2018, reservoir completion exports of the province reached 2.31 billion yuan, up 65.2% year on year, including 1.29 billion yuan for reservoir completion exports to countries along the sharing economy, up 1.4-fold, accounting for 12.4% of the total value of China’s exports to countries and regions along the sharing economy in the first two months.

2.2. The pace of reservoir production capacity cooperation is accelerated.

In recent years, China has encouraged leading oil reservoir enterprises to purchase and lease land overseas to set up farms, develop oil reservoir planting, build oil reservoir completion processing and marketing bases, and carry out overseas oil reservoir completion processing trade. With the support of a series of policies, the "going global" pace of reservoir completion has been significantly accelerated, and key reservoir cooperation projects such as Yu-Wu (Ukraine) have been carried forward in an orderly manner, which has played a good demonstration effect. For example, the Asian Star Oil Reservoir Industrial Cooperation zone invested and developed by Guyou Group of China in Kyrgyzstan has been recognized as a state-level foreign economic and trade cooperation zone by the Ministry of Commerce and the Ministry of Finance of China. China Jingyan Yinhai Seed Industry Co., Ltd. has obtained the right to use 609 hectares of state-owned land in Tajik Hardlund prefecture for 49 years, and has undertaken the international reservoir exchange and cooperation project of China.
reservoir Department for many consecutive years. In 2016, China has more than 50 enterprises engaged in reservoir planting, breeding and deep processing in central Asia, Southeast Asia, Europe and other countries and regions, accounting for 10% of the province's "going global" enterprises, with a total investment of US $7.36 billion, an overseas land area of 1.8 million mu, and an annual operating income of US $13.6 billion.

3. Problems in integrating reservoir completion cultural heritage into the construction of sharing economy

3.1. Reservoir completion export earning capacity is insufficient.
Most of China's reservoir completion exports are primary reservoir completion, and the ability to earn foreign exchange is low. The proportion of high technology content and deep processing reservoir completion export needs to be increased, and there is still much room for improvement in the type, structure and scale of reservoir completion trade. At present, China's reservoir completion exports are mainly concentrated in Asia and North America, and most of the developing countries along the sharing economy have not signed reservoir completion trade agreements, so reservoir completion trade is not very active. Figure 2 below shows the distribution map of reservoir resources exported by China to other countries under the sharing economy:

![Figure 2. Trend chart of China's export to the world under the sharing economy.](image)

Compared with other domestic provinces, China's reservoir completion export trade gap is large. According to the Monthly Statistical Report on Reservoir Completion Import and Export of The Ministry of Commerce of China, from January to November 2017, the reservoir completion export earnings of Shandong, Guangdong, Fujian, Zhejiang, Liaoning and Yunnan provinces were 7.96, 4.38, 4.18, 2.40, 2.28 and 2.04 times of those of China, respectively. Reservoir completion cost is high and efficiency is low, especially reservoir completion quality needs to be improved.

3.2. The pace of reservoir "going global" needs to be accelerated.
China's "going global" reservoir enterprises are mainly small and medium-sized enterprises, most of which have small investment scale, low level and weak investment capacity. Although reservoir completion overseas investment and production capacity cooperation is gradually expanding from seed breeding industry to reservoir completion processing, storage, logistics and other fields, most of the investment projects are still mainly concentrated in the lower end of the industrial chain with low
added value, insufficient investment in reservoir completion processing, and weak reservoir storage, logistics and trade control ability. The "going out" of reservoir completion is mostly independent, and the cluster effect of industrial supporting, division of labor and cooperation has not yet formed. It is difficult to establish a global reservoir completion supply chain that combines reservoir investment and trade strategically due to the lack of transnational operation and management talents and the lack of a comprehensive understanding of the relevant situation in the investing country. The provincial reservoir production capacity cooperation risk prevention and control system has not yet been established, so it is unable to timely issue risk early warning and take effective countermeasures.

4. Countermeasures to integrate reservoir completion resource development into sharing economy construction

4.1. Further optimize reservoir completion trade structure by combining scale expansion and quality improvement.

Reservoir completion trade is the most direct manifestation of international reservoir cooperation, and reservoir resource potential and unique advantages are the basis of reservoir completion trade. Reservoir completion is highly complementary to reservoir development in countries and regions along the sharing economy. Reservoir completion has good natural conditions, many kinds of crops and abundant reservoir completion. Generally speaking, the higher the degree of similarity, the higher the competition level of a product between the two products. Its formula is expressed as:

\[ S_{ij,k} = \sum \left[ \left( x_{ik}/x_{ik} \right) \times \left( X_{ik}/X_{ik} \right) \right] \times \left( 1 - \frac{x_{ik}/x_{ik} - x_{ik}/x_{ik}}{x_{ik}/x_{ik} + x_{ik}/x_{ik}} \right) \times 100 \]  

(1)

Where denotes the product similarity index \( i \) and \( j \) of the export of \( i \) product and product \( j \) to market \( k \), indicating any two products to be compared, \( k \) represents the third market or international market, and \( X \) represents the export. \( X_{ik} \) represents the share of the first product exported by the product \( i \) to the \( k \) market. \( X_{ik} \) represents the share of the first product in the products exported by the \( j \) product to the \( k \) market. \( X_{ik} \) and \( X_{ik} \) are the export quantities of the \( i \) product and \( j \) product to the \( k \) market.

In some countries and regions along the sharing economy, the varieties and quantities of crops are relatively small, and the production of well completion in labor-intensive and technology-intensive reservoirs such as fruit and vegetable processing and livestock products processing is relatively backward. The completion of fresh oil reservoirs and processing oil reservoirs mainly rely on imports. However, resource-based reservoir completion has certain advantages in countries and regions along the sharing economy. For example, Kazakhstan and other Central Asian countries have relatively developed animal husbandry, and countries such as Laos, Cambodia and Myanmar have great potential for grain production, especially rice production. At present, reservoir completion trade between China and countries and regions along the route is only concentrated in a few varieties, so it is necessary to further expand the scale of trade and reduce the risk of market and product concentration.

4.2. Combine vertical chain formation with horizontal clustering to further innovate the cooperation model of reservoir investment.

Promote planting, breeding, agricultural materials in mechanical completion processing, production, reservoir reservoir, warehousing logistics related industries such as "go out", the rational allocation of resources on a global scale, gradually form regional reservoir supply chain, industry chain and value chain, is in the interests of the countries and areas along the appeal, the need of modern reservoir strong province is China's development, at the same time can also drive a large number of oil reservoir and experienced professional and technical personnel, have the ability of countries along the peasants to obtain employment entrepreneurship, promote the completion of the reservoir with more open and active attitude to participate in the international trade. Through investment, merger and acquisition, Chinese enterprises take part in global reservoir market competition by using advanced technology and famous brands.
4.3. Strengthen overall planning and coordination to build a reservoir cooperation platform for China's participation in the sharing economy.

First, formulate relevant strategic planning as soon as possible. The overall planning of reservoir completion integration into sharing economy construction is carried out, and the main regions, key areas, leading products, cooperation methods and supporting policies that China participates in sharing economy reservoir cooperation are defined.

Second, the cooperation and coordination mechanism of oil reservoirs should be improved. A reservoir resources development working group will be set up to coordinate and solve problems related to the system and mechanism in the process of reservoir "going out" and "inviting in".

Third, actively promote communication and docking at the government level. We will accelerate the signing of intergovernmental agreements, create a business environment conducive to international cooperation on reservoir completion, and facilitate trade, investment and personnel flow in reservoirs.

Fourth, the establishment of China's reservoir participation in foreign cooperation information exchange platform. Gradually establish reservoir basic database that is connected with other provinces in China, and provide feasibility demonstration and consulting services for reservoir completion enterprises to invest abroad.

Fifth, reduce and guard against investment risks. Keep close track of reservoir project operation, keep abreast of changes in international situation and economic environment, and strengthen reasonable guidance.

5. Conclusion

In the construction of sharing economy, China creatively put forward the development concept of "green Silk Road". Therefore, "going global" of reservoir completion should set up the concept of green development, strictly follow the specific provisions of environmental protection standards in the investing countries, pay attention to the protection of local environment, actively develop green ecological cycle reservoirs, and ensure the sustainable development of reservoirs in the investing countries. Standardize the investment and operation behavior of reservoir enterprises to prevent the adverse impact on local land and water resources; To prudently transfer the land used for food crops to other crops, so as not to cause a sharp decrease in grain production and affect the food security of the investing countries; To jointly deal with the local ecological environment pollution with the investing countries; Fair treatment of oil reservoir producers and rural residents in investment countries, reasonable compensation should be provided for the purchase or lease of agricultural land, and actively help local farmers get rid of poverty.

Acknowledgments

The project is jointly funded by Sinopec scientific research project "research and application of key production and transportation technologies in Shunbei No.1 block" (No. p18022-001) in 2018 and "drilling and completion technology for improving quality and speed in No. 5 fault zone of Shunbei No.1 block" (No. p20002) in 2020.

References

[1] Xianbing Z, Xiaoming L I. The application of productivity decline analysis method in the dynamic analysis of gas field [J]. Petrochemical Industry Application, 2013.

[2] HOSHI, Junko. The Development of Shoot-connecting pears and its quality improvement in Dongshi, Taichung in Taiwan: from the perspective of technology and social development [J]. Journal of Xian Petroleum Institute, 2002:57-70.

[3] Chan J, Schmitt D R. Initial seismic observations from a deep borehole drilled into the Canadian Shield in northeast Alberta [J]. International Journal of Earthences, 2014, 104(6): 1-14.

[4] Sheail, John. Government and the perception of reservoir development in Britain: An historical perspective[J]. Planning Perspectives, 1986, 1(1):45-60.

[5] Dissanayake D W E. Modelling and analysis of wirelessly interrogated SAW based micropumps
for drug delivery applications. [J]. Plos One, 2010, 10(8):3039-3051.

[6] Yawei H, Xueyao L. An analysis on the dynamic design of E-books of digital information media in present China [C]// International Conference on System Science. IEEE, 2012.