

Analysis on the problems and countermeasures in the management of university research laboratories in China

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Abstract: There are many problems in the management of scientific research laboratories in universities, including uneven resources, poor safety management, frequent personnel turnover and insufficient transformation of scientific research results. To solve these problems, we need to take comprehensive countermeasures, including the optimization of resource management, the perfection of safety management, the measures to retain talents, and the promotion of the transformation of scientific research results. Through the implementation of these countermeasures, university laboratory management will become more efficient, safe and innovative, and make better contributions to scientific research and social development. Based on the research and analysis of the existing problems in university scientific research laboratories, this paper puts forward constructive management countermeasures and suggestions for scientific research laboratories. This has certain reference significance for improving the management level of university scientific research laboratories.

1. Introduction

University scientific research laboratory has always been regarded as the core engine to promote scientific research and innovation. These laboratories not only provide infrastructure and resources for academic research, but also cultivate talents of future scientists and engineers [1-2]. However, although university research laboratories play a key role in promoting the frontier of science and technology, there are a series of problems in laboratory management, which may hinder the effective operation of laboratories and potential research results.

The purpose of this study is to analyze the problems existing in the management of university scientific research laboratories and put forward some feasible countermeasures to improve the operation of laboratories and improve the quality of research results. These problems include uneven distribution of resources, opaque management, untimely maintenance of equipment, and insufficient cooperation among researchers. These problems may lead to slow research progress, waste of funds, damage to laboratory equipment and brain drain. By solving these problems, we can better promote scientific research, cultivate outstanding scientific research talents, and make greater contributions to solving major global problems.

2. Importance of management of scientific research laboratories in universities

The importance of university scientific research laboratory management can not be ignored, which has a key impact on the successful development of scientific research and innovation and the improvement of higher education quality [3].

Promoting the frontier of science and technology: University scientific research laboratory is the innovation engine of science and technology. Good management can ensure that laboratories make full use of resources, carry out cutting-edge research and promote the development of scientific fields. The management quality of scientific research laboratory is directly related to the smooth progress of scientific research projects and the quality of research results.

Training future scientific research talents: University scientific research laboratory is an important place to train future scientists, engineers and researchers. Effective management can provide students and researchers with the resources and guidance they need, help them gain

practical experience and cultivate innovative thinking and problem-solving ability.

Rational allocation of resources: Management can ensure the reasonable allocation of laboratory resources (including equipment, funds and human resources) to meet the needs of different projects. This helps to avoid waste and lack of resources, while improving the efficiency of the laboratory.

Improve the quality of research: the management of university scientific research laboratories can improve the quality and repeatability of research by ensuring the maintenance and updating of equipment, effective data management and quality control. This is very important to ensure the accuracy and credibility of scientific research results.

Transparency in the use of funds: Good management can ensure the transparent use of scientific research funds and avoid wasting or improper use of funds. This will help to improve the legitimacy and morality of the use of funds and maintain the reputation of universities.

International competitiveness: the management level of university scientific research laboratories is also related to international competitiveness. Improper management may lead to brain drain and the failure of research projects, while excellent management can attract world-class research talents and enhance the reputation of universities.

In a word, the importance of university scientific research laboratory management lies in its positive impact on all levels of scientific research, innovation, education and social progress. An efficient management system can not only help university laboratories to play a better role, but also help to promote social development and progress. Therefore, universities should attach importance to laboratory management and strive to improve its management level, so as to achieve more scientific research breakthroughs and cultivate more outstanding scientists and engineers.

3. Problems existing in the management of scientific research laboratories in universities

3.1. Insufficient resources and uneven distribution

University research laboratories often face limited resources, including funds, equipment and human resources. Sometimes, the uneven distribution of resources leads some laboratories to lack the necessary support in scientific research projects, while others have too many resources. This unbalanced distribution may lead to the stagnation of scientific research projects and unfair competition [4-5].

Scientific research projects usually need a lot of resources, including funds, laboratory equipment, human resources and materials. When the laboratory lacks the necessary resources, the progress of scientific research projects is limited, and researchers may not give full play to their creativity and potential. This not only affects the quality of scientific research results, but also limits the exploration of scientific frontiers. Uneven distribution of resources will lead to an unfair competitive environment. Some laboratories may be in a favorable position in scientific research competition because they have more resources, while others may be at a disadvantage because of insufficient resources. This may lead to unfair competition and undermine the fairness and morality of scientific research.

In an environment of insufficient resources and unfairness, researchers may be dissatisfied. This may lead to a decline in the morale of researchers, reduce their motivation to work, and even lead to brain drain. Universities need to retain talented researchers, and resource problems may be one of the reasons why they leave [6]. The resource problem may also pose a threat to the sustainable development of university research laboratories. If the laboratory can't get enough resources to maintain equipment, support research projects and attract excellent researchers, the long-term existence and development of the laboratory will be threatened.

3.2. Management opacity

The opacity of laboratory management may hinder researchers and students' understanding and rational use of laboratory resources. Lack of transparent management system may lead to improper decision-making, abuse of resources, and confusion about the direction of the laboratory.

Opaque management may lead to unclear decision-making within the laboratory. Researchers

and staff may not know the objectives, strategic plans and important decisions of the laboratory, which may lead to confusion and uncertainty. Lack of clear decision-making direction may make it difficult for the laboratory to achieve its scientific research and development goals. An opaque management system may lead to resource allocation problems. Researchers and staff may not know how to allocate laboratory resources, which may lead to unreasonable allocation of resources, dissatisfaction and waste of resources [7]. Transparent resource allocation mechanism is the key to ensure effective use of resources and fair competition.

Opaque management may lead to improper financial management. If the financial decision-making and expenditure of the laboratory are not restricted by supervision and transparency, it may lead to the problem of waste of funds and improper use of funds. This may damage the reputation of the university and lead to financial difficulties. Opaque management may lead to inefficient information sharing. It may be difficult for researchers and staff to obtain information inside the laboratory, which may hinder the transfer and cooperation of knowledge. Effective information sharing is one of the key factors for the success of scientific research. Opaque management may affect the attraction and retention of talents. Talented researchers may seek a clearer, more transparent and more conducive management environment for personal development. Therefore, opaque management may lead to brain drain and have a negative impact on scientific research laboratories in universities.

3.3. Equipment maintenance is not timely

Research laboratories usually have expensive equipment and instruments, but the maintenance and updating of equipment are usually ignored. Failure to maintain equipment in time may lead to equipment failure, delay scientific research projects, increase costs and even pose a threat to the safety of researchers.

Scientific research equipment is usually an expensive investment. If it is not maintained in time, the service life of the equipment will be shortened, so it needs to be replaced in advance, which increases the cost. Failure to maintain the equipment in time may lead to the quality and repeatability of the research. Instability and inaccuracy of equipment may affect the credibility of research results, making it difficult for scientific research results to be repeatedly verified by other researchers.

3.4. Insufficient cooperation

Researchers in scientific research laboratories sometimes tend to operate independently rather than actively cooperate. Lack of collaboration and knowledge sharing may limit the potential of innovation, leading to waste of resources and low research efficiency [8-9].

Lack of cooperation may lead to limited innovation of scientific research projects. Scientific research problems are usually complex and diverse, requiring professional knowledge and skills in different fields. If the researchers in the laboratory are unwilling to cooperate, the ability to solve complex problems will be limited and the progress of scientific research may be hindered. There may be similar equipment and resources in each laboratory, but without cooperation, these resources may be purchased and used repeatedly. This not only wastes funds, but also may lead to inefficient use of resources.

4. Countermeasures for the management of scientific research laboratories in universities

4.1. Establishing the management system of scientific research laboratory

Scientific research laboratory is the core place of scientific research activities in universities and the foundation of scientific research and technological innovation. The management of scientific research laboratory is directly related to the efficiency and safety of scientific research activities and the rational utilization of resources. Therefore, it is very important to establish a scientific research laboratory management system, which can establish the organizational structure and management level of scientific research laboratories and clarify the responsibilities and powers of managers at all

levels. This helps to reduce confusion and redundancy in management and improve management efficiency [10-11]. A clear management system can ensure a clear division of tasks, avoid unnecessary waste of resources and accelerate the progress of scientific research projects.

The management system of scientific research laboratories can also strengthen the safety management of laboratories. By establishing detailed safety regulations and procedures, managers can define safety responsibilities and make emergency plans. This helps to reduce the risk of laboratory accidents and ensure the safety of laboratory members. The management system of scientific research laboratory is helpful to the rational allocation of resources. Managers can reasonably allocate laboratory equipment, manpower and funds according to the needs of research projects. This helps to avoid the abuse and waste of resources and improve the utilization efficiency of resources. The management system of scientific research laboratory can promote teamwork. A clear management system can help researchers work together better, share resources and information, and promote the progress of scientific research projects. Teamwork helps to promote innovation and improve the quality of scientific research results.

In a word, the establishment of scientific research laboratory management system is of great significance for improving management efficiency, ensuring laboratory safety, rationally allocating resources, promoting teamwork and performance evaluation. This management system should be flexible, adapt to the needs of different fields and scientific research projects, and help to promote the sustainable development and innovation of scientific research in universities.

4.2. Strengthening the safety management of scientific research laboratories in universities

Scientific research laboratories are an important part of scientific research and education in universities. However, these laboratories often involve potential dangers when dealing with chemistry, biology, physics and other experimental research. Therefore, it is very important to strengthen the safety management of university scientific research laboratories.

Various chemicals, sharp instruments and high-pressure equipment are often used in university scientific research laboratories, and these potential risk factors may threaten the life safety of laboratory members. Strengthening safety management can reduce the probability of laboratory accidents and ensure the life safety of laboratory members. Laboratory equipment and experimental materials are usually expensive, and laboratory accidents may lead to the loss of these equipment and materials. Through strict safety management, the risk of laboratory accidents can be reduced and unnecessary waste of resources can be prevented. Strengthening safety management is helpful for universities to abide by laws and regulations. Many countries and regions have promulgated relevant safety regulations, requiring laboratories to meet a series of standards. Not only to abide by the law, but also to ensure the legitimacy and sustainability of scientific research activities. By strengthening safety management, the safety awareness of laboratory members can be cultivated. This not only helps to prevent accidents, but also helps laboratory members to extend their safety awareness into their daily lives and ensure their personal safety.

Strengthening the safety management of university scientific research laboratories is an important means to maintain life safety, prevent waste of resources, abide by laws and regulations, improve reputation and cultivate safety awareness [12]. Universities should establish detailed safety management system, conduct regular safety training and strengthen equipment maintenance and inspection, so as to ensure the continuous improvement of laboratory safety management level and provide a solid foundation for the success and sustainable development of scientific research.

4.3. Strengthen information management

The application of information management in university scientific research laboratories is becoming increasingly important. By using information technology scientifically and reasonably, the efficiency, transparency and safety of laboratory management can be improved, which is helpful to promote the smooth progress of scientific research.

Information management makes laboratory management more efficient (Figure 1). Through electronic data recording, remote monitoring of experimental equipment, online meeting and scheduling, managers can manage laboratory resources more easily, reduce a lot of tedious manual

work and improve management efficiency. This enables researchers to concentrate more on their research work. The information management system can provide online reservation function for laboratory resources, and researchers can reserve equipment and laboratory space in advance as needed, thus avoiding the conflict and waste of resources. This contributes to the rational utilization of laboratory resources and improves the utilization rate of equipment.

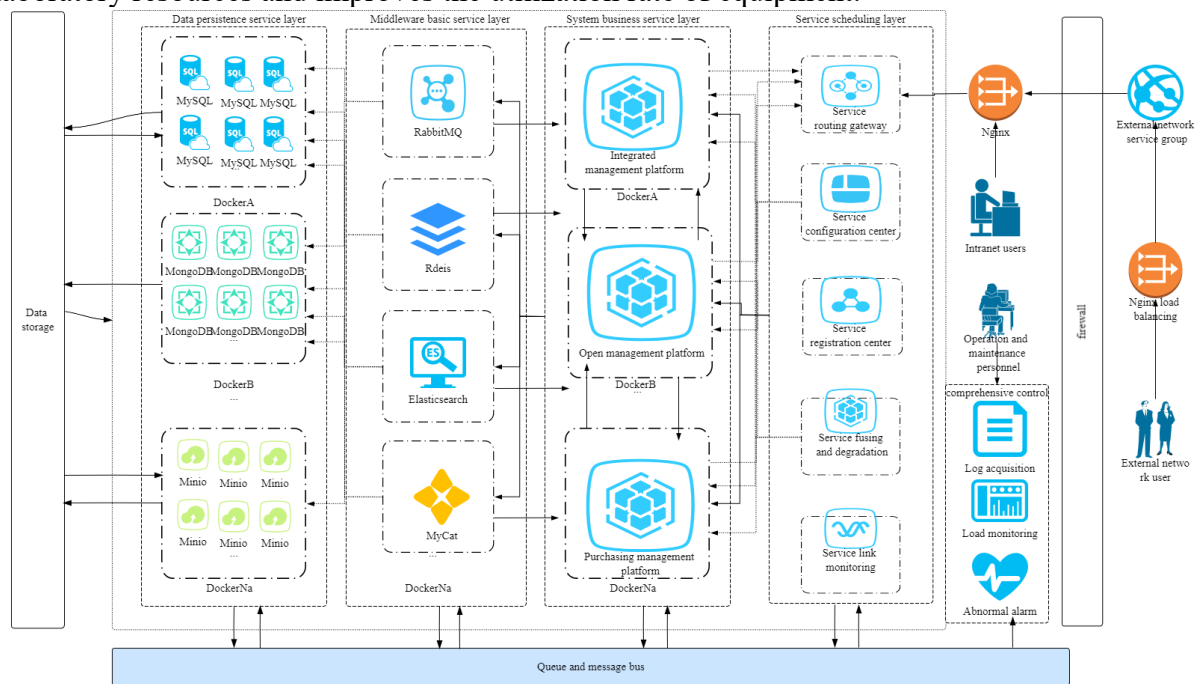


Figure 1 Software architecture of smart lab

Information management can strengthen the security and backup of laboratory data. A large amount of data generated in the laboratory can be safely stored and backed up through the network to avoid the risk of data loss. In addition, the online storage and sharing of data also facilitates the cooperation and data sharing of researchers. The information management system can make the experimental equipment have remote monitoring function. This means that researchers can monitor the equipment status and experimental progress even when they are not in the laboratory, find problems in time and take measures to improve the utilization efficiency and prolong the service life of the equipment.

Strengthening the information management of university scientific research laboratories is helpful to improve management efficiency, resource utilization efficiency, data security, transparency and international cooperation. Universities should actively introduce information management systems, regularly update technologies and train managers and researchers to ensure the successful implementation of information management and promote the development of scientific research.

4.4. Strengthen the construction of talent team

As an important place for scientific research, the efficiency and quality of university scientific research laboratory management directly depend on the talent team inside the laboratory. Therefore, it is very important to strengthen the construction of talent team in the management of university scientific research laboratories.

Improve the competitiveness of scientific research laboratories: the competitiveness of scientific research laboratories depends largely on its talent team. Excellent researchers can lead the laboratory to make more achievements in scientific research and innovation. Therefore, strengthening the construction of talent team is helpful to improve the competitiveness of laboratories and attract more scientific research projects and cooperation opportunities.

Promote the output of scientific research results: Close cooperation between managers and researchers in scientific research laboratories is the key to the output of scientific research results.

By cultivating high-quality management and scientific research personnel, the quality of project management and scientific research results can be improved. This will help to accelerate the output of scientific research results and the progress of scientific research projects.

Innovation and laboratory culture: the construction of talent team is also helpful to cultivate innovation and laboratory culture. University research laboratories should encourage employees to participate in innovative research and provide them with opportunities for innovative projects and experiments. This not only contributes to the output of scientific research results, but also helps to cultivate innovative culture in the laboratory and improve teamwork and enthusiasm.

Sustainable development and renewal: the construction of talent team in scientific research laboratory should be a continuous work. With the continuous development of science and technology and the change of laboratory research direction, the talent team needs to be constantly updated and developed. Universities should provide employees with opportunities for continuing education and training to meet the changing needs.

Strengthening the construction of talent team in the management of university scientific research laboratories is very important for improving the competitiveness of laboratories, the output of scientific research achievements, the cultivation of innovative culture, international cooperation and the sustainable development of laboratories. Universities should make a clear talent team construction plan to provide development opportunities and support for employees, so as to ensure more success and achievements in laboratory management and scientific research.

5. Conclusions

There are many problems in the management of scientific research laboratories in universities, including uneven distribution of resources, poor safety management, frequent turnover of personnel and insufficient transformation of scientific research results. These problems directly affect the scientific research efficiency and output of university laboratories, so a series of countermeasures are needed to solve these problems. Problems in the management of university scientific research laboratories need comprehensive measures, including resource management, safety management, talent retention and transformation of scientific research results. Only through the implementation of these countermeasures can university laboratory management be more efficient, safer and more innovative, and make better contributions to scientific research and social development.

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