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Analysis and Countermeasures on Product Quality Inspection Management in the Quality Management System of Research in Universities

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Abstract

Based on the operation and practice of the scientific research quality management system in Universities, according to the standards demands on product quality inspection and the characteristics of scientific research product, the questions of scientific research product quality inspection in the quality management system in Universities were summarized. The implementation, supervision and management measures of scientific research product quality inspection were analyzed and put forward, in order to provide the reference of enhancing the operational effectiveness of scientific research quality management system and improving the research management in Universities.

Key words: Research in universities; Quality inspection; Quality management system; Scientific research management

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INTRODUCTION

Universities become a force of scientific and technology research in China. Many Universities in order to improve and maintain the quality of research projects or products have proven their ability to provide a stable customer and applicable statutory and regulatory requirements of the research project or product satisfaction, the

research quality management system has established becoming a trend. Since 2006, by the market economy and the relevant national policy guidance, research and management of many domestic colleges and universities have been introducing quality management system standard (GB/T19001-2008). In the existing management system and the system background, the effectiveness questions of the quality management system of scientific research building after the remarkable day by day, such as a domestic colleges and universities to directly under the Ministry of education, 29 of which have established a quality management system of scientific research in Colleges and universities conducted a survey analysis, analysis and summary of the scientific research quality management system in Colleges and universities of many typical problems (Zhang, Qiu, & Yang, 2010). Combining with the operation management of scientific research quality management system in Universities seven years of practice, according to the characteristics of scientific research product in Universities, quality inspection and quality management system based on the requirements of the product, supervision and administration of the quality inspection and product quality management system for scientific research in Colleges and universities, aims to research the specification product quality inspection process management, enhance service effectiveness scientific research management system operation in Universities.

1. THE REQUIREMENTS OF THE STANDARD OF QUALITY INSPECTION

1.1 Standard Requirements of Quality Inspection

GB / T19001-2008 standard (China National Standardization Management Committee, 2009) requires

Organization to deal with characteristics of the product is monitored and measured to verify that product requirements

have been met. Such monitoring and measurement should be performed in accordance with planned arrangements at appropriate stages of the product realization process. The evidence of compliance with the acceptance criteria should be preserved. The records shall indicate the authorizing release of product for delivery to the customer's staff. Unless approved by a relevant authority and, where applicable, approved by the customer, or in the planned arrangements have been satisfactorily completed, not to the customer release of product and delivery of service .

All of above clearly pointed out the requirements for quality inspection and process control points, summarized as follows:

- (a) The purpose of the quality inspection is to verify that product requirements have been met.
- (b) Quality inspection plan should be implemented on time.
- (c) The development of quality inspection methods and equipment should be based on the characteristics of the product characteristics that distinguish the product attributes; the file should be prepared as a test basis.
- (d) The tester of quality inspection should be responsible for authorization, exceptions should be required to release the program and fulfill the approval procedures.
- (e) Quality inspection records should be traceable.

1.2 Relationships of Quality Inspection and Quality Management

The relationships of quality inspection and quality management were summarized as follows:

- (a) From the perspective of the development process of quality management, quality inspection is an important means to ensure product quality, total quality management is from the earliest stages of development over the quality inspection, quality management are closely related to many content quality inspection (Zhang, 2011).
- (b) For the purposes of quality management system, quality inspection for the product, where product includes the raw materials, semi-finished and finished product such systems have a variety of products related to the process output.
- (c) Quality inspection is part of quality management, quality inspection and control and direct content management, including procurement of goods and validation (Standard clause 7.4.3), product monitoring and measurement (standard clause 8.2.4), control of nonconforming product (standard clause 8.3) and test status (standard clause 7.5.3) and other processes, including the ability to test the indirect personnel (standard clause 6.2) measuring and monitoring security devices (standard clause 7.6) and so on.
- (d) Quality Management only on production but neglect of testing, it will make the product quality cannot be guaranteed, the impact of the development and effectiveness of the organization, excessive emphasis on quality inspection, but also forest for the trees.

2. THE RESEARCH PRODUCT FEATURES AND QUALITY INSPECTION IN UNIVERSITIES

2.1 The Research Product Features in Universities

Product defined in the standard (China National Standardization Management Committee, 2009) is the result of the process. Processes are a group of interrelating or interacting activities of transforms inputs into outputs. Common types of product can be divided into hardware, software, services and processed materials.

Hardware and processed materials are generally tangible product, often referred to as the cargo, with a count of number or continuity characteristics, such as It, 11.

Software and services are often intangible product. Software consists of information, generally in the form of methods, reporting or procedures. Service is the result of supplier and customer contact to complete one or more of the activities, the service can be knowledge transfer, hotels and restaurants for customers to create comfortable environment and so on.

Research in Universities is a unique process consists of a set of start and end dates, and scientific research activities coordinated and controlled as the main component of the university, the process to achieve the requirements of the goal line with time, cost and resource (Yu, 2011). The results of the project of scientific research activities in Universities can be a single or several product. The university research type determines the type of product, research product in Universities inductive generalization is divided into four categories:

- (a) Theoretical research project, which research product type was research reports, papers, monographs, patents, computer programs and so on.
- (b) Experimental study project, which combined with theoretical and experimental research, the product of research report contains the results of the testing process, papers, monographs, patents, computer programs, test methods, test procedures and other software form.
- (c) Prototype project: Theory and practice study, namely research prototype product for tangible product.
- (d) Physical product project: research into tangible product, such tangible product generally has been finalized and can be mass-produced.

Research product in Universities has the following characteristics:

- (a) Compared with business product, research product in Universities has less number but variety.
- (b) Research product in Universities is not only involved research reports and other intangible product but also involved prototype, styling product and other tangible form product. Product types include various types of hardware, software and services.
- (c) Research product in Universities includes the

procurement of raw materials product, semi-finished and finished product.

2.2 Problems of Quality Inspection of Research Product in Universities

The problems of quality inspection of research product in Universities were summarized as follows:

(a) The characteristics of research projects in Universities to determine the quality management system within the scientific research output of small number of product, features diverse types of product, so much research product in Universities quality inspection workload, but the product quality inspection and diverse types.

(b) Due to the characteristics of research in Universities, product quality inspection indicators qualitative indicators, less quantitative indicators.

(c) Research universities generally do not have a special quality inspection agencies and personnel, inspector general project team concurrently.

(d) Emphasis on production and quality is rooted in the general production manager also affect research in Universities point of view of product quality inspection, testing is only considered to meet the requirements of the quality system, the leadership is not enough emphasis on quality inspection or leadership attention is not reflected in reality.

(e) Management of research institutions in Universities tends to executive management, product quality inspection personnel and activities lack of flexibility and effective incentives.

3. PROCESS ANALYSIS OF RESEARCH QUALITY PRODUCT INSPECTION

3.1 The Process of Research Product Quality Inspection in Universities

Quality inspection is the quality activities in the system of quality management, which is part of the product realization process. The teacher is the main body of University research product quality inspection, which called the inspector (standard clause 6.2). According to the test procedures (standard clause 7.1), applying for monitoring and measuring equipment (standard clause 7.6), implementation of product quality inspection activities (standard clause 8.2.4), and the inspection reports were concluded at last. These personnel, equipment, inspection reports and other process monitoring and centralized management are part of the division of human resources, equipment and scientific research in the research quality management system in Universities.

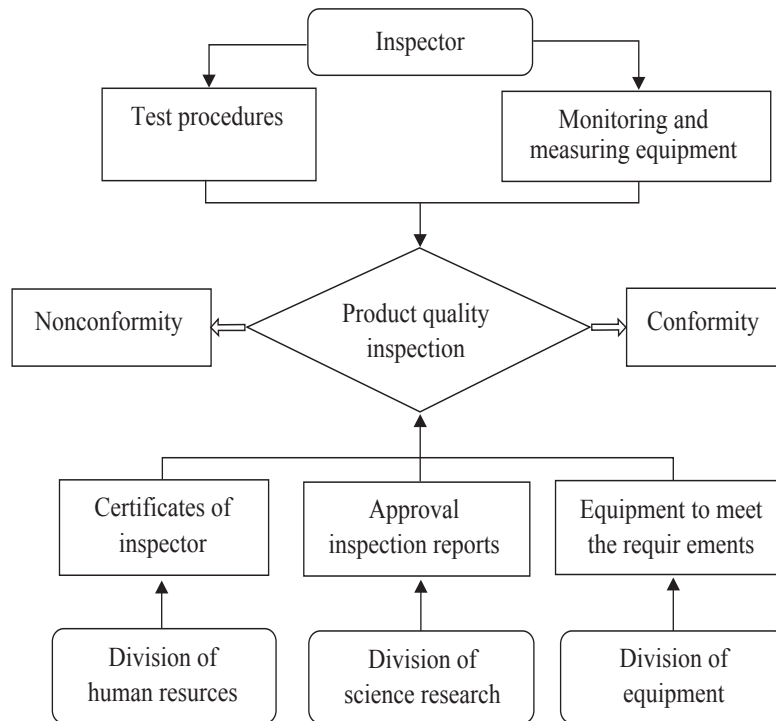


Figure 1
The Process of Research Product Quality Inspection in Universities

3.2 The Methods of Research Product Quality Inspection in Universities

PDCA cycle method, that is PDCA cycle, is known as the Deming cycle referring to a work in accordance with the

plan, do, check, act (improve). The management takes the order of the four stages of the cycle. Act (improve) is back into the plan and then repeat the above. This implementation of closed loop recycling management.

PDCA cycle is a scientific procedure to total quality management as follows.

(a) P(plan) phase: To adapt to the user's requirements, through market research, the development of technical and economic indicators, the quality of the design and planning goals, identify specific measures and methods to achieve these goals into concrete action.

(b) D(do) phase: Be given in accordance with plan and planning content, we should conscientiously to implement in order to achieve program content. This is a very important part of any effective quality management program. If not carefully implemented, we cannot achieve the desired results.

(c) C(check) phase: According to the plan and planning content, and effectiveness of checks performed to detect the implementation plan and the planning process experiences and problems. Only by examining, the experience and problems could be found. Otherwise it is impossible to raise the level of quality management.

(d) A(act) phase: The lessons of successful or failure experiences were summarized the inclusion criteria, in order to consolidate the achievements, lessons learned, continuous improvement, enters the new PDCA cycle.

Quality management system can be seen as a big process, contains a lot of processes in large process. PDCA cycle for these processes is to be controlled through the process of entering the next cycle after disposal. This is the continuous improvement of the quality management system approach can improve the effectiveness and efficiency of the quality management system to run. PDCA once per cycle can take less poor and the higher level of management. This is the only way to improve the effectiveness of the quality management system in order to improve the quality of the product (Zhang, 2011)

4. THE EFFECTIVE MANAGEMENT OF RESEARCH QUALITY PRODUCT INSPECTION IN UNIVERSITIES

4.1 Quality Inspection Basis

Standard clause 6.2 requires "Monitoring and measurement should be performed in accordance with planned arrangements at appropriate stages of the product realization process. The evidence of conformity with the acceptance criteria should be kept." This requirement indicates that the need for quality inspection documents to standardize testing methods and procedures, commonly known as inspection procedures, which are generally classified according to system range of product prepared should include testing purpose, scope, testing procedures, product specification, test methods, procedures, discrimination based on content. For the special requirements of the customer performance metrics, features can make supplementary provisions (Shi, Zhang,

& Cheng, 2009) by referring to annex to the contract requirements.

The preparation of inspection procedures on one hand can achieve control product quality to meet inspection requirements and achieve specific quality goals. On the other hand, it also helps unified product inspection and control procedures, strengthening inspection requirements, process control to ensure product quality. In addition, the inspection procedures are not once and for all, the need for timely tracking of product standards and norms of the latest version of the product no national standards organizations should develop internal standards and timely updates.

4.2 Quality Inspection Conditions Guarantee

With the knowledge innovation and technology development, changes in customer requirements, the quality inspection methods should be improved and enhanced. The equipment innovation and quality inspection related to personnel and equipment requirements needed to develop and improve, as it comes to some of the more complex geometrical dimensions traditional tests can only be elusive (Huang, 2004).

4.2.1 Quality Inspection Personnel

(a) Basic quality requirements, the quality inspection works require inspectors to have good analytical skills, work experience, and rigorous, meticulous work attitude and ethic. (b) Relevant technical requirements, the best choice for research product quality inspection in Universities personnel are professional and technical personnel. Strengthen professional training inspectors to the functional characteristics of the product, performance indicators to fully understand. Strengthen training in the use of equipment, making it familiar with the product as well as the formation process experimental testing process various technical indicators. (c) Licensing system, Standard (China National Standardization Management Committee, 2009) requirements "It shall indicate authorizing release of product for delivery to the customer's staff," that is, "certificates". To keep the product for a controlled test, inspection seal number authorized by the manager representatives or top manager to assurance inspector independent exercise of powers.

4.2.2 Quality Inspection Equipment

Standard clause 7.6 requires the requirements for monitoring and measuring equipment control. Ensuring teaching and research equipment shared is important in Universities. Establish monitoring and measuring equipment ledger, develop and release monitoring and measuring equipment calibration / verification plan, organize periodical calibration equipment sector / verification of monitoring and measuring equipment, implemented after approval, to ensure accurate measurement data and measurement results of effectiveness.

4.3 Quality Inspection State Control

Standard clause 7.5.3 requires to correctly distinguish and management of raw materials, components, parts,

purchased parts, and finished product in which the state. Only qualified raw materials, components and so on may be tune sequence, assembled or put into production. The product sending to customer must pass through the final inspection. Quality inspection state management includes state identification and product identification. The state identifies the general involved four categories: (a) to be tested; (b) to be judged; (c) conformity; (d) nonconformity. The product identification commonly used labels, tags, processes card and regional records. Good quality inspection of state management can prevent alteration, loss, misuse, or mix. Acutely product quality inspections in the actual works are very important.

4.4 Supervision of Quality Inspection

Supervision and quality inspection is an important means to ensure the test to achieve the desired effect (Shi, Zhang, & Cheng, 2009). The ranges of product inspection include the procurement of product, processes and final product. The supervision and inspection of the contents include inspector qualification, monitoring and measuring equipment to meet the requirements, test methods and records that meet the technical requirements, inspection reports approved and nonconforming disposal etc..

University is the academic semester system, supervision and quality inspection generally to six months for the cycle. The Supervision and management of product inspection works were summarized as follows:

(a) Division of human resources' works: inspectors as a teacher, serving research product quality inspection jobs, including job requirements, training, appointment cards, the annual assessment works etc..

(b) Division of scientific research's works: responsible for the management of equipment, effective monitoring and measuring equipment in good condition, including the establishment of accounting, procurement management, stock verification, equipment maintenance and overhaul, test / calibration, on-site inspection etc..

(c) Division of equipment's works: responsible for the supervision and management of the inspection report, including the identification of inspection reports, inspection reports approved, stamped, product out of the University inspection record, issuing certificates, unqualified disposal etc..

4.5 Disposal of Quality Test Results

Results of research product quality inspection in Universities divided into two categories, one is qualified, namely inspection certificate issued for the out of school registration; the other is unqualified, according to the program management control of nonconforming product (standard clause 8.3), rework, degrade, repair and scrap the unqualified product. For the procurement of product and outsourcing, quality will directly affect the quality of product. Procurement of product should be strictly

implemented incoming inspection. For outsourcing controlling, the relevant requirements of the standard clause 8.3 should be put in.

CONCLUSION AND DISCUSSION

By the end of 2012, the Ministry of Education held a meeting to deploy "six mechanisms" to strengthen the scientific management of universities, a profound understanding of the importance of strengthening research management, urgency, and effectively enhance the sense of responsibility, to further improve the system and innovative mechanisms to continuously improve research management scientific level. Research quality management system is serving for scientific research management in Universities. Research quality management system is a tool to improve the scientific research management system and mechanism in Universities. In order to improve the effectiveness of the research quality management system in Universities, on one hand it needs organizational change management college and macro mode, need to "administrative led "to the" customer-led "," management approval "to" service guide "change" (Zhang, Qiu, & Yang, 2010), on the other hand it need to proceed from research management process, enhance product quality inspection, the details begin to effectively improve the quality of research products and achievement levels. In short, enhancing product quality inspection management is effectively improving the scientific research level of product quality and outcomes for scientific research in Universities.

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