

On Scientific Research Management in University and College^{*}

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On the direction, scientific research at university emphasizes on basic research and important propositions; on the process, it combines with cultivation of innovative talents; on the conditions, it has many advantages, such as comprehensive disciplines, adequate personnel, and well information; and on the result, it mainly displays its double benefits on the interaction between scientific research and teaching. University scientific research management mainly includes "programming and planning," "organization and leadership," "communication and coordination," and "guidance and control" and deals with activities as "team building," "funds management," "conditions building," "project management," and "achievements management." Principles of "service," "humanistic," "autonomy," "loose," "classification," and "innovation" should be followed to achieve the objectives of "proper programming and planning," "good organization and leadership," "nice communication and coordination," "effective guidance and control," and "excellent efficiency and effectiveness."

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Introduction

University is not only the cradle of talent cultivation, but also the source of knowledge innovation. Throughout the history of university, scientific research at university has been a long time, especially since Humboldt proposed that university should conduct scientific research in the early 19th century, scientific research has become conscious, systematic, and organized behavior of universities. Consequently, universities play a vital role in knowledge expansion and innovation.

Characteristics of University Research

Studying and grasping the characteristics of management object is the premise of scientific and effective

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management. Thus, it is necessary to first explore characteristics of scientific research at university before studying its objectives, content, and principles. Compared with research institutes, enterprises, institutions, and other social organizations, besides the general characteristics, such as unification of creation and inheritance, individuality and synergy, and autonomy and sociality, research at university also has the following characteristics.

On Research Direction, Emphasis on Basic Research and Important Propositions

Generally speaking, universities focus on “pure science” research, basic research, or “discovery research,” rather than application and development research or “invention research” whether from the perspective of “Being” or “To-be.” As the organization to cultivate advanced specialized talents, university research is naturally foundational and theoretical. “The research which can closely combine with teaching and directly promote advanced talents cultivation should be the basic research that can generate and expand new knowledge and theories” (Hu, 2006, p. 31). Research university is particularly typical at this point.

Historically, “The nature of university determines its particular interest in basic research” (Zhang, 2010, p. 187). Because rationalism which plays an important role in the appearance of university particularly emphasizes on the systematicness and logicity of the knowledge and believes systematic knowledge is easiest to be imparted. Besides, “University is the cradle of thought” (Zhang, 2010, p. 188). The preference to academic freedom is the long-standing tradition at university and philosophy plays a leading role to university. Finally, speculation is supreme at university which dominates the experiment and the level of the experimental results (Zhang, 2010, pp. 187-188).

Furthermore, universities, especially research universities, have not only natural interest in basic research but also unique advantages. The adequate young talent resources, high level scientific and technical experts, the fast interchange and renewal of personnel, the active academic thoughts, and the wide range of disciplines are particularly suitable for free exploratory, curiosity-driven, and interdisciplinary basic research.

Compared with other social organizations, universities are more concerned about important propositions, such as traditional culture, classical literature, classical philosophy, the ancient cultural history, archaeology, universe history, the earth’s history, animal history, and human history and has more sense of responsibility and interest. From the perspective of “should however,” only universities can undertake the significant mission relating to human civilization.

On Research Process, Combination With Cultivating Innovative Talents

Scientific research and talents cultivation especially graduate education are closely combined. While carrying out scientific research and innovation, universities provide all kinds of professional talents for the society after strict training. “It is unique for university to combine the research and teaching with cultivating scientific successors. Scientific research is the precondition of scientific cultivation and improving the level of talents” (German Scientific Committee, 2004, p. 42). Universities should give priority to talents cultivation especially graduates cultivation and make the best of research projects, instructors, and conditions to closely combine them with talents cultivation and the building of disciplinary platform. They should explore and develop ways and mechanism to promote the positive interactions between research and teaching so that the latest research trends and knowledge can be timely reflected in teaching and the teaching methods and contents can provide a sharp weapon for exploring scientific frontiers and solving economic and social development challenges.

On Research Conditions, Advantages of Numerous Disciplines, Adequate Personnel, and Well Information

There are comprehensive disciplines in university which can be called “multi-disciplinary consortium”, so it can promote the cross-discipline and multi-discipline intersection, integration, and infiltration. There are high level scientific and technical experts and adequate young talent resources, especially the huge quick thinking, energetic, physically strong, and high-spirited young students at university. The active academic thoughts, fast interchange and renewal of personnel, frequent academic exchanges at home and abroad, and the advanced information system and rich information resources are all favorable conditions for carrying out scientific research in particular the comprehensive, crossing, basic, and frontier research.

On Research Result, the Double Benefits in the Interaction Between Scientific Research and Teaching

The fundamental change brought by scientific research is that all the people at university change into researchers: professors, students, and managers are also researchers, learning researchers, and organizational management researchers. Undergraduate, graduate, and doctoral students respectively receive preliminary, basic, and advanced research training. (Zhang, 2010, p. 181)

High-level teaching can promote research, because the combination with teaching can timely make the achievements systematic and logical. In the same way, science research can ensure the sustainable improvement and the high level of teaching, because the introduction of research achievements and the application of new discoveries, inventions, principles, and methods to teaching can improve the educated people’s academic level up to the frontier of modern science, technology, and culture. Research and talents cultivation enhance each other, and this interaction has become an important feature of modern higher education.

Objectives of University Research Management**Proper Programming and Planning**

Scientific research plans are choices and arrangements for the research objectives and action plan in future period, that is to say, deciding the objectives of scientific development and the way to accomplish them based on the law of scientific development, economic and social needs, the historical and realistic conditions of the department (university, department/institute, and discipline/specialty) while scientific research programs are long-term, global, and forward-looking plans.

Research programming and planning is an important way of rational resources allocation, waste and risk reduction, having the initiative in research and ultimate high efficiency and effectiveness achieving. The proper research programs and plans firstly require foresight and one’s own opinions of future research work so as to find the specific and right research direction. For example, university-based research programming and planning should develop science and technology development strategies according to the school situation especially identify priority and key areas of development, and select and support characteristic and key disciplines on the basis of the comprehensiveness of disciplinary structure to make and stress the university’s research characteristics and advantages.

It should be noted that the established research programs and plans are only the framework of overall and main direction as well as steps and measures in future. They should be amended correspondingly with the change of internal resources, capabilities, and the external environment and situation to ensure their scientificity, rationality, and the role of guiding.

Good Organization and Leadership

In terms of organization and leadership, university research management should reach the following objectives: establishing grassroots academic organizations with “diversity,” “autonomy,” “academic priority,” and “scientific and normative management system and operation mechanism” (Zheng & Wang, 2009); building “three types of pluripotent researchers” research teams; implementing “project system”; attracting, cultivating, and motivating talents and staffing high-level research team; following the principle of function, profession, capability, high efficiency, exploration, and innovation to set up research management organizations; building a research management team with fine quality and extensive knowledge as well as ability of strategic management, decision-making, innovation, application, emergency, organization, coordination and expression protect hard conditions; consolidating the protection of software and hardware condition; etc..

Nice Communication and Coordination

University research management departments should give full play to advantages of abundant human resources and comprehensive disciplines to promote the cooperation and communication at university, concentrate wisdom and pool the efforts to undertake comprehensive, complex, and important research and promote the combination, co-construction, and integration with other universities, enterprises, institutions, and research institutes.

University research management departments should strengthen the communication between the leaders, followers, and members in the scientific research organizations and management mechanism. Take for example the communication management in research project, in the research cycle, research managers should strengthen the spread and communication of information, thoughts, and feelings related to the research to ensure the right and timely generation, collection, processing, storage, and communication of information. Team members’ getting the latest information needed at different time and places should be guaranteed so as to facilitate the on-line cooperation between scattered places. It is necessary to set up systems, make plans, ensure resource supply, control the implementation, and appraise the performance of communication management and then constantly improve them (Ji & Han, 2003).

Effective Guidance and Control

University research administrative departments should make policies and rules, adopt restricting and incentive measures, regularize and guide researchers’ conduct, and control the research activities through inspection, supervision, monitoring, and feedback to ensure the implementation and accomplishment of the scheduled objectives.

Excellent Efficiency and Effectiveness

University research administrative departments should explore the law of scientific research activities and grasp the scientific and effective management methods to serve research activities better. Through the “proper” programming and planning, “good” organization and leadership, “nice” communication and coordination, and “effective” guidance and control, more achievements and talents will come out faster with less effort.

Content of University Research Management**Perspective of the Process**

University research management can be classified into four levels—university, department/institute,

discipline/specialty, and project. No matter what level of the research management, it usually involves the following process:

1. Programming and planning: The research program and direction are set in accordance with the laws of scientific research, economic and social development needs, and their own conditions. For example, at the university level, research management should decide discipline categories as development priorities; department/institute level, disciplines; discipline/specialty level, direction; project level, problems, content, methods, route, conditions, and teams. Then, they make specific research plans according to the long-term program and current situation. Later, the work of implementation, inspection, feedback, appraisal, control, and adjustment should be reinforced.

2. Organization and leadership: Establishing research management organization should comply with the principle of function, profession, capability, high efficiency, exploration, and innovation as well as the decision-making, planning, organizing, conducting, controlling, and coordinating of research system and its elements. The tasks of organization and leadership includes selecting people with fine quality and extensive and comprehensive knowledge as administrative staff; setting up academic organizations in form of department, institution, research center, laboratory, institute, research and design center, research base, sci-tech and philosophy, and social science innovation platform; and reinforcing the building of the research team through the allocation and adjustment of the establishment, recruitment, assignment, evaluation, promotion, further study, and training of the staff.

3. Communication and coordination: Researchers have high consciousness and self-esteem as well as strong sense of freedom. As the most personalized and autonomous mental activities, research activities the least fit with unified principle and administrative orders. In view of the above characteristics, the consistency and understanding between the leaders and followers and the managing and managed should be achieved by coordination and communication.

4. Guidance and control: Guidance and control means making research policies and rules to restrict, stimulate, and guide the conduct of research organizations and researchers. Appraising and correcting research activities and management through inspection, supervision, monitoring, and feedback can ensure the implementation of the plan and the accomplishment of research objectives.

Perspective of the Components

University research management mainly includes the following items:

1. Team building: Human resources are the primary resources, so universities should focus on training, introducing, and retaining talents especially the elitists; strengthening academic echelon construction; promoting the growth of a new generation of academic leaders; and training and bringing up a number of united, cooperative, and efficient teams of excellent scientists. As the basic power of university research and the main force of innovation, universities should strive to build a high-performance disciplinary team with “clear objectives,” “effective leadership,” “high-quality members,” “reasonable structure,” “cooperative and innovative atmosphere,” and “organizational support” (Liu, 2007).

2. Funds management: It basically includes research funding budget, expenditure and supervision, final accounting, and assessment. According to the current characteristics of the scientific research and the objective of improving the effectiveness, research managers can set up a multi-structured university research funds management mechanism which consists of three levels—project team, institute, and university, and conducts

fund budget management, expenditure adjustment and audit management, final accounting of concluded program, and supervision of ordinary expenditure (Chen, 2010).

3. Conditions building: It both includes the building of “hard” conditions, such as research fund, equipment, literature, and places, and “soft” conditions, such as enthusiasm to science, indifference to fame and fortune, creative spirit, and the situation of letting a hundred flowers bloom, a hundred schools contend.

4. Object management: Project system is a research management pattern of project organizing and managing as well as the research activities which focuses on the project and takes the project team as the fundamental unit after determining the subject based on the principle of fair competition and selectively supporting. In the initial stages of project establishment, the work should be focused on promptly issuing notice, signing the contract, and work arrangement. In mid-project management phase, the key work is fund management and mid-term inspections of implementation. In the later stages, it shifts to conclusion work and achievements transformation. The staff of research management should not only focus on the ordinary management, but also pay more attention to the process management on the base of the characteristics of project system management. The staff also need to strengthen the study of accounting, contract, and intellectual property law involved in fund budgeting, contract affairs, and intellectual property protection, enlarge knowledge range and improve management level. To optimize resource allocation and ensure effective implementation of project system, three elements—scientific organizational management, whole-budget management, and effective financial supervision—should be kept throughout project system management.

5. Achievements management: Research achievements include written material (paper, monography, report, programme, etc.) and physical ones (new products, material, techniques and methods, etc.). Research achievement management refers to the registration, identification, review, approval, statistics, analysis, evaluation, awards, publicity, promotion, application, filing, reporting, and query of the achievements. By the help of modern media technology, universities can create the information database of research achievements exchange, project team, fund, statistics, users, concluded project, achievements, and citation index according to the design philosophy of hierarchical structure. Among them, the information database of research achievements exchange may include bulletin boards, research trends, and notebooks and can provide dynamic interaction between information databases of project team, members, fund, users, achievements, and project conclusion (Qian, 2004).

Principles of University Research Management

Principles of university research management are the basic rules and requirements for research management activities, which are based on its characteristics, objectives, tasks, and contents for the purpose of management level and efficiency enhancement. In addition to the general principles of higher education and science and technology management, such as “system principle,” “closure principle,” “feedback principle,” “whole-divide-compound principle,” “ability level principle,” “elastic principle,” “motive principle,” “innovation principle,” “coordination principle,” “sustainable development principle,” and “humanistic principle” (He & Xu, 2004), the following principles should also be complied with.

Service Principle

“Service principle” means that the role administrative staff play should be “server.” “The key of university research management is to guide the researchers what and how to do rather than to strictly require what they

have to do” (Yang, 2005, p. 19). Essentially, it requires transformation of administrative staff’s function from regulating, dominating, and controlling function of a “commander” to coordinating, communicating, and guiding function of a “server.”

“It is a brilliant way for administrative staff to follow philosopher” (Zhang, 2010). The characteristics of research activities require administrative staff fully respect the researchers’ subject consciousness. Engels said, “People should persist in illustrating the world from the world itself.” Who can do it best? Of course, it is those who conduct the research. The characteristics of researchers, such as “high autonomy,” “strong self-esteem,” and “prominent consciousness of freedom”, also have such requirement. Establishing service concept and role shows respect not only for the law of scientific research, but also for the researchers’ personality.

The management philosophy—management is service—especially fits for university research management. University management departments and staff mainly serve the research work especially the researchers on the front line. They should actively help researchers solve the problems and difficulties in research to ensure that they can put their heart into work. (Yang, 2005, p. 20)

Therefore, as “servers”, university manager’s thought should be “conversation” and “communication” instead of “domination” and “control.” Through equal conversation and communication, the researchers can fully get to know the research direction and development objectives of university. They combine the research direction of the university with their own interest and the research and development goals of the university with themselves, so as to achieve the best management result and the ultimate goal of management.

Humanistic Principle

Marx’s materialist believes that man is always the social main-body and the subject of social activities; the individual’s initiative and enthusiasm is the real heart and motivation of all social activities. The “humanistic principle” of research management emphasizes on researcher oriented and centered so the managers should change the traditional concept “see things but not people” and the rigid management simply emphasizing on “rules and regulations centered”. They should establish the people-oriented awareness, fully understand the decisive role the talents play in research and innovation, and take it as their core work and guiding ideology to find, cultivate, attract, and stabilize the talents and give full play to their creativeness (Yang, 2005, pp. 65-66). The managers should aim to “serve the teachers and researchers,” place them on the core position of research and ensure their leading role. They should also fully pay attention to teachers, explore their potential, and enhance their enthusiasm and creativeness through management. What is more, they should ensure the full development and use of their physical strength and intelligence, striving to build the space and atmosphere suitable for inspiring the researchers’ vigor, imagination, and creativity.

Autonomy Principle

“Autonomy principle” of research management means the respect for freedom law of scientific research. For research itself, it is a basic guarantee of significant breakthrough and discovery in research especially in basic science research that the creativeness and initiative of individual research can be freely played without the interference from the external factors, such as economical, political, and administrative factors (Wu, 1999, p. 103).

Without freedom, there will be no creativity and great effectiveness in research. Except the “planning study” with definite objective, research activities especially basic research should encourage the free exploration, because the unpredictability of its result and the difficulties in setting specific objective, schedule

and finish date beforehand except the overall direction. History of science shows that many significant breakthroughs came from free exploration and most of the Nobel Prize winners in the 20th century also proved it (Zou, 2006).

Loose Principle

Research is a kind of mental and creative activity which closely related to the researcher's personality, potential, and interest. Loose principle means that the policy should be flexible, emphasizing on guidance and advocacy instead of constrain and restriction and leaving more space for unexpected things, because the unpredictability and uncontrollability of research (Zhang, 2010, p. 201).

Loose principle requires respect for individuality. The successful examples of achieving expected result with fixed methods are rare so the research tactics or methods must be flexible. In the face of difficulties, good qualities—determination, calmness, courageousness, and dedication—are very important, but sometimes it is difficult to distinguish them from the derogatory personalities—stubbornness, blindness, reckless action, and laissez-faire, so the organizers, managers, or leaders should fully trust and understand the relevant researchers (Du & Gao, 2000). Loose principle requires soft management, comprehensive utilization of “law,” “reason,” and “emotion,” and adoption of non-mandatory manner to transform the external will into internal consciousness. Research managers cannot seek instant success in research especially basic research, because it is a long-term activity. Research managers need to encourage risk-taking, tolerate the failure, advocate innovation, be pioneers, and build a favorable cultural environment for original creativity. They also need to encourage academic democracy and advocate innovation culture to protect the publication and full discussion of different academic perspectives.

Classification Principle

“Classification principle” of research management means different management methods should be adopted for different discipline/specialty. Natural science, social science, and humanities are different disciplines, so the relevant research content, methods, and ways are also different. Even in the natural science, although science and technology have a very close relationship, they have an obvious difference. The goal of science is to know the nature while technology's is to transform the nature through the knowledge gained in science, so the management method of technology research cannot be used to science research (Zou, 2006). The scientific, normalized, and unified management must respect the differences and specificity of disciplines. Social science, humanities, and natural science share some policies, principles, methods, content, and measures of management, but they have their own managing characteristics. Only paying attention to these differences and specificity can research managers build a management mechanism helpful for the comprehensive, balanced, and coordinated development between the various disciplines and overcome the discrimination and imbalances between disciplines.

Here, we take the differences between humanities and social science as an example. The openness, diversity, individuality, and subjectivity existing in the content of humanities determine that it is difficult to build a unified index system, so it never has recognized evaluation criteria. Humanities study on the spiritual and the meaning world. The evaluations of it are mainly value and aesthetic evaluation and the general criteria are academics and creativeness which is obviously different from the more practical social science. Humanities research is an arduous and long-term work, so the administrative staff should pay more attention to encourage the researchers to lay a solid foundation and make long-range disciplinary plan, foundation building, and

development objective. They should also focus on building a persistent, strict, harmonious, and loose academic atmosphere and avoid the impetuous mood and the wrong anxiety for quick success (Sun, 2005).

Innovation Principle

“Innovation principle” of scientific management refers to the concept, mechanism, ways, and means must advance and change with the times. It requires the administrative staff establish the innovative consciousness and take it as a guideline. They should keep on exploring and upgrading management mode and way. Research management innovation is the “accelerator” of knowledge and technology innovation. As regarding to the guiding ideology, development planning, institutional mechanisms, work deployment, and assessment system, administrative staff should probe boldly, practice bravely, and go for innovation.

Innovation principle requires the implementation of dynamic management.

University administrative staff should keep track of the new development, duly adjust and regroup the personnel, equipment, fund, and information according to different research tasks, different requirements in different stages and the change in the situation to keep it relatively moving and maximize the research efficiency. (Xiao, 2006, p. 268)

Innovation principle also requests the university administrative staff to study while providing good service and do research while studying. Practice has proved that dynamic “learning management” is essential to the research management innovation in the new era. Only through strengthening the managers’ study, enhancing their awareness of the significance of their work, as well as mastering extensive knowledge, abundant information, and advanced and effective methods can constant innovation be realized in research management work.

Conclusion

Compared with other research institutions, university scientific research has its own characteristics. On the direction, scientific research at university emphasizes on basic research and important propositions; on the process, it combines with cultivation of innovative talents; on the conditions, it has many advantages, such as comprehensive disciplines, adequate personnel, and well information; and on the result, it mainly displays its double benefits on the interaction between scientific research and teaching. In the management of scientific research, these characteristics should be grasped and utilized. University scientific research management is diverse and complex, mainly includes “programming and planning,” “organization and leadership,” “communication and coordination,” and “guidance and control” and deals with activities as “team building,” “funds management,” “conditions building,” “project management,” and “achievements management.” In view of the above characteristics of university scientific research and its management field and activities, the scientific research management of university should establish the objectives of “proper programming and planning,” “good organization and leadership,” “nice communication and coordination,” “effective guidance and control,” and “excellent efficiency and effectiveness,” and follow the principles of “service,” “humanistic,” “autonomy,” “loose,” “classification,” and “innovation.”

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