

# A Study of Career Development Goals of Petroleum Machinery Graduate Students

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**Abstract:** With more and more difficult problems encountered in drilling engineering, there is a growing demand for high-level petroleum machinery talents in the petroleum industry. In response to the demand for talents, through the assessment of comprehensive abilities such as professional background knowledge and skills, specific field interest ability and communication ability, we deeply explore the personal ability assessment method and career development goal setting strategy in the field of petroleum machinery. It provides practitioners with an accurate positioning and then formulates reasonable career development goals to promote personal growth and the development of the petroleum industry.

**Keywords:** Petroleum Machinery; Postgraduate Students; Career Development; Personal Competence Assessment; Talent Needs

## 1. Introduction

The domestic oil and gas supply gap is 500 million tonnes and 250-300 billion cubic metres respectively, and the contradiction between domestic oil and gas supply and demand will exist for a long time [1]. Postgraduate education is the highest level of higher education, a key symbol of the competitiveness of a country's higher education, and the main channel for the independent training of top-notch innovative talents [2-3]. As an important talent support of the petroleum industry, postgraduate students of petroleum machinery have a direct impact on the efficiency and quality of oil extraction in terms of their technical level and professional quality. The purpose of this paper is to explore how to formulate reasonable career development goals, provide guidance for the career development of graduate

students in this field, and promote the effective supply and articulation of the demand of the petroleum equipment industry and the quality of talent cultivation by analysing the talent demand and promotion routes of different positions in the field of petroleum machinery as well as the assessment of the personal ability of graduate students in the field of petroleum machinery [4].

## 2. Analysis of Talent Demand and Promotion Routes in the Petroleum Machinery Industry

### 2.1 Mechanical Design and R&D Category

**Job Description:** Responsible for the design, development and improvement of petroleum machinery products. Including structural design, component selection, material selection for drilling equipment, cementing equipment, downhole tools and other types. At the same time, also need to participate in new product development projects, from programme design to sample testing, the whole follow-up.

**Promotion Route:** Junior Mechanical Design Engineer → Intermediate Mechanical Design Engineer → Senior Mechanical Design Engineer → Design Supervisor → Design Department Manager → Technical Director.

### 2.2 Technical Support and Service Category

**Job Description:** Provide technical support and after-sales service for the use of petroleum machinery. At the site of petroleum enterprises, solve the technical problems arising during the operation of machinery, debugging, maintenance and repair of equipment. At the same time, communicate with customers to understand their needs and feedback, and provide suggestions for product improvement.

**Promotion route:** technical support specialist → technical support supervisor → regional technical manager → technical service director.

### 2.3 Production Management Category

**Job Description:** Responsible for the management of the production process of petroleum machinery, including the development of production plans, scheduling of production tasks, management of production progress, control of production quality and cost. Need to work closely with the design department, purchasing department, quality inspection department, etc., to ensure the smooth progress of production.

**Promotion route:** production planner → production supervisor → production manager → production director.

### 2.4 Equipment Inspection and Maintenance Category

**Job Description:** Conduct regular inspection and maintenance of petroleum machinery to ensure safe operation and stable performance of the equipment. Using a variety of testing equipment and tools, testing and analysing the parts and components of machinery, timely detection of potential problems and failures, and repair and replacement.

**Promotion route:** equipment inspector → equipment maintenance engineer → equipment supervisor → equipment management department manager.

### 2.5 Sales and Marketing Category

**Job Description:** Responsible for sales and marketing of petroleum machinery products. Understand market demand and competition, develop sales strategy and marketing plan, and establish good cooperation relationship with customers. Need to have good communication skills and market analysis ability, be able to introduce the features and advantages of the product to customers, answer customer questions.

**Promotion route:** sales representative → sales supervisor → sales manager → sales director.

### 2.6 Research and Project Management Category

**Job Description:** Participate in scientific research projects in the field of petroleum machinery and carry out technical research and innovation. Apply for research funding, form research teams, develop research plans, conduct experiments and tests, and write research reports and academic papers. At the same time, you also need to manage and

coordinate the scientific research projects to ensure the smooth progress of the projects.

**Promotion route:** research assistant → project leader → research department manager → director of technology research and development.

## 3. Accurate Assessment of Personal Development Plans

### 3.1 In-Depth Personal Character Assessment

Understanding one's personality traits can help one find a more suitable career direction. According to the Myers-Briggs Type Indicator (MBTI), there are 10 typical personality types among the research samples of postgraduate students of petroleum machinery in this paper, and the personality types suitable for working in the field of petroleum machinery and suitable for their positions are given in Table 1. Among them, personality type I: introversion - E: extroversion; S: sensing - N: intuition; F: sensibility - T: rationality; P: perception - J: judgement [5-7].

### 3.2 Comprehensive Assessment of Individual Competencies

On the basis of personal character assessment, in order to meet the actual needs of the society and the employment problems of talents as a guideline, the assessment of personal ability of petroleum machinery postgraduates is divided into two aspects: professional ability and social ability. The professional ability in the structure of personal ability should include the mastery of mechanical theoretical knowledge (mechanical design, mechanical principle, mechanical drawing, etc.) which is universal and mechanical theoretical knowledge (oil drilling machinery, offshore oil and gas equipment and technology, introduction to petroleum engineering, etc.) which is specific to the petroleum industry [8]. Its evaluation criteria can be quantified through competition scores, examination papers, practice and other aspects. The social ability in the personal ability structure should include the completion of the enterprise internship, teamwork, foreign exchange-oriented content, and its evaluation criteria can be quantified through the internship log, competition experience, foreign language level and so on.

**Table 1. MBTI Personality Assessment for Petroleum Machinery Postgraduate Students**

personality type	Personality	Work	Social	Suitable Position
ISTJ	Quiet and introverted Serious and reliable Logical	Strong sense of responsibility, high concentration, do not like variables	Happy to help and care for others	Equipment testing and maintenance jobs, technical support and service category
ISFJ	Friendly and quiet Attentive and patient Sacrificial	Observant, thoughtful, quiet, and upset and frustrated if someone breaks the rules	Values partner and family and cares about the feelings of others; can be shy around strangers	Equipment testing and maintenance jobs
ESTJ	decisive and capable Sociable Passionate and stubborn	Have their own unique and clear logic system; technical and career orientated people	Sociable, demanding of others, easy to ignore others' feelings	Mechanical Design and Development, Production Management, Research and Project Management
ESFJ	High EQ sociable warm-hearted	Rigorous, with a strong focus on safety and reliability; malleable, well organised and co-ordinated	Good at identifying the needs of others and providing assistance	Project Management Category, Sales and Marketing, Production Management
ISTP	Positive and optimistic Sharp and impulsive Complexity of character	Strong action and information insight; interested in cause and effect, systematic processes; willingness to try alternative activities	Introverted but communication can take over	Technical Support and Service, Equipment Inspection and Maintenance, Mechanical Design and Development
ESTP	Positive and optimistic Flexible and versatile Smart and confident	Positive and open attitude and problem solving with a practical focus, good at improvisation; a spirit of challenge	Articulate and gifted leader; strong personality	Project Management, Sales & Marketing, Production Management, Technical Support & Services
ENFP	Free-spirited and enthusiastic. Prone to mood swings	Wide-ranging interests also tend to be talented and adaptable; acts with confidence, but tends to procrastinate	A master of socialising, a master of all kinds of coldness; always ready to give appreciation and help to others	Sales & Marketing, Technical Support & Services
INTP	Quiet and introverted Thoughtful Suspicious and critical	Passionate about exploring logic and principles; possesses in-depth problem solving skills	unsociable	Equipment Inspection and Maintenance Category, Mechanical Design and Development Category
ENTP	Inquisitive Honest and direct confident.	Innovative and quick-thinking Good at finding theoretical possibilities; difficult to be persistent	speak bluntly without euphemism	Mechanical Design and R&D Category
ENTJ	strong and domineering Decisive and honest Self-esteem	Quickly identifies irrationalities and inefficiencies; good at long term planning and goal setting	Strong No mercy	Project management, production management

#### 4. Integration of Diversified Needs and Scientific Target Planning

##### 4.1 Periodicity of Target-Setting

Many students are confused about their future career direction although they choose to major in petroleum machinery [9]. After entering the

postgraduate life, they seem to be at a loss when facing a new way of learning and a new living environment, which leads to a lack of target direction in their learning process and makes it difficult for them to enhance their professional abilities in a targeted way. The full-time time limit for petroleum machinery graduate students is usually two to three years. Students formulate their personal goal planning from the time of admission and need to make periodic adjustments to their development goals and implementation strategies according to the situation. It can be said that the periodicity of goal setting ensures the realisation of personal development goals [10].

## 4.2 Multiple Synergies in Goal-Setting

### 4.2.1 Collaboration between colleges and tutors

Colleges can provide rich academic resources, advanced experimental equipment and a good academic atmosphere for petroleum machinery graduate students. Mentors, with their rich professional knowledge and scientific research experience, play a key role in academic guidance, research direction selection, etc., and can tailor-make personalised cultivation plans for students according to their characteristics, helping them to delve deeper into their professional fields. As a postgraduate student of petroleum machinery, you should actively communicate with your supervisor to clarify your research interests and career direction.

### 4.2.2 Enterprise synergy

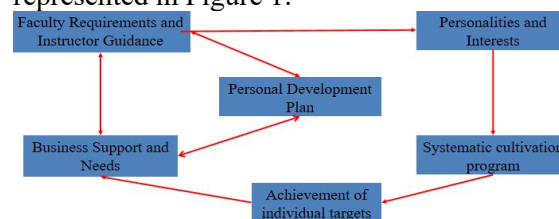
Petroleum machinery-related enterprises have a keen insight into industry trends and market demand. For courses that require high practical experience, colleges can hire enterprise experts to give lectures and conduct enterprise case teaching in combination with the actual operation of enterprises [11]. Students can establish contact with enterprises through internships, project cooperation and other ways, and can take the initiative to seek opportunities for internship in enterprises to understand the actual operation and technical needs of enterprises. In the process of internship, they can communicate with engineers and managers of enterprises to understand the latest technology and development direction of the industry.

### 4.2.3 Family synergy

Family support and understanding are crucial

to the career development of postgraduate students. Family members can give you encouragement in spirit and provide you with protection in life. When formulating career development planning goals, you should fully consider your family's expectations and actual situation. Communicate with your family to let them understand your career planning and seek their support. At the same time, it is also important to set career development planning goals that meet your inner needs based on your interests, abilities and values.

The multi-party synergy process can be represented in Figure 1:



**Figure 1. Multi-Party Collaborative Goal-Setting Process**

## 5. An Investigation into the Implementation Strategies of the Career Development Goals of Petroleum Machinery Graduate Students

### 5.1 Learning & Enhancement

#### 5.1.1 Course study

Courses in petroleum machinery cover a wide range of knowledge such as mechanical design, material mechanics, fluid mechanics, petroleum engineering and so on. Learning these courses systematically, students can establish a professional knowledge system and lay a solid foundation for future work and research in the field of petroleum machinery.

#### 5.1.2 Practical exercise

Scientific research projects can deepen professional knowledge, cultivate innovation ability and improve scientific research quality, so that they can break through themselves in solving specific problems. Corporate internships enable them to understand the actual needs of the industry, accumulate valuable practical experience, and build up professional networks. The combination of the two paves a solid path for postgraduates' career development in the field of petroleum machinery, helping them to better adapt to their future work and become the best in the industry.

#### 5.1.3 Academic exchange

For postgraduate students of petroleum

machinery, it is of great significance for them to participate in academic conferences and seminars. This not only enables them to get in touch with the industry's cutting-edge dynamics and the latest research results, broaden their professional horizons, but also communicate and interact with experts and scholars at home and abroad, inspire innovative thinking, accumulate valuable resources for future career development, and help them develop their own road to success in the field of petroleum machinery.

## 5.2 Comprehensive Quality Cultivation

### 5.2.1 Cultivation of innovation ability

In the field of petroleum machinery, technology is constantly advancing and market demand continues to change. Graduate students with innovation ability can break through traditional thinking and develop more efficient and reliable petroleum machinery products and technologies, bringing competitive advantages to enterprises. At the same time, innovation ability also helps them to stand out in their career development, become leaders in the industry, and promote the sustainable development of the petroleum machinery industry.

### 5.2.2 Teamwork ability cultivation

In scientific research projects and practical work, it is often necessary for people with multi-disciplinary backgrounds to work together. Good teamwork ability can make students of different majors, tutors and enterprise personnel communicate efficiently, complement each other's strengths, and overcome complex technical problems. It also allows students to grow rapidly in the team and accumulate rich experience in cooperation. In enterprises, graduate students with strong teamwork ability are more favoured by enterprises, can better adapt to the workplace environment, and lay a solid foundation for achieving career development goals.

### 5.2.3 Cultivation of communication ability

Whether in the process of scientific research, or in the enterprise internship or future work, effective communication with supervisors, team members and customers can better understand the task requirements, coordinate the work progress, solve the problem of conflicts, and ensure the smooth progress of the project. Excellent communication skills will enable the petroleum machinery graduate

students to fully demonstrate their professionalism and competence, open the door to more opportunities for career development, and help them achieve greater success in the field of petroleum machinery.

## 6. Concluding Remarks

As an important support for the fossil energy industry, the technical level and personal quality of petroleum machinery graduate students are directly related to the development and utilisation of oil and gas resources. They should adjust their career development goals in time according to the changes in the social environment, and continuously improve their own ability to adapt to the rapid development of the industry. Therefore, it is of great practical significance to determine career development goals by considering personal interest, industry demand and social environment, and to formulate practical career development goals. Personal interest can stimulate their own internal motivation, so that in the process of career development to maintain a proactive attitude; industry demand determines the market requirements for talent and job setup, need to pay close attention to the industry dynamics, to understand the skills and knowledge required for different positions, in order to better adapt to market competition. Petroleum machinery graduate students should continue to learn, improve personal comprehensive quality and adjust the career planning, to achieve their career development goals, and contribute to the development of the petroleum industry.

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