Analysis on the quality management of comprehensive inspection and testing institutions

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Abstract: The importance of quality management in comprehensive inspection and testing institutions is self-evident. This paper systematically analyzes the status quo of quality management in comprehensive inspection and testing institutions, and finds that most of these institutions have problems such as imperfect management system, inadequate personnel quality and ability, inadequate equipment and environmental management, and lagging testing methods and technologies. In view of the above problems, the paper puts forward improvement measures on improving the quality management system, strengthening personnel training and management, optimizing the inspection and testing process, optimizing the equipment and environmental management, and promoting the application of new technology. Through the implementation of a series of management measures, it will help to improve the accuracy, fairness and effectiveness of the test results, promote the sustainable development of the institution, and contribute professional and technical strength to the high-quality development of the economy and society.

1. Introduction

With the rapid development of economy and society, people's requirements for product quality and living environment are increasing, and comprehensive inspection and testing institutions play an irreplaceable important role in ensuring product quality and safety, maintaining market order, protecting consumer rights and interests, and promoting high-quality development. However, in recent years, some cases of falsification of test data and questioning of environmental monitoring data have aroused widespread concern about the accuracy and fairness of test results. How to effectively improve the quality management level of comprehensive inspection and testing institutions and ensure the authenticity and reliability of test results has become a major issue to be solved. This paper will deeply discuss the effective path to improve the quality management level of organizations from multiple dimensions such as quality management system, personnel management, process optimization, equipment environmental management, and technological innovation.

2. The concept and function of a comprehensive inspection and testing organization

Comprehensive inspection and testing institutions refer to professional technical organizations that are established according to law in accordance with the relevant provisions of the Measures for the Administration of the Identification of Qualifications of Inspection and Testing Institutions, and that use technical conditions and professional skills such as instruments, equipment and environmental facilities to conduct inspection and testing of various types of products or specific objects stipulated by laws and regulations in accordance with relevant standards or technical norms. At present, most of them are public welfare institutions. Through the use of advanced testing technology and equipment, such institutions provide comprehensive and systematic product quality testing, environmental monitoring, engineering testing, special equipment testing, measurement and calibration and other comprehensive technical services for various industries, and assume the

important responsibilities of ensuring product quality and safety, maintaining market order, protecting consumer rights and interests, and promoting high-quality development. By implementing strict testing procedures and effective standards such as national standards and industry standards, they test the performance parameters that the product should have, or evaluate the quality of the product, and test whether the product complies with national regulations and industry standards [1]. At the same time, they also undertake the supervision and random inspection tasks of market supervision and management departments at the national, provincial and municipal levels, to provide reliable data support for the market supervision work of government departments, or to provide scientific basis for their formulation of relevant policies. In addition, comprehensive inspection and testing institutions play a key role in technological innovation and industrial upgrading. They have advanced testing equipment and professional technical personnel, in the testing work can find the defects and shortcomings of products in time, provide technical advice and improvement suggestions for enterprises, and promote the continuous improvement of product quality. At the same time, the institution can also use its favorable resource advantages to participate in the research and development and evaluation of new materials, new processes and new products of scientific research institutions and production enterprises, and provide technical support for the development of emerging industries. The work of comprehensive inspection and testing institutions runs through the whole life cycle of products, from raw material procurement to product production, use until scrap, and their professional services are needed. It plays an irreplaceable role in ensuring product quality and safety, promoting technological innovation, and maintaining social and public interests, and is an indispensable and important technical force in modern society.

3. The significance of quality management in comprehensive inspection and testing institutions

Quality management is the main means to control the risk of comprehensive inspection and testing institutions and ensure their effective operation. As a professional technical service organization, the accuracy, fairness and effectiveness of its test results are directly related to the credibility and survival and development of the organization. The implementation of strict quality management is the fundamental guarantee to ensure the authenticity and reliability of the test data and maintain the authority of the organization. First of all, quality management is the premise to ensure the accuracy of test results. Comprehensive inspection and testing institutions need to strictly control the whole process of testing, from personnel qualifications, equipment, environmental conditions to operating procedures and other links must meet the relevant standards and specifications. Secondly, quality management is the key to maintaining the fairness of test results. As an independent testing institution, the comprehensive testing institution must keep its testing conclusions objective, neutral, fair and just. Through quality management, the organization can establish an effective stakeholder identification and review mechanism to avoid undue influence from the tested party or other stakeholders, so as to ensure the fairness and authority of the test results. In addition, quality management can improve the effectiveness of test results and provide a basis for relevant decisions. Quality management can ensure the standardization and standardization of the testing process, so that the test results have good traceability and reliability, so as to improve the utilization value of data, and provide high-quality technical support for government supervision and enterprise decision-making.

4. The deficiency of quality management of comprehensive inspection and testing institutions

4.1 The quality management system needs to be improved

Although most comprehensive inspection and testing institutions have established a preliminary quality management system, the integrity and effectiveness of the system still need to be improved. On the one hand, the management system design of some institutions has a lag, and it is difficult to

timely adapt to new changes and new requirements in the field of testing. With the continuous emergence of new technologies, new methods and new standards, the existing management system is often difficult to cover completely, resulting in a lack of clear guidance and constraints in actual operation. On the other hand, the system operation lacks an effective supervision mechanism, the system implementation is just a formality, can not really play a management role. Although many agencies have developed a series of management systems, the lack of monitoring and evaluation of implementation has resulted in a virtual system. At the same time, as the field of inspection continues to expand, the existing system is also facing challenges in terms of coverage and adaptability, and it is difficult to meet the management needs of emerging fields. In addition, the continuous improvement of the system is also passive and lagging, and it is difficult to optimize and improve in time according to the actual operation.

4.2 Personnel quality and ability need to be improved

The quality of personnel is the basis of quality management, but there are still deficiencies in this aspect in comprehensive inspection and testing institutions. On the one hand, some practitioners have insufficient professional knowledge and skill reserve, which is difficult to meet the increasingly complex testing needs. With the continuous update of detection objects and methods, higher requirements are put forward for personnel's professional literacy, but the knowledge structure and skill level of some personnel have been difficult to keep up with the pace of industry development. On the other hand, there are also problems such as weak professional ethics awareness and sloppy work attitude, which may affect the accuracy and reliability of the test results. As a government public welfare testing institution, independence and impartiality are its lifeline, but some personnel do not know enough about this and may be improperly influenced in the testing process. At the same time, the rapid upgrading of testing technology requires personnel to constantly learn new knowledge and master new skills, and the training investment and system construction of some institutions lag behind the demand, restricting the continuous improvement of personnel quality. The training content is outdated and the form is simple, which is difficult to meet the actual needs of personnel [2].

4.3 Equipment and environmental management needs to be strengthened

Equipment and environmental management directly affect the accuracy of test results, but the current management work in this area is still insufficient. Some institutions do not pay enough attention to the maintenance and metrological traceability of testing equipment, and the performance of equipment cannot be effectively guaranteed. Testing equipment as the hardware basis of testing work, its performance directly determines the accuracy of the data, but some organizations on the equipment maintenance work is only a formality, failed to establish a perfect maintenance system and cycle plan, resulting in equipment performance can not be guaranteed. At the same time, there are omissions in the control and monitoring of the test environmental conditions, which may bring systematic errors to the test results. Test environment such as temperature, humidity, cleanliness, etc., if not properly controlled, will directly affect the accuracy and reproducibility of test data, but some institutions do not pay enough attention to this. Although most institutions have established equipment management and environmental control systems, in the specific implementation process, there are still problems such as inadequate maintenance of equipment and inadequate control of environmental conditions.

4.4 Detection methods and technical applications need to be strengthened

Testing methods and technology application are the core competitiveness of comprehensive inspection and testing institutions, but the development of this field is relatively lagging behind. On the one hand, some institutions have insufficient investment in the research and application of emerging detection technologies, and their technological innovation ability is limited. Testing technology is the basis of comprehensive inspection and testing institutions, but some institutions have seriously insufficient investment in research and development of new technologies, and it is difficult to keep up with the pace of industry development, resulting in weak technological

innovation ability. On the other hand, the optimization and improvement of existing detection methods are also lacking of continuous efforts, and it is difficult to meet the requirements of increasing detection accuracy and efficiency. With the continuous update of detection objects, traditional detection methods are often difficult to meet new requirements, but some institutions have insufficient input in method optimization and improvement, which restricts the improvement of detection quality and efficiency [3].

5. Comprehensive inspection and testing institutions quality management improvement measures

5.1 Improve the quality management system

Improving the quality management system is the key to improve the quality management level of comprehensive inspection and testing institutions. It is necessary to construct a scientific, complete and effective quality management system from the two levels of system construction and operation supervision. In terms of system construction, institutions need to establish a quality management system that covers the whole process. The system shall meet the requirements of relevant laws and regulations and standards, and be refined and improved according to the actual situation of the organization. The content of the system should cover personnel management, equipment management, environmental control, testing process control, data processing and report preparation, etc., to form a comprehensive and systematic management framework. At the same time, the system should also be forward-looking, timely absorb advanced management concepts and practices in the industry, and provide institutional guarantees for emerging technologies and new testing services. In addition to system construction, effective operation supervision is also a prerequisite for the smooth implementation of the quality management system. The institution shall establish a sound internal audit and management review system, check and evaluate the operation of the system regularly, find problems in time and take corrective measures. At the same time, process monitoring should be strengthened, and critical control points should be strictly monitored to ensure that systems and requirements are effectively enforced. In addition, the organization can also introduce a third-party audit mechanism, accept the evaluation and guidance of external professional bodies, and promote the continuous improvement and perfection of the quality management system. Through continuous improvement of the quality management system, comprehensive inspection and testing institutions will be able to better play their professional and technical advantages and contribute professional strength to the high-quality development of the economy and society.

5.2 Strengthen personnel training and management

Institutions should strengthen training, improve management from two aspects, and constantly improve the professional quality and professional ethics of personnel. In terms of personnel training, institutions need to establish a systematic training system. The training content should cover professional theoretical knowledge, operational skills, quality awareness and other aspects, and carry out targeted design according to the actual needs of different positions. At the same time, the form of training should also be diversified, in addition to the traditional classroom training, can also take practical exercise, on-the-job guidance, exchange and discussion and other flexible ways to improve the pertinence and effectiveness of training. In addition, institutions should also pay attention to the continuous learning of personnel, encourage employees to participate in various professional training and qualification examinations, and update their knowledge and skills with The Times. In terms of personnel management, institutions need to establish scientific performance appraisal and incentive mechanisms. Performance appraisal should include the professional ability, work attitude and quality awareness of employees into the scope of assessment, and link the assessment results with salary and job promotion, so as to fully mobilize the enthusiasm of employees. At the same time, institutions should also strengthen professional ethics education, cultivate employees' quality awareness and social responsibility, and improve their independence and impartiality. In addition, reasonable staffing and division of labor are also important links to

ensure the quality of testing, and organizations should scientifically allocate human resources according to work needs to avoid excess or insufficient staffing. Personnel training and management are the cornerstone of quality management [4]. Only with a high-quality testing team, the organization can continue to provide accurate and reliable testing services.

5.3 Optimize the inspection and testing process

The optimization of the inspection and testing process can be started from three aspects: streamlining the process, strengthening the quality control and strengthening the information construction, and constantly improving the detection efficiency and data quality. First of all, organizations need to comprehensively comb and optimize the existing testing process according to relevant regulations and standards, eliminate redundant links, and streamline operational steps. On this basis, a scientific and reasonable standardized process is established to clarify the operation requirements and quality control points of each link, so as to avoid affecting the test results due to human error. At the same time, it should also strengthen the dynamic management of the process, adjust and improve the process in time according to the application of new technologies and new methods, and ensure that it is adapted to the actual operation. Secondly, institutions should strengthen quality control in key links to ensure the accuracy of data from the source. In the sample receiving, experimental operation, data processing and other links, it is necessary to establish strict quality control measures, such as double check, parallel experimental comparison, standard product testing, etc., to discover and correct deviations in time. At the same time, it should also strengthen the process supervision of the inspection personnel, standardize the operation behavior, and avoid omissions and mistakes. In addition, institutions need to increase information construction efforts to achieve efficient collection and sharing of test data. Through the construction of testing data management system, the whole process of testing data will be unified storage and management, to achieve data traceability and auditability. At the same time, the system should also have data analysis and report generation functions to improve the efficiency of data processing. In addition, organizations can also explore the establishment of data sharing mechanisms to share detection data with relevant departments and stakeholders to improve the value of data utilization. By streamlining processes, strengthening quality control, and strengthening information construction, institutions will be able to significantly improve detection efficiency and data quality, and provide efficient and high-quality technical services for high-quality economic and social development.

5.4 Optimize equipment and environmental management

Through equipment maintenance, measurement traceability, and environmental control, equipment and environmental management can be effectively optimized to provide reliable hardware support for detection work. In terms of equipment maintenance, the organization needs to establish a sound equipment management system, and conduct standardized management of the whole life cycle of equipment acceptance, use, maintenance, and scrapping. The system should clarify the maintenance cycle, operation specifications, and troubleshooting process of the equipment to ensure that the equipment is in good running condition. At the same time, the organization should also be equipped with full-time equipment management personnel, responsible for the daily maintenance and maintenance of the equipment, timely discovery and elimination of equipment failure hazards. In addition, for key equipment, the organization can also sign a maintenance agreement with the equipment supplier, and regularly ask the manufacturer to overhaul and maintain. In terms of measurement traceability, institutions need to establish a complete measurement system to ensure the traceability of test data. The institution shall be equipped with all kinds of standard substances and standard instruments to meet the testing needs, and carry out regular calibration or re-determination of them; An internal measurement traceability system should also be established to trace the testing equipment to the corresponding standard instruments according to the level, forming a closed-loop traceability chain; In addition, it is possible to establish a cooperative relationship with national metrological institutions to regularly send key equipment for inspection to ensure the accuracy of metrological traceability. In terms of environmental control, institutions need to strictly control and monitor the experimental

environment according to the requirements of different testing projects. It includes comprehensive control of temperature, humidity, cleanliness, electromagnetic environment and other factors to avoid fluctuations in environmental conditions affecting the test results. At the same time, the institution should also establish an environmental monitoring system to monitor key environmental parameters in real time, and take immediate countermeasures once abnormal conditions are found [5].

5.5 Promoting the application of new technologies

Promoting the application of new technologies is an important way for comprehensive inspection and testing institutions to improve inspection efficiency and quality and maintain competitive advantages. First, institutions need to increase investment in technology research and development and establish independent innovation mechanisms. On the one hand, the institution should set up a special technology research and development department, equipped with advanced research and development equipment and experimental conditions, to provide hardware support for technological innovation. On the other hand, institutions should also encourage innovative activities of employees, establish an innovation incentive mechanism, and inject continuous impetus into technological innovation. At the same time, the institution can also carry out industry-university-research cooperation with external institutions such as universities and research institutes, integrate superior resources, and jointly overcome technical problems. Secondly, institutions need to improve the technology management system and regulate the introduction and application of new technologies. For new technologies, the organization should establish a strict evaluation and verification process to comprehensively evaluate their feasibility, economy and safety, and ensure the maturity of the technology. At the same time, detailed operating procedures and quality control measures should also be formulated to standardize the application of new technologies in actual testing. In addition, institutions also need to strengthen the intellectual property protection of new technologies to prevent technology leakage and theft. Moreover, organizations need to pay attention to the cultivation and introduction of innovative talents. On the one hand, organizations should provide adequate training opportunities for existing employees to help them master the theoretical knowledge and operational skills of new technologies. On the other hand, institutions should also attract outstanding technical talents at home and abroad to join through reasonable salary and career development channels, and inject new vitality into technological innovation.

6. Conclusion

As a public welfare professional technical service institution of the government, the accuracy and fairness of the test results of comprehensive inspection and testing institutions are directly related to the public interest. Strengthening quality management is the cornerstone of the organization's survival and development. By continuously improving the quality management system, strengthening personnel training, optimizing the testing process, strengthening hardware support, and promoting technological innovation, the institution will be able to continue to provide high-quality testing services, contribute professional strength for maintaining product quality and safety, protecting ecological environment safety, and contribute professional technical support for high-quality economic and social development. In the future, with the continuous emergence of new technologies, new products and new materials, the quality management of comprehensive inspection and testing institutions will also face new challenges, and it is necessary to improve management measures with The Times and move forward with economic and social development.

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