The Dilemmas and Strategies of Chinese Marine Bio-medicine Industry

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Abstract. Marine bio-medicine industry is recognized as one of the most promising industries in the 21st century. The State Oceanic Administration of China has put the development of marine bio-medicine industry into the national strategic level. This article reviewed the development of Marine Bio-medicine Industry in China, argued that issues in human resources, innovation, demand, R&D investment and technology transfer mechanism restrained the development of the industry. It is concluded that, in order to promote the development of marine biological medicine and narrow the gap between developed countries, the government should increase capital investment and strengthen policy support. Enterprises should devote more to the ability of independent innovation, improvement of the industrial mechanism and market exploitation.

Introduction

Marine bio-medicine industry as the emerging pharmaceutical industry in the most active and fastest growing areas, is recognized as one of the most promising industries in the 21st century. This industry basically covers the field of biotechnology, chemical medicine, modern medicine, diagnostic reagents, medical equipment and biomedical services, the second decade of the 21st century, the national strategic level of support makes Chinese marine bio-medicine industry into a new development stage, and its industrial chain led to the improvement of the technical level of the entire region, for the development of marine economy to provide power. Cao Yuwen (2017) pointed out that the biomedical industry is an important part of the strategic emerging industries, is the "twelfth five" period to seize the industrial development of high-end and cutting-edge strategy focus[1]. Modern marine drug research began in the 1940s, the first developed by the United States and other developed countries from the marine organisms isolated from the structure of a new type of specific biological activity of the compound. Since the 1960s, marine biological resources have aroused widespread concern in the medical profession, countries competing to invest heavily in marine biomedical research. Chinese systematic study of marine biological drugs began in the 1970s[2]. Since the 1990s, many coastal countries have made use of marine resources as a basic national policy. Meng Fei (2015) mentioned that China's marine biological resources are rich, and has been found and recorded marine life to 20,278 species up to now, in the case of land use of medicinal resources is almost exhausted, marine medicinal resources show great potential for new drug development[3]. This article reviewed the recent development of marine bio-medicine industry in China, analyzed the current dilemmas and proposed corresponding strategies.
Development Status of Marine Bio-medicine Industry in China

National Policy Support

The State Oceanic Administration of China promulgated the National Plan for Marine Science and Technology Development In 12th Five-Year for Marine Science and Technology Development, and put the development of marine bio-medicine industry into the national strategic level. The Chinese Ministry of Finance and the State Oceanic Administration jointly issued a notice that the special funds to support the use of marine biomedical innovation, the production of new marine pharmaceutical products and traditional Chinese medicine research and development in May 2012. To mariculture, deep-sea fishing, marine bio-pharmaceutical and other strategic emerging industries as the focus, in Shandong, Guangdong, Zhejiang and other marine economic province to establish economic innovation demonstration area. Shi Qiuyan, Ning Ling (2014) pointed out that the State Oceanic Administration of the First and Third Ocean Research Institute, Ocean University of China, the South China Sea Institute of Oceanology, Chinese Academy of Sciences and other marine biological medicine included in the field of key research. The scope of the study extends from the coastal, shallow sea to the deep sea and polar regions, and the research of marine living resources is increasingly rich, laying a solid foundation for the future development of new products.

Figure 1. The Composition of the Added Value of Major Marine Industries in 2016.

Biomedical Industry Cluster to Strengthen the Trend

With the support of national policy, China's marine biomedical industry development and research teams continue to become standardized and group, the researchers are also increasing. Through the human, capital and technology and other advantages of the efficient integration of resources, biomedical industry cluster to achieve cooperation and innovation between enterprises, so as to promote the rapid development of enterprises. Second, the coastal provinces and cities to actively respond to national policies, to establish Qingdao, Shanghai, Xiamen and Guangzhou as the core of dozens of marine biological medicine research institutions. The government to "promote bio-pharmaceutical industry to
accelerate the development of a number of policies” and other policies, to promote the biomedical industry gradually formed a biomedical research and development institutions as the core of the industrial chain.

**Diversification of Biomedical Industry**

At present, China's bio-pharmaceutical industry to the formation of biological research and development institutions as the core, to raw materials, chemical agents and proprietary Chinese medicine and other biological manufacturing industry-led, to health materials and pharmaceutical products and other manufacturing industries to support the diversified development pattern. In addition, with the increasing trend of population aging and the improvement of living standards, people's health care awareness, health products, the market has been more and more attention, big health industry has a huge growth potential, domestic bio-pharmaceutical companies have Investment and health care products industry, to promote the diversification of the pharmaceutical industry.

**Development Dilemmas**

**Lack of Professional Talent**

In the global marine biomedical value chain of the most important, but also occupy the high value-added links is the drug research and development links, which for the entire industry development has a crucial role. Relative to foreign developed countries, China's current marine bio-medicine industry, a serious shortage of talent, both with international perspective and high-level marine biological research ability of high-level talent is scarce. The main reason for this is the main research of China Ocean Research Institute of energy investment in the field of aquatic products research, and not with the pharmaceutical research institutions or institutions in-depth deep research and development of marine pharmaceutical products, Which led to medical research and marine research out of line, the rapid development of marine pharmaceutical industry, research and development should not wait for the level.

**Low Level of Innovation**

China's marine science and technology innovation capacity than the developed countries there is a serious shortage of independent intellectual property rights of the original new drug is very few, the relevant scientific research institutions technological innovation is low, low conversion rate of scientific research, production and research structure is loose, most of Generic drugs. As of 2012, China has only 11 patents on marine bio-medicine, and some drugs in the market are not high quality or low cost to win, but through rebates, etc. to increase sales, seriously damaged the pharmaceutical industry healthy growth.

**R & D Funding is Insufficient**

First of all, the marine biomedical industry as a strategic marine emerging industry despite has the high technology, high yield and high growth characteristics, but also high input, high risk, long research and development cycle characteristics, leading to its pre-development needs to invest a lot technology, capital, talent and other resources, thus many companies unsustainable.

In recent years, the developed countries in the marine investment in science and technology, venture capital and securities market gradually replace the government investment as the main force, and China's marine bio-pharmaceutical
industry, the main source of venture capital is still the government investment and bank science and technology development loans, the larger market risk Capital investment has also produced a strong constraint, leading to the use of venture capital in the marine bio-pharmaceutical industry funding gap is large, a single source channels, cannot meet the development needs, restricting the development of marine bio-pharmaceutical industry. And thus the formation of effective social financing mechanism has become our current urgent problems to be solved.

<table>
<thead>
<tr>
<th>country / region</th>
<th>R &amp; D investment growth (%)</th>
<th>Percentage of global R &amp; D (%)</th>
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</thead>
<tbody>
<tr>
<td>The European Union</td>
<td>13.2</td>
<td>28</td>
</tr>
<tr>
<td>United States</td>
<td>13</td>
<td>46</td>
</tr>
<tr>
<td>Japan</td>
<td>2.3</td>
<td>8</td>
</tr>
<tr>
<td>China</td>
<td>27.5</td>
<td>1</td>
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**Market Demand Pull Weak**

From the experience of rapid development of marine bio-medicine industry in developed countries such as Europe and the United States, it can be seen that the market demand is an important factor in the formation of scale, multi-financing and stable development. Market demand is an important driving force for the rapid development of any industry. But China's biomedical industry started relatively late, people's health awareness is relatively weak, weak demand for biomedical market.

**The Mechanism of Industrialization is Not Perfect**

There are many problems in the research and development of pharmaceutical industry in China. These problems can be analyzed from the lack of perfect industrial technology transfer mechanism, the research and development institute of biomedical research cannot realize the industrialization of innovative resources and scientific research results.

**Development Strategies**

**Increase the Reserve of Professionals**

China's marine biomedical industry development urgently needs a lot of talent pool. Establish a hard environment conducive to personnel training, colleges and universities can be set up with the marine biology medicine-related courses, focusing on training master's and above high level of talents, at the same time to strengthen cooperation with higher research institutes to encourage research institutes into the business. Secondly, the government can send out graduate students, visiting scholars, etc., open up channels of communication with the ocean economy, learn the world's cutting-edge technology, improve the ability of independent innovation to promote the development of China's marine biological medicine industry.

**Strengthen R & D Investment, Improve the Level of Innovation**

Marine biological medicine industry development is the biggest bottleneck is the funds and technology. Therefore, our government should increase the funds in
the technology research and development, major projects in areas such as investment efforts, mobilize multi-force, multi-faceted funds, especially to take the leading role of the backbone enterprises to further promote the marine bio-pharmaceutical industry risk financing mechanism to create a good financial environment to promote the formation of an effective capital chain, thereby enhancing the industrial competitiveness. At the same time attach importance to technological innovation, encourage innovation platform and industrial alliance construction, industrial chain as the base of the middle and lower reaches of enterprises to cooperate, build a technological innovation system, introduce of collaborative innovation model, jointly develop common technology to improve the overall level of innovation.

Develop Scientific Industrial Management and Promote the Development of Biomedical Industry

Biomedical industry standardization has a better guiding effect on the development of biomedical industry and market. Countries in the development of biomedical industry standards in the process to actively guide the development of pharmaceutical industry, while the development of biomedical industry standards, comprehensive domestic development, develop viable medical standards, play a better command role. Accelerate the industrialization of bio-pharmaceutical business, reduce operating costs, to achieve bio-pharmaceutical industry to improve operating efficiency.

Conclusions

The development of marine bio-medicine industry in China is mainly affected by capital investment, talent pool, independent innovation ability, market pull, industrial mechanism and other aspects of the impact. In order to promote the development of marine biological medicine and narrow the gap between developed countries, the government should increase capital investment and strengthen policy support. Enterprises should strengthen the ability of independent innovation, improve the industrial mechanism, expand market demand. Because of marine bio-medicine as a new industry, research data and data resources less, only from the macro point of view of the marine bio-pharmaceutical industry to study. In the future research, we can analyze the operational situation of Marine bio-pharmaceutical business enterprises and analyze them at the micro level.

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References