

The Situation and Significance of the Construction of Analysis and Testing Center in Colleges

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Abstract: *The for Chinese inspection and testing market has exceeded 100 billion magnitude before 2010, but the response speed of the testing market has been widely criticized. Testing institutions are often unable to obtain sufficient effective market information and dare not to invest in personnel or equipment, thus restricting the services for customers. On the basis of researching on kinds of domestic inspection and testing institutions, we summarized the operation mode of some analysis and testing centers in colleges and universities, and we analyzed the significance of the construction of analysis and testing centers in colleges.*

Keywords: *Analysis and Testing Center, Colleges, Construction status*

1. Introduction

With the transformation and development of China's economic and industrial structure, and the deepening of the government's comprehensive reform, the core position of inspection and testing services in the quality improvement strategy is becoming increasingly prominent. The guiding role of changing testing methods in the development of disciplines is becoming increasingly significant. The market for testing services in China is undergoing drastic changes due to various factors. The market driving force is shifting from government led to market and industry demand driven. Overall, market demand has increased, but due to an increase in participants, competition has further intensified. The market changes brought about by networking and the changes in China's market position in trade provide unprecedented opportunities for the development of inspection and testing platforms.

The social demand for inspection and testing mainly includes government businesses, key projects, export-oriented enterprises, and innovative research and development enterprises. The demand for inspection and testing has exceeded the billions before 2010. Due to the fact that the testing institutions belong to different industry regulatory departments, and the asset form is mainly state-owned, the phenomenon of fragmentation in the testing and certification industry is obvious. Meanwhile, with the further transformation of China's industrial structure, the direction of industrial development has shifted from being made in China to being created in China; The main body of China's industrial structure has shifted from high energy consumption and high pollution processing and manufacturing industries to energy consumption and high efficiency service industries. The dominant position of enterprises in independent innovation, the improvement of the technological innovation market environment, the policy inclination towards strategic emerging industries, and the three closely related factors of the technology service industry have opened up a vibrant market. The inspection and testing service as a cutting-edge and leading industry, has great urgency and potential for development.

The inspection and testing service industry, as an important component of the technology service industry, has been growing rapidly and has always been of concern to all relevant industries. Due to its promising development prospects, the number of industry participants has also grown rapidly. The growing participants come from various testing institutions within the system released by institutional reform. Instrument companies are also entering the inspection and testing service market. With the further opening up of the domestic testing agency industry, domestic instrument manufacturers have accelerated the pace of cross domain services. Finally, foreign institutions are also accelerating their entry into China in various ways. The rapid growth of China's inspection, testing and certification not only promotes the rapid development of domestic institutions, but also attracts the development efforts of foreign institutions. However, the response speed of China's testing market has been widely criticized. There are many cases in the industry where a company spent three months searching for a testing agency that can provide corresponding services. And testing institutions often hesitate to invest personnel and equipment due to the inability to obtain effective market development trend information,

thereby limiting the difficulty of providing services to customers. With the development of information technology and the further integration of the internet industry and testing business, a large number of information platforms have emerged relying on various resources, and are activating the testing service market in the form of networks. In the previous stage of economic development, China's economic growth relied on exports and international markets, which to some extent indicates that China's economy belongs to an export-led economy. At present, the external demand led economy is rapidly transforming into a domestic demand led economy. In this new situation, the testing service industry representing standards, quality, and brand is an important link in the trade support chain. The new era has brought a new market for inspection and testing services, while also providing a new opportunity for the development of inspection and testing institutions^[1].

2. Current situation of domestic platforms

2.1. Current situation of domestic analysis and testing institutions

At present, there are a large number of domestic testing institutions, but the overall level of order in the industry is low, showing a phenomenon of many, small, scattered, and weak industry self-discipline. From a field perspective, it covers multiple systems such as quality supervision, agriculture, health, and entry-exit quarantine, with significant duplication in basic testing capabilities among each system. In terms of industry management, the testing institutions are subject to multi management, resulting in a complex and complex overall operation of the industry, unclear industry management entities, and difficult coordination. In terms of the market, mandatory business, competitive business, and voluntary business intersect, with a transparent pricing system and a lack of standardization in competition. A benign market competition mechanism has not yet been established, and some institutions have abandoned fairness and independence for competitive business, even resulting in fraudulent and illegal incidents.

With the increasing importance of testing activities in social production and life, the overall standardization and entry threshold of the industry are constantly improving. The original testing market is relatively scattered, intensifying market competition, and compressing the industry's development space. However, the development methods of small and medium-sized testing institutions are relatively extensive, and the rise in regulatory costs brings greater pressure to their production and operation. After years of development, large-scale comprehensive testing institutions have a high degree of standardization, strong social credibility, strong technical capabilities and scale advantages, and overall profitability is stronger than small and medium-sized testing institutions. The rapid growth of the market has also attracted the development trend of foreign institutions, and compared to various domestic institutions, the advantages of foreign testing institutions are also more obvious.

2.2. Current situation of local analysis and testing institutions

According to research statistics, as of 2021, there are 25 local analysis and testing institutions nationwide, including 2 national level analysis and testing institutions (Guangzhou and Shanghai) and 23 provincial level analysis and testing institutions.

According to administrative regions, there are Jilin Province, Shaanxi Province, Zhejiang Province, Tibet Autonomous Region, Hainan Province, Inner Mongolia Autonomous Region, Taiwan, Hong Kong and Macao Special Administrative Regions that have not established local analysis and testing sharing centers.

According to unit level classification, national level analysis and testing centers include Guangzhou Analysis and Testing Center (Public Welfare Category II) and Shanghai Institute of Metrology and Testing Technology (East China National Metrology and Testing Center, Shanghai Testing Center) (Public Welfare Category II), with the remaining 23 being local analysis and testing centers.

According to the division of unit nature, there are 25 local analysis and testing centers nationwide, 9 public welfare first class testing centers, 11 public welfare second class testing centers, 2 unincorporated entities, and 3 transformed enterprises. Among them, local testing centers with enterprise nature account for 12% of the total.

The local analysis and testing center can serve as a training base for training analysis and testing skills. From the perspective of personnel training, it can cultivate technical personnel's operational ability, hands-on ability, experimental design ability and scientific and rigorous thinking. Through

experiments, theories, technologies and methods can be further understood. And use the modern analysis and testing technology to establish the instrument analysis method to be applied in practice, give play to the education and teaching function of the local analysis and testing center, and constantly improve the quality of talent training. To stimulate the desire to explore unknown things, to use scientific instruments in the laboratory for scientific research, to give experimental technicians more opportunities to exercise, promote the emergence of scientific research results, constantly improve experimental skills, and cultivate a large number of skilled and research-oriented talents, is a vivid interpretation of the integration of education, teaching and scientific research exploration and practice.

The local analysis and testing center is the basis for the construction of key laboratories at all levels. It constantly strengthens the discipline construction, enriches the discipline connotation, and focuses on the interdisciplinary and integrated development. According to the discipline development direction, the scientific instrument resources of the local analysis and testing center are taken as the basis for the establishment of key laboratories, so as to quickly build key laboratories or related platforms, and make them a gathering place for outstanding talents. More conducive to the development of discipline construction and personnel training work; The establishment of analysis and testing fund through various ways can provide necessary financial support for the research of analysis and testing methods, the maintenance and operation of instruments and equipment or the improvement and improvement of instrument performance, and provide necessary guarantee for the integrated development of teaching, scientific research and personnel training; At the same time, it is necessary to continuously improve the research ability and level of analysis and test methods, increase the reserve of analysis and test methods, so as to improve the rapid response to emergencies. The full text of the article must be typeset in single column.

2.3. Construction status of Analysis and testing sharing center

Domestic analysis and testing sharing centers are mainly built in colleges and universities. With the rapid development of scientific research activities to explore the material world, experimental instruments and equipment have gradually become the basis of discipline development and scientific research in colleges and universities. Large precision instruments and equipment are the guarantee of personnel training and technological innovation and development. To provide strong support for the cultivation of high-level top talents and the research of national major project technology. At present, the ownership rate of large precision instruments and equipment in various universities is uneven, and the regional layout and service coverage of some large precision instruments and equipment with specific functions are not reasonable, resulting in low efficiency of instrument use and unmet testing requirements. The construction of analysis and test sharing center is a powerful means to improve the use efficiency of large instruments and make reasonable and effective use of equipment and human resources.

By 2021, there will be about 140 analysis and testing centers in colleges and universities. Most analysis and testing centers have advanced instruments and equipment, highly educated professional team, good place environment, with strong analysis and testing ability. In addition, universities are independent of the market and are natural third-party laboratories. The analysis and testing center of colleges and universities has achieved three main functions, one is to serve the cross-research among different disciplines of the university, the other is to provide a public experimental place for the cultivation of college talents, and the third is to provide an important sharing platform for social services.

According to the operation and management mode, the analysis and testing centers of domestic colleges and universities can be roughly divided into the following four categories:

First, the Analysis and Testing Center of Shanghai Jiao Tong University and Analysis and Testing Center of Sun Yat-sen University are represented by the directly affiliated mode of the university. This mode relies on the establishment of disciplines and is managed by affiliated functional departments, which is easy to obtain the support of the university and has a wide range of services.

Second, the analysis and test Center of Tsinghua University and the Analysis and Test Center of Peking University are represented by the mode of relying on the discipline platform and the joint management of functional departments. The analysis and test center is attached to the discipline platform, which makes the work of the analysis and test center closely connected with teaching and research, close to the frontier of the discipline and conducive to the development of instrument functions. In addition, the funds of the discipline platform can also support the operation and

maintenance of the instruments, thus forming a virtuous cycle. However, the scattered instruments in the research group bring certain difficulties to the management at the school level.

The third is the university-school two-level management mode represented by Wuhan University Test Center and Southeast University Analysis and Test Center. Under this mode, the analysis and test center belongs to the college, which is an operation mode emphasizing the combination of disciplines. The university department is in charge of the business, so the management of the superior unit and the scientific research team of the college is smooth, but the service scope is limited to the college. It is not closely connected with teaching, which is not conducive to interdisciplinary. This mode is beneficial to maintain and improve the personnel level of analysis and testing center.

Fourth, the analysis and testing Center of the University of Science and Technology Beijing is the representative of the operating company management mode. In this mode, a business company is established, and under the premise of not changing the subordination relationship of large instruments and equipment in the school, the instruments are integrated into the virtual operating platform of the company according to the characteristics of the discipline, which is managed by the company in a unified way, and the external business is developed. This way can fully improve the utilization rate of large instruments and effectively carry out foreign service work. However, the disadvantage is that economic benefits may be emphasized while social benefits may be ignored in practical work.

The Analysis and Testing Sharing Center project of Xidian University is a comprehensive inspection and testing institution with the goal of discipline development, talent training and serving the society. It is managed by the functional departments of the university to give full play to the advantages of the university's disciplines and integrate superior resources. The technology resources of the State Key Laboratory of the University, the National Engineering Research Center of Wide and Tight Band Semiconductor, the Key Laboratory of Radar Signal Processing, the Key Laboratory of Antenna and Microwave Technology and other national science and technology innovation bases are fully open to the society and shared, and all kinds of inspection and testing businesses are actively carried out.^[2]

3. Advantage of Analysis and testing sharing center

3.1. Improve the utilization rate of instruments and equipment, maximize the realization of resource sharing

Analysis and test sharing center is an intensive management platform for large instruments and equipment. Through the analysis and test sharing center, resources of various departments and disciplines are integrated, which reduces the idle waste and repeated purchase of instrument resources, improves the use efficiency of instruments and equipment, and thus realizes resource sharing at a higher level. The centralized management of instruments is of great significance to the cultivation of talents and the acquisition of scientific research results, to the cultivation of comprehensive applied talents and to the improvement of teaching and research level, professional development and the construction of a conservation-oriented society. Centralized management of large instruments and equipment is conducive to efficient use of funds, improve efficiency, to achieve the need of materials, materials to the best use.

3.2. Support the construction of disciplines and promote the development of frontier cross fields

With the continuous progress of human science and technology, a single discipline has been unable to conduct in-depth research on some problems. The comprehensive development trend of scientific problems requires to find the internal relations between disciplines and reasonably build a new system of cross-disciplines. Analysis and testing sharing center is conducive to breaking the inherent ideological constraints among various disciplines, focusing on the introduction of multidisciplinary thinking and practical application value, and constantly training multidisciplinary innovative talents. To walk in the academic frontier, we must base on the new interdisciplinary field, increase the exchange of disciplines, promote the integration of disciplines, open up the new direction of disciplines, and lead the new development of disciplines. Through the establishment of cutting-edge equipment sharing platform, it can effectively promote the construction of disciplines and achieve academic diversification.

3.3. Promote the combination of industry, university and research to cultivate innovative talents

Analysis and testing sharing Center is not only a scientific research service platform, but also an important base for universities to cultivate all-round, high-quality innovative applied talents. The analysis and testing sharing Center can provide students with theoretical knowledge related to instruments and equipment, and through the training on the use of instruments and equipment, combine theory with practice to enhance practical level and critical thinking ability. Analysis and test sharing center can also provide favorable support for students to carry out independent research projects.

3.4. Open and sharing to enhance the social service function of schools

Analysis and testing Sharing Center is an intensive management platform for large-scale equipment and instruments. It is open and shared both inside and outside the school. It can provide testing services for various enterprises and units and is a link between enterprises and schools. Through the cooperation with the analysis and test sharing center, enterprises can improve their own testing and research and development ability, reduce their research and development costs, improve their benefits, and promote the development of local economy.

4. The management mechanism of Analysis and testing center in college

4.1. Establish and improve the sharing mechanism of instruments and equipment

Equipment and instruments used for teaching and scientific research in schools, especially those of high value, must be incorporated into an open and shared system to provide testing services for others and society.^[3]

4.2. Establish a use-oriented evaluation and supervision system with user participation

The evaluation method of instruments and equipment can be evaluated in terms of utilization rate, user evaluation, effective service time, service quality, output, level and contribution of relevant research results.

4.3. Establishment of large instruments and equipment maintenance and upgrading fund

Instruments and equipment with good assessment results will be funded by the school for repair, maintenance and new function development.

4.4. Establish cost accounting and service fee management mechanism

In accordance with the principle of cost compensation, the cost of ordinary services is assessed, the value-added benefits of advanced services are reflected, and a reasonable paid service mechanism is implemented. An incentive system shall be established to promote the sustainable development of the center, and performance rewards shall be given to units and technicians who provide open and shared services.

4.5. Strengthen information security and intellectual property protection

The intellectual property generated from the independent scientific experiments conducted by users shall be owned by users themselves. The scientific research facilities and instruments those have been used shall be clearly referred to when the results are published.

4.6. Explore the establishment of instruments and equipment "redemption" mechanism

In view of the problem that the equipment was idle and still occupied after one project, a "redemption" mechanism in the form of innovation vouchers and time charges can be established, which was managed by the school in a unified way for secondary development and utilization.

5. Conclusions

The construction of the analysis and testing center can meet the urgent needs of teachers, especially young teachers, for scientific research conditions, realistic needs for reasonable allocation of resources and potential needs for discipline construction and development. The good construction of the center can strive to promote the improvement of school education and teaching conditions, provide strong support for talent introduction and major project commitment, provide strong support for organized scientific research and free exploration of independent topics under the new nationwide system, provide strong support for the development of superior disciplines and basic disciplines, and promote interdisciplinary integration and innovation.

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References

- [1] Yu Z.(2022). *Discussion on the Construction of University Analysis and Test Center under the Sharing and Open Mechanism. Shanghai chemical industry*,5, 50-52.
- [2] Yuan C.C, Han Q, Zhao Q and Yao Y.Z.(2022). *Research on the path of promoting interdisciplinary integration through equipment sharing in universities with industrial characteristics. Journal of Luoyang Normal University* ,11,58-61.
- [3] Xu J.J and Liu F.(2022). *Research on Innovation Mechanism of Equipment Sharing in University Analysis and Test Center. Experimental technology and management*,8, 229-232.