

## Heilongjiang Petroleum & Petrochemical Service Outsourcing Industry Cluster Construction

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### Abstract

Heilongjiang petroleum & petrochemical service outsourcing business covers whole industry chain of upstream, midstream and downstream of petroleum & petrochemical field, and owns technology, software and hardware support system. Petroleum & petrochemical service outsourcing enterprises and related organizations own the conditions of forming petroleum & petrochemical industry cluster, and the construction of petroleum & petrochemical service outsourcing industry cluster has certain necessity and feasibility. The construction goal is “One Base and Two Centers”. The construction measures include the introduction of well-known enterprises, the support to backbone enterprises as well as cultivation and introduction of talents, doing well training work, constructing platform facilities, integrating outsourcing market, strengthening organizational leadership and perfecting policy system, and so forth.

**Key words:** Petroleum & petrochemical; Service outsourcing industry; Industry cluster

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### INTRODUCTION

The development of Heilongjiang petroleum & petrochemical industry chain is mature relatively, and petroleum & petrochemical service outsourcing industry gradually developed on the basis of traditional petroleum & petrochemical industry, with the oil city-Daqing as the key city. The business covers upstream, midstream and downstream of petroleum & petrochemical industry chain. Petroleum & petrochemical service outsourcing enterprises gather in the service outsourcing industrial park. Through crisscrossed network relationship, many enterprises with different divisions and scales are closely connected with various organizations related to development. The enterprises gradually form preliminary cluster, which has the basis for industry cluster development<sup>[1]</sup>. However, it is still a strategic research subject to study how to plan and guide the development of petroleum & petrochemical service outsourcing industry cluster, how to use the advantages of industry cluster to reduce cost, how to mutually cooperate with each other, how to expand business and enhance competitiveness, how to build a regional brand and promote local economic growth, and finally how to assist to realize the sustainable development of the industry.

### 1. ANALYSIS OF HEILONGJIANG PETROLEUM & PETROCHEMICAL SERVICE OUTSOURCING INDUSTRY

The biggest problem of resource-based industry is the sustainable development and Heilongjiang petroleum & petrochemical industry takes no exception. As time goes on, the reduction of petroleum production is inevitable. However, the development of petroleum &

petrochemical service outsourcing industry relieves the pressure of petroleum production to a certain extent. Therefore, it is particularly important to give detailed analysis to Heilongjiang petroleum & petrochemical industry chain, divide the petroleum & petrochemical service outsourcing business on the basis of traditional petroleum & petrochemical industry chain, and explore petroleum & petrochemical service outsourcing industry cluster construction.

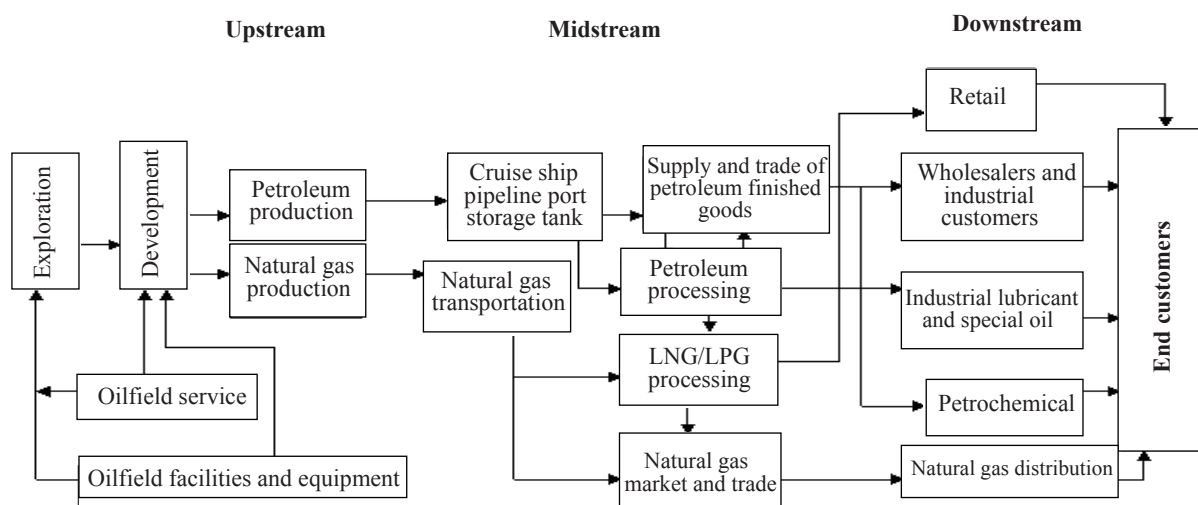
Heilongjiang petroleum & petrochemical service outsourcing business covers the whole industry chain<sup>[2]</sup> from the upstream exploration, development and refining, to the midstream and the downstream transportation, storage, processing and sales, and information and services.

### 1.1 Business Scope of Petroleum & Petrochemical Industry Chain

Petroleum & petrochemical industry chain is formed based on petroleum resource development and utilization,

with petroleum resource as the core. It is an enterprise group with relationship among industry departments, including the concept of four dimensions such as: value chain, enterprise chain, supply and demand chain and space chain. In the industry chain, there exists upstream and downstream relationship as well as mutual value exchange. The upstream conveys products or services to the midstream and the downstream, and the downstream provides feed back to the midstream and the upstream<sup>[3]</sup>.

Heilongjiang petroleum & petrochemical industry, with Daqing oilfield as the key place, has formed a complete petroleum & petrochemical industry chain. Specific business scope is shown in Figure 1. The upstream business of the chain includes exploration, development and production of petroleum and gas. The midstream and the downstream of the chain include transportation, storage and processing of petroleum and gas, as well as various petroleum & petrochemical finished goods sales.



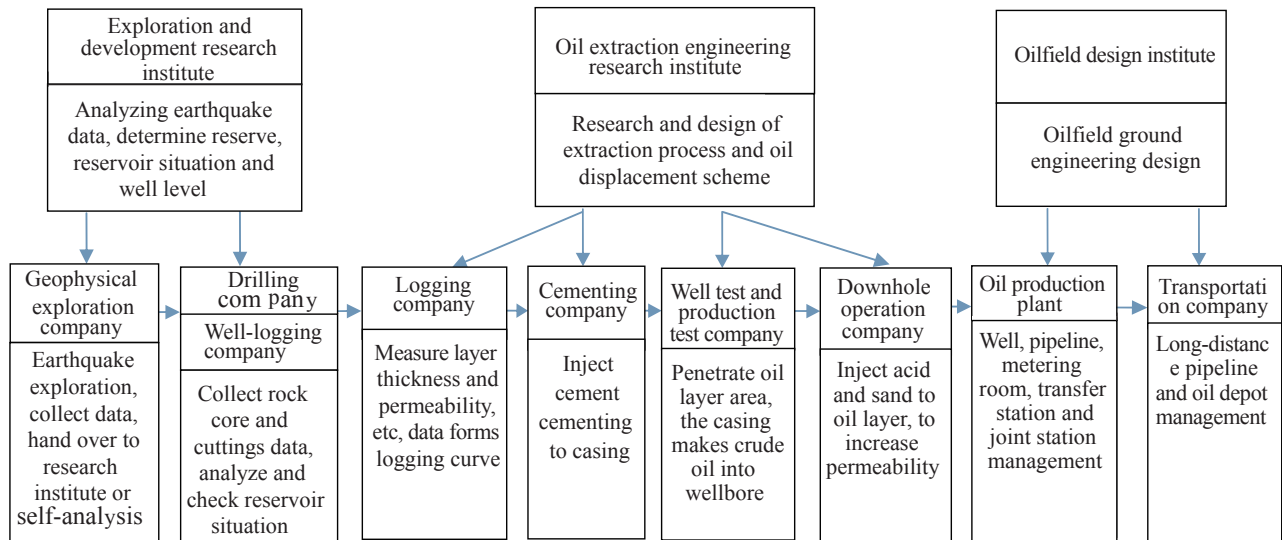
**Figure 1**  
**Petroleum & Petrochemical Field Industry Chain**

### 1.2 Heilongjiang Petroleum Service Outsourcing Business

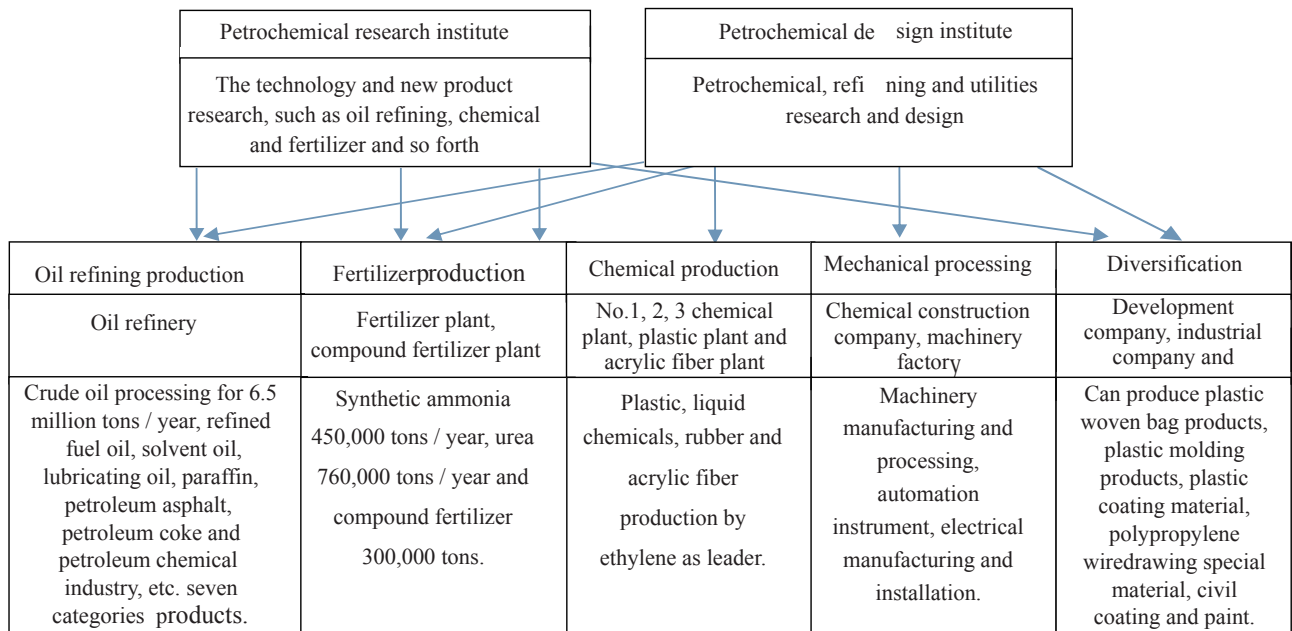
After years of technology and experience accumulation, in above petroleum & petrochemical industry chain, petroleum service outsourcing business undertaken by Heilongjiang Province includes earthquake data processing interpretation, logging data processing interpretation, oil reservoir evaluation data simulation, oil displacement design and effect evaluation, oilfield ground engineering design, pipeline detection evaluation and cleaning. The business is distributed in oilfield exploration and development research institute, oil extraction engineering research institute, oilfield design institute and affiliated service units, including: Geophysical exploration company, drilling company, logging company, oil production plant and transportation company and so forth (as shown in Figure 2).

### 1.3 Heilongjiang Petrochemical Service Outsourcing Business

After years of technology and experience accumulation, in the above petroleum & petrochemical industry chain, petrochemical outsourcing business undertaken by Heilongjiang Province includes chemical production process control and monitoring, chemical production operation simulation, chemical production process design, energy-saving, consumption-saving, environmental protection technical services and related R&D services. The business is distributed in petrochemical research institute, petrochemical design institute, oil refinery, fertilizer plant, chemical plant, machinery plant and related industrial plants and so forth (as shown in Figure 3).



**Figure 2**  
**Petroleum Service Outsourcing Business**



**Figure 3**  
**Petrochemical Service Outsourcing Business**

### 1.4 Classification of Heilongjiang Petroleum & Petrochemical Service Outsourcing Business

In accordance with the traditional way of classification, service outsourcing business is mainly divided into information technology outsourcing (ITO), business process outsourcing (BPO) and knowledge process outsourcing (KPO)<sup>[4]</sup>. The above Heilongjiang petroleum & petrochemical service outsourcing business can be summarized in detail according to this way of division. First, ITO includes petroleum & petrochemical software development and solutions, petroleum & petrochemical technology service, petroleum & petrochemical industry design, embedded system background support,

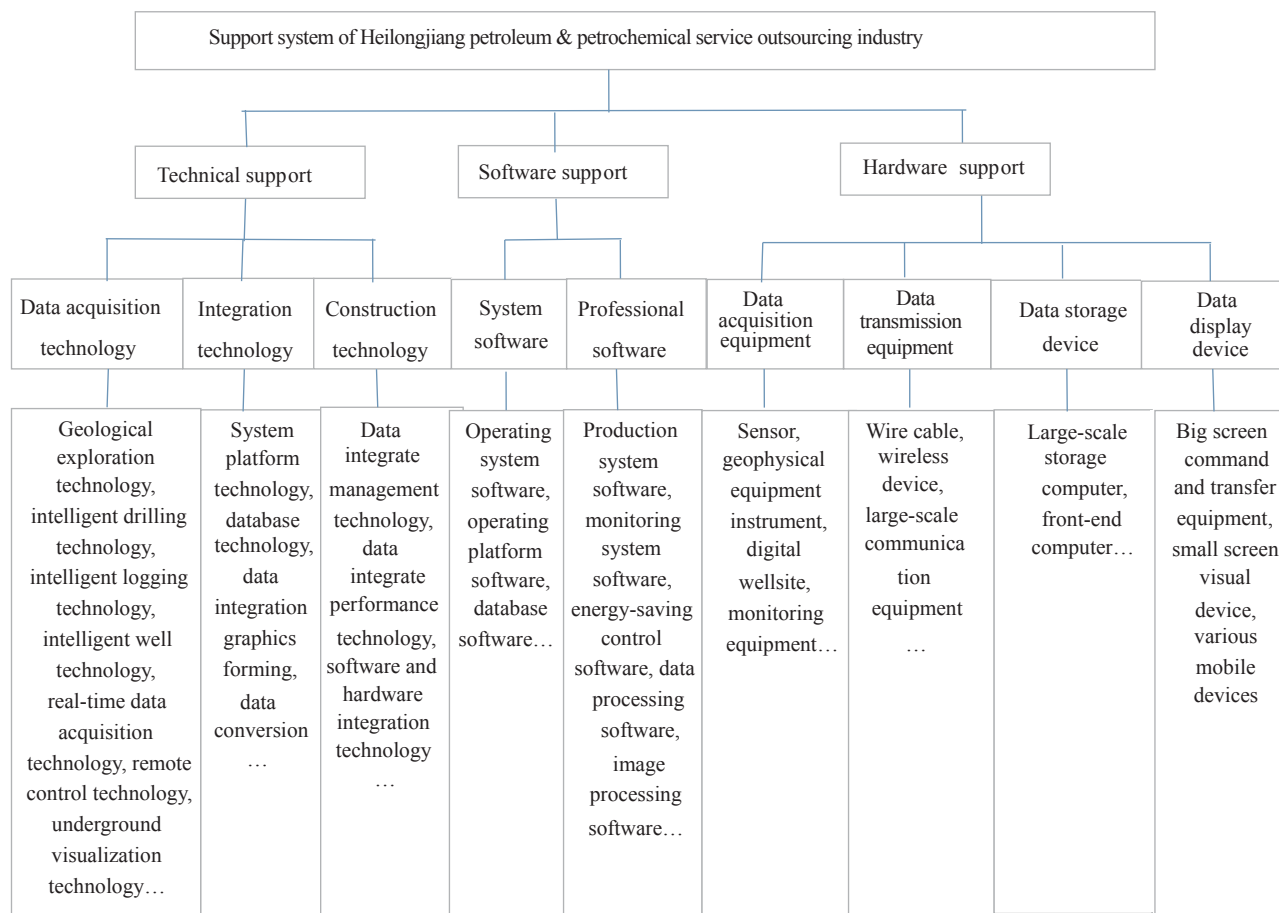
e-commerce and network technology services. Special software development and solutions of petroleum & petrochemical include petroleum industry application software, petrochemical industry application software, petroleum & petrochemical industry auditing and taxation application software; Special petroleum & petrochemical technology service includes exploration, geophysical exploration, logging, drilling, fracturing, workover, well-logging, perforation, well test, extraction, petrochemical and refining, etc.. Special industrial design of petroleum & petrochemical includes petroleum & petrochemical industry design and services; Embedded system background support includes petroleum &

petrochemical security technology, system integration, network engineering, monitoring services, logistics transmission system, laser goggles, LED lighting and display; E-commerce includes petroleum & petrochemical bulk commodity trading platform; Network technology services include website construction and network media, digital media and advertising design, website production and network software development, talent website construction and network media. Second, BPO includes data services and call services. Data services include petroleum & petrochemical data acquisition, data processing, geological information, professional database and data center; call services include call center business. Third, KPO includes animation film, television and engineering design. Animation film and television include petroleum & petrochemical multimedia publicity and

virtual reality, animation production, game production, film and television production; engineering design includes oilfield ground engineering design, architectural design and decoration design and so forth.

### 1.5 Support System of Heilongjiang Petroleum & Petrochemical Service Outsourcing Industry

Based on the above analysis and classification, we can find that Heilongjiang petroleum & petrochemical service outsourcing business not only covers petroleum & petrochemical field industry chain, but also owns related industry support system. For example, data center service enterprise provides hardware services for enterprises of software and technical service, software enterprise provides software services for data acquisition and processing of data center, to provide software service for technical enterprise (as shown in Figure 4).



**Figure 4**  
**Support System of Heilongjiang Petroleum & Petrochemical Service Outsourcing Industry**

## **2. NECESSITY AND FEASIBILITY ANALYSIS ON HEILONGJIANG PETROLEUM & PETROCHEMICAL SERVICE OUTSOURCING INDUSTRY CLUSTER CONSTRUCTION**

### **2.1 Necessity of Heilongjiang Petroleum & Petrochemical Service Outsourcing Industry Cluster Construction**

#### **2.1.1 It Helps to Relieve the Pressure of Petroleum Reduction of Production**

Petroleum & petrochemical traditional industry made great contributions for the nation, however, oil resource is non-renewable, so, it is imminent to find continuous industry to solve sustainable development problem of petroleum & petrochemical. Petroleum & petrochemical service outsourcing industry derived from traditional industry is bound to become one of continuous industries, the cluster construction can more effectively promote the development of economy, make snowballing agglomeration effect, promote rapid derivative and growth of new enterprises in the cluster.

#### **2.1.2 It Helps to Improve Overall Competitiveness of Industry**

The formation of petroleum & petrochemical service outsourcing industry cluster will be beneficial to reduce enterprise cost, improve production efficiency, encourage innovation, so as to improve competition ability of overall industry. At the same time, competitiveness also can promote cooperation, the enterprises can join to develop new products, open up new market together, to form a kind of mechanism of both competition and cooperation. Small and medium-sized enterprises can overcome their own weaknesses through this efficient network interaction and cooperation, and contend with more powerful competitors<sup>[5]</sup>.

#### **2.1.3 It Helps to Enhance Innovation Ability of Enterprise**

The development of industry cluster is conducive to promote enterprise's innovation in all aspects, because the cluster can provide good innovation environment for enterprises, can promote transfer and diffusion of knowledge and technology, at the same time, the existing of Learning Curve and technical innovation and cooperation among enterprises can reduce innovation cost, as a result, accelerate the development of enterprises.

#### **2.1.4 It Helps to Form Regional Brand of Petroleum & Petrochemical Service Outsourcing**

Petroleum & petrochemical service outsourcing industry cluster is a flexible production complex composed of petroleum & petrochemical service outsourcing enterprises, relevant supporting enterprises, local governments, industrial associations, financial institutions

and educational agencies and so forth. The development of industry cluster can gradually form regional brand of petroleum & petrochemical service outsourcing, so as to go out Heilongjiang, towards the nation and world.

### **2.2 Feasibility of Heilongjiang Petroleum & Petrochemical Service Outsourcing Industry Cluster Construction**

Based on above analysis, under long-term experience and technology accumulation, Heilongjiang petroleum & petrochemical service outsourcing enterprises have been able to undertake relevant service outsourcing business from upstream exploration and development, to midstream and downstream transportation, refining, processing and sales, etc. overall industry chain within petroleum & petrochemical field, most of petroleum & petrochemical service outsourcing enterprises gather in service outsourcing industrial park, own the conditions of forming industry cluster with related supporting enterprises, associations and governments, etc. institutions.

At the same time, according to industry cluster theory, petroleum & petrochemical industry cluster mainly depends on petroleum resource to develop, so single industrial structure and simple supply chain form determine congenital deficiency of low diversity degree and lack of vitality, the cluster characteristics of complementarity and network are difficult to reflect in resource-based industry cluster. Government's strong interference also makes resource-based industries suffer from big constraint. However, to a great degree, petroleum & petrochemical service outsourcing industry cluster construction can liberate from the constraint of resource-based industry cluster development, the enterprises can form complementarity and network characteristics, the members can form certain knowledge flow and have a certain spillover effect to the surrounding areas<sup>[6]</sup>.

Therefore, Heilongjiang petroleum & petrochemical service outsourcing industry cluster construction has certain feasibility.

## **3. THE GOAL AND MEASURES OF HEILONGJIANG PETROLEUM & PETROCHEMICAL SERVICE OUTSOURCING INDUSTRY CLUSTER CONSTRUCTION**

### **3.1 The Goal of Industry Cluster Construction**

Heilongjiang petroleum & petrochemical service outsourcing industry cluster construction should take the new opportunity of international software and service outsourcing industry rapid transfer, highlight the characteristics of local industry, the keys of cluster construction are petroleum & petrochemical information engineering technology outsourcing services, data

outsourcing services, cloud services, IoT and embedded system as well as creative design service outsourcing, try to create the brand of “one base and two centers”, namely, world petroleum & petrochemical service outsourcing industry base (focus on the businesses of petroleum & petrochemical software development, industrial design and technical services and so forth), China data outsourcing service center (focus on petroleum & petrochemical data acquisition, data processing, geological information and professional database) and cloud service center (focus on petroleum & petrochemical e-commerce cloud services, security monitoring and IoT cloud services, internet contents and application cloud services, education cloud services and call cloud service and so forth). Try to build innovative petroleum & petrochemical service outsourcing industry cluster, to promote local economic development.

## **3.2 Measures of Industry Cluster Construction**

### **3.2.1 To Introduce Well-Known Enterprises and Support Backbone Enterprises**

For the emphasis of introduction, pay special attention to layout and development of Schlumberger and Halliburton, etc. large-scale international petroleum & petrochemical service outsourcing enterprises at home and abroad, set up China headquarters in Asia in Heilongjiang Province around Daqing oilfield. At the same time, pay attention to foreign petroleum & petrochemical service outsourcing enterprises with convenient communication with oilfield, concentrated service outsourcing enterprises and high operating costs. In introduction information, make good use of industry organization, website, exhibition and media, and pay attention to collect, sort out and research industry development and the dynamic of enterprises. In introduction channel, establish good relationships with industry experts, consultants, influential entrepreneurs and intermediary institutions, and pay attention to intermediary introduction and gather merchants by friends. In promotion, propagate petroleum culture, iron man spirit, make a speech through internet (micro-blog) marketing, professional exhibition booth and industry BBS, and promotion through mainstream media and so forth, to increase propaganda, to improve recognition and reputation of Heilongjiang petroleum & petrochemical service outsourcing.

Research and analyze key enterprises one by one, classify and provide personalized service aiming at restriction factors of enterprise development, pay special attention to market development, talent introduction and cultivation, foreign publicity and contact, fund and policy and so forth. help leading enterprise rapidly develop and grow, to make them lead comprehensive development of the industry. In accordance with technical advantages and accumulation of enterprises, cultivate backbone enterprises in outsourcing fields of production and management in whole process of upstream and downstream of petroleum & petrochemical, as well as

automatic control and so forth, gradually form petroleum & petrochemical service outsourcing industry cluster of participating in international competition<sup>[7]</sup>.

### **3.2.2 To Cultivate and Introduce Talents and Do Well Training**

Strengthen introduction to high-end talents and reward policy, by industrial development to gather high-end talents. Implement “100 persons” action plan around key development areas of Heilongjiang petroleum & petrochemical service outsourcing industry cluster, gather and cultivate a batch of high-tech entrepreneurial teams led by high-end and leading innovative and entrepreneurial talents. Perfect talent incentive mechanism, to encourage intellectual elements and technology elements and so forth, participate in final profit distribution of enterprise, improve the incentive to key position talents, encourage enterprise reduce the brain drain through equity, options and annual salary system and so forth. Introduce well-known training institutions at home and abroad, to achieve zero distance between training and employment, between recruitment and waiting. Promote cooperation connection between enterprise and universities, in time feedback relevant demand information to local universities, and guide local universities develop relevant professional training through the way of course replacement and field work, etc. to develop degree and skill education. Positively strive for talent training special fund support of national ministry of commerce, encourage enterprise to conduct training by itself. Encourage core talent introduction, team introduction and project introduction, etc. to attract professional talents<sup>[8]</sup>.

### **3.2.3 To Construct Platform Infrastructure and Integrate Outsourcing Market**

Internet service needs to green, energy-saving and safe data center (a large number of server cluster) as basic support. Government should further perfect basic data center and petroleum & petrochemical public service platform construction, to provide petroleum & petrochemical data processing, data storage, server hosting, network line, talent training and intellectual property rights, etc. basic services for enterprises, so as to reduce the initial investment and operation cost; Timely adjust network transmission bandwidth according to the requirements of enterprise, to reduce data transmission, voice communication and electricity costs, to build a good environment for industry development.

Analyze and dig oilfield market, seize the favorable opportunity of digital oilfield construction, explore the mode of “factory is exchanged by market”. Form service outsourcing enterprise union by petroleum & petrochemical service outsourcing enterprises as main body, in accordance with inner link of oilfield petroleum & petrochemical outsourcing business sector, guide enterprise division and collaboration, jointly explore the market and undertake outsourcing projects, to cultivate

petroleum & petrochemical outsourcing service flagship enterprise. Investigate government market and promote government informatization by the way of purchasing IT service. By government and oilfield market to cultivate local enterprise grow and attract foreign enterprise settle.

### 3.2.4 To Strengthen Organizational Leadership and Perfect Policy System

Petroleum & petrochemical service outsourcing industry cluster construction should set up industry leading group, the head should be leader of provincial government, the members should include the persons of science and technology, commerce, industry and information committee, development and reform committee, modern service and petroleum & petrochemical Top 10 enterprises, etc. related departments. Strengthen planning and promotion of policy preparation, standard research, industry joint and scientific research and so forth. Under the deployment of leadership team, clear the division of tasks and promote petroleum & petrochemical service outsourcing industry cluster construction. Further implement relevant national industrial policies, actively help key projects of petroleum & petrochemical service outsourcing industry cluster strive for the support of national various special funds while implementing relevant policies of government service outsourcing industry. Support industry cluster development in Russia's petroleum & petrochemical trade, introduction, discount loans, investment subsidies, technical renovation, achievement industrialization and industry base construction and so forth. Give full play to the government role, to guide risk investment support Heilongjiang petroleum & petrochemical service outsourcing industry cluster construction<sup>[9]</sup>.

## CONCLUSION

On the basis of illustrating the current situation of the development of the petroleum and petrochemical industry chain of Heilongjiang Province, the paper, in detail, analyzes the petroleum and petrochemical industry

outsourcing business, and then states the necessity and feasibility to construct the petroleum and petrochemical service outsourcing industry cluster in Heilongjiang province. Finally, it puts forward the construction goal and the countermeasures, which provides references for the related research and offers a clue for the economic transfer of the resource-based cities.

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