On the Planning of Chinese Marine High-tech Industry Demonstration Zones: From the Perspective of Supply-side Structural Reform

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Abstract: China's national agricultural high-tech industry demonstration zones focus on supply-side structural reform in their overall plan of development. This paper selected the China's marine industry as its research subject and analyzes its current situation and major problems. After summarizing the current researches of China's marine industry parks, from the perspective of supply-side structural reform, this paper specifies the tasks and objectives of the construction of the marine hi-tech industry demonstration zones. The overall planning of the demonstration zones must set distinctive development as its orientation, and we should emphasize innovation-driven and green development, devise a functional zoning that embraces marine-land and all-round integration, and seek mechanism innovations that could invigorate the inner drive of development. The paper also puts forward the major principles that the planning of marine hi-tech industry demonstration zones should obey in the context of supply-side structural reform.

Keywords: supply-side structural reform, marine industry, hi-tech industry demonstration zone, overall planning, innovation-driven

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1. Introduction

In recent years the "No. 1 Central Documents of China" (the first policy statement of the year released by the central authorities) have made the issues relating to agriculture, rural areas, and rural people their constant concern. The report delivered at the 19th National Congress of the Communist Party of China (NCCPC) clearly pointed out that "Issues relating to agriculture, rural areas, and rural people are fundamental to China as they directly concern our country's stability and our people's well-being." As socialism with Chinese characteristics has entered a new era, the principal contradiction has changed. A total solution is yet to be achieved to counter several issues relating to agriculture, rural areas, and rural people, such as the uneven development between urban and rural areas, inadequate agricultural development and poverty among farmers. The challenges particularly lie in the low level of agricultural modernization, the insufficient international competitiveness of agricultural products, the poor coordination between supply and demand, as well as the supply-side structure of industries and products failing to satisfy the demand of the market. In response, the central conference on rural work held December 24, 2015 in Beijing for the first time proposed to "enhance the supply-side structural reform in agriculture" and incorporated the proposal into the "No.1 Central Document" for 2016. In February 2017, Xinhua News Agency, authorized by the Central Committee of the CPC and the State Council, issued the "No.1 Central Document" for 2017, which specifically noted that "Currently, the principal problem of agriculture has changed from insufficient supply to the structural contradiction, which is highly marked by the co-existence of excessive supply and insufficient supply in a certain phase. The supply-side has come to be the chief culprit of the agricultural contradiction." After that, carrying out the supply-side structural reform in agriculture and replacing old drivers of growth with new ones became a wide concern across China.

Building Agricultural Science and Technology Park (ASTP) is a key approach to improving the technological innovation system in agriculture, to step up the transformation from old development engines to new ones and to realize innovation-driven development. The No.1 Central Document for 2017 emphasized a higher-level ASTP construction during the agricultural supply-side structural reform. ASTP's innovative capacity provides important support for the advancement of the agricultural supply-side structural reform. To make evaluation of ASTP innovation more scientific and to effectively enhance ASTP to innovate, Peng Jing and Sun Chengzhi, orienting their evaluation index system toward the market demand, adopted the comprehensive evaluation model based on the network analysis method when trying to establish the weight of each index, and formulated the evaluation model for ASTP's innovative ability during the agricultural supply-side structural reform.[①] Building a competitive industry with regional characteristics and establishing national agricultural high-tech industry demonstration zones is a crucial step to make agriculture more competitive in the international market. Agricultural high-tech industry demonstration zones, each with one dominant industry, mark a superior pattern of ASTP, and play an important role in cultivating players of agricultural innovation by concentrating favorable scientific/educational resources and clustering the leading industries. In January 2018, the General Office of the State Council issued the Guideline on Promoting Development of Agricultural New and High-tech Industrial Demonstration Zones, a key document that for the first time focused on the agricultural high-tech industry and provided national-level, systematic guidance for the construction of agricultural high-tech industry demonstration zones. The notice explicitly proposed to set

① Peng & Sun, 2017

the focus of the construction of agricultural high-tech industry demonstration zones on deepening the agricultural supply-side structural reform, and to "build pioneering zones for the development of innovation-driven agriculture and pilot zones for the agricultural supply-side structural reform." Therefore, to explore the characteristics of the leading industry of a regional agriculture, concentrate on and delve into the bottlenecks of its development, and to make plans for developing agricultural high-tech industry demonstration zones on a scientific basis, is of great pragmatic significance for upgrading the competence of a regional agriculture and its sustainable development capacity. Recent years have seen an annually growing percentage of marine industry in agriculture and the former gradually grew to be a pillar industry in China's national economy. This paper takes the marine industry as an example, focuses on the perspective of agricultural supply-side structural reform, explores the framework and approaches to building agricultural high-tech industry demonstration zones, and offers some helpful ideas for the implementation of related work.

2. The current situation and problems of China's marine industry development

As its contribution to the global GDP grows rapidly, the marine industry has gradually risen to become a key field that has attracted the attention of all major coastal countries across the world. Each of these countries has made marine development plans according to their own realities, and moreover, has by degrees formulated their own advantageous industries and special trades in marine development. Spurred by the goal of building China into a top maritime power, the gross marine production of China began to surpass that of the U.S. in 2011. After that it has ranked first in the world and hopefully, will retain its leading position for a considerable length of time.[①] In 2016, China's marine production amounted to 7.0507 trillion RMB (about 1.0151 trillion USD), accounting for 9.5 percent of Chinese GDP and contributing 9.9 percent of the national economic growth. The marine industry is playing a very important part in China's national economy. After China's economy enters the new normal, China will have to address the bottleneck problems slowing further development if it wishes to retain the leading position of its marine industry in the world. Those problems mainly include:

2.1 Prominent contradictions between supply and demand, a sluggish external market and a marine industrial structure crying for adjustments

Even at the beginning of the 21st century, China's marine industry had already established itself as a combination of "the primary, secondary and tertiary industry sectors."[②] Yet compared with other maritime powers, China only predominates in the primary sector which engages in marine catch and sea farming. As for the secondary and tertiary sectors whose products carry more added value, China could barely overtake U.S., and it lags the U.S. particularly in marine energy development, wind power and marine tourism. At the same time, China's advantageous sectors such as fishery, sea salt, ship building and marine transportation are easily restrained by the total amount of resources and the global economic situation. That poses a threat to the formation of a long-term mechanism that helps increase the international competence of China's marine industry and promotes its sustainable development.

2.2 Low investment in science and technology, weak industrial agglomeration and severe deficiency

① Zhang et al, 2016
② Yu, 2015

of innovation

Technological innovation mainly influences the quality of the supply of marine products. China's marine industry is currently challenged by the deficiency of innovative capacity, which is mainly reflected by relatively low technological innovation efficiency: the technology transfer is difficult and slow to come; the industrial agglomeration effect is not prominent. Hence the requirements for the upgrading of the marine industry cannot be addressed and it is rarely possible to formulate core industrial competence or a new innovation-driven marine industry.①

2.3 Homogeneity of regional industries, poor coordination and mediocre advantageous industries

China's marine industry is marked by homogeneity in structure, which is in breach of the principles of comparative advantage adhered to during the layout of industrial activities, limits the evolution of divisions of labor based on job specialization at a larger geographical scale, and hampers regional industrial collaborative innovation, industrial agglomeration as well as the effect of economies of scale. Moreover, this homogeneity also causes the repetition of low-level construction and malicious competition across regions, thereby leading to the coexistence of overabundant mid/low-end products and insufficient high-end products, of overcapacity and an undersupplied market.②

2.4 Given the fragile marine environment and the reduced offshore resources, more guidance is yet to be in place for the green development and spatial expansion.

Due to years of over-exploitation of marine resources and the element-driven and extensive model of technological development that has long been adopted, the offshore resources of China are nearly exhausted, and the marine environment is drastically deteriorating. As the campaign for a better preservation rate of the mainland natural coastline and an ecology-first development strategy begins, China's marine industry must transform its pattern of economic growth and orient itself to greenness, ecological friendliness and sustainable development, all the time focusing on ecologizing the technological innovation and the production mode.③ At the same time, international cooperation must be strengthened, and exploration must be extended to new spaces like the deep sea and the polar ocean so as to find substitutes for current energies.

3. The objectives and tasks of China's marine high-tech industry demonstration zones in the context of supply-side structural reform

Building marine-industry-themed agricultural high-tech industry demonstration zones is an exemplary solution to the above problems, for it can agglomerate regional advantageous resources, help conduct integrated demonstration of the key, shared technologies, increase the innovation output and the rate of technology transfer, bring strategic adjustments to the industrial structure, better coordinate between the regional innovation-driven development and the industrial agglomeration, and accelerate the differentiated development of the marine industry as well as its upgrading and transformation. Though related research on the whole is yet to be enriched, some scholars take different approaches and angles, and come up with several beneficial findings about the

① Xu & Yang, 2018.
② Yu, 2015; Zhang &Bu, 2016.
③ Qin &Du, 2017.

construction of marine industry technology parks, for example, Huang Huamei studied Daya Bay Linhai Industrial Park and provided thoughts about constructing marine eco-civilization demonstration zones;[①] Zhang Yuqiang and Sun Hefeng based on their comparison study of the already established exemplary cases, considered several factors, such as strategic positioning, location planning, competitive advantages, innovation-driven development and precautionary measures, and acquired a primary framework as well as suggestions for the future construction of China's marine high-tech industry parks;[②] Shen Tiyan and Shi Xiaoming focused on the entire coastal zone of China and conducted research into the spatial structure and layout of marine industrial parks built during the 13th Five-Year Plan period.[③] The proposal of initiating the agricultural supply-side structural reform offers a whole new perspective for research on the planning of the marine high-tech industry demonstration zones and puts forward new requirements and poses new challenges.

According to the No.1 Central Document for 2017 and No. 4 Document of 2018, given the current situation of the development of China's marine industry, in light of the focus on agricultural supply-side structural reform, the objectives and tasks of the construction of China's marine high-tech industry demonstration zones can be summarized into:

3.1 Set an example for marine economic development and fuel the implementation of the strategy of becoming a great maritime power

The marine high-tech industry demonstration zones are to be built in pioneering areas for the innovation-driven development of the national marine industry, pilot areas for the supply-side structural reform, demonstration areas for the construction of eco-civilization and for the harmony and progress of society, and exemplars of land-marine integrated development, thereby cultivating globally influential marine biotechnology innovation centers and marine-based high-tech industrial clusters, largely increasing China's marine economic competence, leading China's marine industry onto the global stage by seizing upon the opportunity brought by the Belt and Road Initiative, and facilitating the implementation of the strategy of becoming a great maritime power.

3.2 Accelerate the transformation from old drivers of growth to new ones and build new marine high-tech highlands

With the demonstration zones established, scientific institutions could be encouraged to found their own research bases, guided by the strategy of promoting innovation-driven development and rural vitalization, systematic and integrated research and engineering development could be performed, revolving around all the aspects of the marine industrial development, China's marine high-tech integrated innovation systems and application demonstration platforms could be established and improved, and China's marine technological prowess could be enhanced. When the role of the demonstration zone as a pilot, exemplar and incubator is leveraged, scientific R&D will be transferred to applications, the influence of technology on production will be strengthened, technological innovation will become a more powerful pillar and impetus for marine high-tech development, the regional marine industry will be better armed with technology, better equipped and industrialized, and an industrial, technological, leisure and training center for the national marine economy as well as a demonstration window that displays China's marine high-tech prowess.

① Huang et al., 2017.
② Zhang & Sun, 2015
③ Shen & Shi, 2017

3.3 Optimize the structure of China's marine industry and transform the mode of marine economic development

Building a distinguished characteristic industry is a key task of the high-tech industry demonstration zones. China's coastal provinces must fully exploit their already-existing advantages in the marine industrial structure and optimize the geographical distribution of the marine industry. Meanwhile, all the advantageous resources must be integrated to build marine high-tech industrial clusters with distinctive characteristics, structural complementarity and the prospect of immediate benefits. It is necessary to let the leading enterprises play their part in spurring others, to push forward the upgrading of all agricultural aspects and the value increase of the entire chain, to further enhance the regional brand effect, to cultivate new industrial dynamics and to breed new development engines.

3.4 Promote urban-rural integrated development and help regional farmers (fishermen) get rich

Demonstration zones essentially aim at lifting farmers (fishermen) out of poverty and increasing employment and incomes. The marine high-tech industry that is fueled by the demonstration zones is helpful for extending the industrial scope, expanding the industrial chain, raising the level of industrialization in all aspects, reaping more comprehensive benefits, boosting the development of related industries, increasing the incomes of farmers (fishermen), creating more job opportunities and solving the issues relating to agriculture, rural areas, and rural people. It can advance the construction of new socialist country sides, narrow the gap between urban and rural development, bring the level of rural economic and social development closer to that of urban areas, and set demonstration zones as an example for regional urban-rural integrated development.

3.5 Deepen global cooperation and enhance the international competence of China's marine industry

It is necessary to proactively play a part in the Belt and Road Initiative to leverage both international and domestic markets/resources, optimize the layout, and to encourage the marine high-tech demonstration zones to adopt a broader international view. It is also necessary to introduce foreign advanced technologies and models with the demonstration zones taking precedence in using for technology transfer to elevate the marine industry itself and marine products to a higher level, to make the demonstration zones more international and to enhance the international competence of regional marine products.

4. The strategies of the planning of marine high-tech industry demonstration zones

The overall planning of marine high-tech industry demonstration zones must focus on three key words: "marine" "high-tech" and "science." The marine industry must predominate and a differentiated, distinctive path of development must be adopted, and technology must be the leading element and innovation must be the major impetus. High standards must be used for the construction of the demonstration zones, high-tech industries must be cultivated, and pilot/demonstration areas for the marine supply-side structural reform must be established.

4.1 Overall positioning: depend on resources, establish themes with scientific methods, and emphasize regional industrial characteristics

The overall positioning of regional marine high-tech industry demonstration zones must be planned from the macro perspective of the layout of the entire China's marine industry. Shen Tiyan and Shi Xiaomin

held that the spatial layout of China's marine industry is mainly marked by "three districts and one belt."[①] After an in-depth analysis they proposed a strategy for further optimization, namely formulating a "multi-axis and multi-center" pattern that is supported by "two belts, three centers and five circles," and, based on realities and strengths of resources, established the main orientation of each marine industry park/district/circle;[②] Ma Xueguang and Zhang Yifei, through a shift-share analysis, studied the four kinds of differences existing in spatial clusters among Chinese coastal areas, compared the structures and strengths of the marine industry across different regions, and concluded with a marine industry development strategy for all marine-related provinces as well as approaches to build a marine industrial system.[③] These academic findings provide important references and basis for the overall positioning of regional marine high-tech industry demonstration zones. Only by fully leveraging their comparative advantages, adhering to the principles of "one theme for one district" and learning through problem solving, precisely identifying their own characteristics and advantages in the marine industry, highlighting differentiation and specialization in development, making development strategies and concrete measures according to local realities, and tackling the key, shared technological problems in developing the distinctive, advantageous industries can the industries across different regions realize mutual complementarity and collaborative innovation. Only in that way can the innovative development of the marine industry have true guidance, and progress can be made in fields such as industrial agglomeration, technological innovation, integration of the primary, secondary and tertiary sectors, green development, rural rejuvenation and international cooperation.

4.2 Industrial planning: insist on innovation-driven development, be green development-oriented and build high-end industrial clusters

Research has revealed that marine industrial agglomeration has a marked positive influence on the differentiated development of regional marine economies.[①] Therefore, once the positioning of marine high-tech industry demonstration zones is clearly specified on a scientific basis, it is necessary to consider planning effective industrial clusters around the leading industry, to extend the industrial chain towards the low/high-end markets, to give full play to the crucial role of innovation and technology during the process of industrial agglomeration by improving infrastructures and introducing top talents, to integrate marine and land resources, to propel collaborative and cluster development between different marine sectors,[②] to construct a large number of related high-end industrial clusters, and to push forward the sustainable development of the regional marine industry. For example, Weihai Marine High-tech Industry Demonstration Zone, during its industrial planning, established the marine biotechnology industry as its core, leading sector, and around it constructed four major industrial clusters that span modern marine fishery, intensive processing of marine products, new marine bio-materials and marine bio-medicine. It has made it clear that its goal is to build a nationally famous industrialization base of marine biological technology, a breakthrough area for transformation that will take the lead in the innovative development of regional marine biotechnology, and a collaborative demonstration zone for international marine biotechnology industry that could radiate to Northeast Asia. Yet the strategy of driving growth through innovation must agree

① Shen & Shi, 2017
② Shen &Shi, 2017
③ Ma & Zhang, 2017.
④ Ji &Zhao, 2016
⑤ Xu & Yang, 2018

with the level of regional marine industrial agglomeration.[①] While it is possible to let the industrial agglomeration fuel the regional marine economy, it is also necessary to pay attention to green development, to appropriately adjust the degree of industrial agglomeration, and to increase investments in sectors of eco-civilization construction such as marine ecotourism, restoration of coastal native landscapes and even ecological projects on islands and reefs thereby improving the quality of the supply of marine products and increasing the capacity for the sustainable development of China's marine economy.[②]

4.3 Function zoning: improve the function of the demonstration zones, integrate marine and land resources, and achieve all-round integration and sharing

The goal of the marine high-tech industry demonstration zones is to achieve all-round integration and sharing. This integration not only means the integration of the primary, secondary and tertiary sectors that focus on quality and efficiency, but also includes industry-urban, industry-rural and urban-rural integration, which means building a new-type community that integrates "technology, industry and life." The planning of the zone must adhere to the principle of "unifying all planning," focus on the marine zone, integrate the ocean and land's functions in the economy, ecology, culture and society,[③] highlight the demonstration zones' role as the exemplar in technological innovation, R&D and application, experiment and demonstration, and technological services and training, and quicken the pace of building innovation-driven platforms such as technology transfer centers, tech entrepreneurship platforms and high-tech industry incubation bases. The core zone must include the major functioning district, the district for industrial optimization, the major district for development, the district for restrained development and the district for ecosystem conservation, which will play their respective part in innovation-driven development, exemplary demonstration, industrial agglomeration, supply management and ecological services. Moreover, sharing of resources and information among them must be guaranteed. Major performers of innovation must be cultivated, the gap between urban and rural development must be narrowed, rural infrastructures and public service systems must be improved, and the governance of human settlements plus the "livable countryside" projects must be deepened. Regional special training bases could be established to improve the vocational and technical skills of farmers(fishermen). A mechanism that allows farmers(fishermen)to share the incremental industrial benefits could be tried and implemented to lift them out of poverty and to formulate a new type of community model that will achieve industrial-rural and industrial-urban integrated development.

4.4 Mechanism innovation: transform the functions of government; invigorate the inner drive of development with Internet

Innovation of systems and mechanisms provide guarantees for a higher-level construction of high-tech industry demonstration zones. Reinforcing the reform of the mechanisms of marine industrial development is an important approach to invigorate the inner drive of development. The key mechanisms that need to be reformed include those of the environment of the marine industry, investment/financing, market allocation of sea area resources, and marine talent cultivation and recruitment.[④] First, the functions of government must be transformed and turned to guide, regulate, monitor and evaluate to make the market fully exert its influence on the allocation of resources and the adjustments in the industrial structure. Meanwhile, the internet and the big data platforms could

① Xu & Yang, 2018.
② Ji & Zhao, 2016.
③ Wang, 2017
④ Wang, 2017

be used to formulate a "smart ocean" information service system, thereby integrating marine product e-commerce platforms and management service platforms, establishing a healthy development standard system and an intelligent production and management system for the marine industry, improving its capability for entireprocess information management, and pushing forward the upgrading of the marine industry.

5. Conclusion

This paper, inspired by the agricultural supply-side structural reform, gives a comprehensive analysis of the major problems facing China's marine industry. It studies the objectives and tasks of the marine industry and proposes ideas for the planning of marine high-tech industry demonstration zones. According to related research, in the context of the supply-side reform, the planning of marine high-tech industry demonstration zones must obey the following principles: (1) Pursuing technology-driven, high-end development. The prominent problems occurring in the marine industry could point out a direction for development. The independent innovation of science and technology must be strengthened, technology transfer must be accelerated, strategic high-tech industries like the "internet plus" and "smart ocean" must be promoted, the national highland of marine innovative technological applications must be built, the role of technology in supporting the marine industry must be enhanced, and the development of a marine high-tech industry must be encouraged across China. (2) Emphasizing distinctive characteristics and optimizing the upgrading. The marine industrial structure must be optimized based on the advantages of the demonstration zones in resources, industry sectors, location and technical talents, as well as on the requirements of the market. Distinctive, high-end marine industry sectors must be developed, upgrading must be encouraged within the marine industry and the path of "rejuvenating a district through its marine industry" must be made feasible. (3) Weakening the influence of the government while letting the market lead. The functions of the government must be transformed. Related policies must be carried out and related investments must be increased. Financial innovation must be accelerated, financing platforms built, and financing channels extended. Meanwhile, the market must fully play its decisive role in resource allocations. Enterprises must be made major performers of innovation, who must adjust themselves to the varying market, extend the industrial chain, and optimize the resource allocations and the product mix. (4) Putting people first and pursuing all-round improvement. In the face of the requirement for talents in internationalization, financialization and informatization of the marine industry posed by the construction and development of marine high-tech industry demonstration zones, the highly efficient service mechanisms of the resource-intensive, talent-intensive high-tech industry could be used, and large-scale, multi-channel technical training could be conducted, thereby cultivating and introducing a superior group of young professional talents, and increasing the demonstration zones' capacity for sustainable development in all aspects. (5)Achieving industrial-rural integrated development and increasing farmers' incomes. Improving the environment of the (fishing) villages and increasing the farmers' (fishermen's) incomes must be listed as the primary task. During the construction of marine high-tech industry demonstration zones, the integration of the first, second and third sectors must be encouraged. Industry must assist agriculture, and urban areas must help rural areas. A batch of new-type communities for farmers (fishermen) must be planned to concentrate farmers (fishermen) in the second and third sectors. (6) Integrating production, living and ecology, and expanding the functions of the demonstration zones. The marine industry is marked with the green-development-orientation and the peculiarities of the regional cultures in the (fishing) villages, thus the natural landscape must be

protected and leveraged. The demonstration zones must shift their attention from mere production to production, living and ecology. The marine industry could also be extended into more sectors, such as marine recreation and sightseeing, and marine ecotourism.

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