

2014

BioTechnology

An Indian Journal

FULL PAPER

BTAIJ, 10(20), 2014 [12654-12659]

A study of research evaluation system at home and abroad

Jizhi Lin¹, Xiangqian Zhang²

¹Scientific Research Department, Huaqiao University, Quanzhou, (P.R.CHINA)

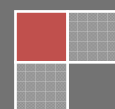
²Business Administration College, Huaqiao University, Quanzhou, (P.R.CHINA)

ABSTRACT

This paper reviews and compares the leading characteristics of research evaluation system in the world. On the basis of this comparison, and focusing in particular on China. The advantages and disadvantages of different approach employed in research evaluation are analyzed. The areas for improvement of research evaluation system in China are outlined. This paper aims to provide useful information for members of the scholar community and research policy official about the basic aspect of research evaluation.

KEYWORDS

Research evaluation; Research management; Evaluation system.



INTRODUCTION

Research evaluation has supervision, control, guidance and feedback function, is an important part of research management, and is the foundation for healthy development of science and technology. Higher education institutions as an important part of the national innovation system with the capacity of teaching, is to carry out the science challenges of today and the future; is to transforming the important mission of scientific research to serve the community; is at the heart of national scientific and technological innovation. Science and technology innovation has attracted public attention with the economic development and deepening reform in China. Research evaluation will play an effective role in improve science and technology innovation. It has important theoretical and practical significance. Currently, there is no national standardized research evaluation system and policy in China. It only confined to universities and research institutions to develop their own internal administrative department. While it promotes research work in universities, its disadvantages also appear apparently. Therefore, in order to build and strengthen the national research evaluation system in China, it is essential to understand and analysis the procedures and development in the world.

THE CHARACTERISTICS OF RESEARCH EVALUATION SYSTEM IN THE WORLD

All research evaluation for universities and institutions has two common purposes: to improved the quality of research, and for greater public accountability. The various forms of research evaluation can be categorized into three approaches. In the first, the research evaluation is carried out at the national level led by government. The independent agency is assigned to carry out the assessment, although the outcomes of this assessment are not linked with funding decisions; the second approach, research funds are allocated on the form of research evaluation; the third approach is the combination of peer review and performance indicators, namely quantitative and qualitative method^[1].

The Netherlands, Britain, Australia and the United States have fame for their long history, distinctive, typical and representative system in the development of scientific research evaluation in the world.

The Association of The Netherlands Universities (VSNU) which represents the interests of the 13 Universities developed a Quality Assessment of Research system. It evaluates universities' research performance over a period of four to six years. There are four main evaluation criteria: Scientific quality; scientific productivity, scientific relevance and continuity of research. The assessment is translated into a five-point rating, (1 = 'poor', 5 = 'excellent'). Results of the evaluation are not directly linked with the allocation of government funds. The reputation is the main driving force of universities' participation in the assessment. Each discipline is evaluated by a different review committee; the member is either a Dutch expert or foreign expert thoroughly familiar with the Dutch scene. To ensure impartiality, committee members were predominantly foreign^[3,4].

UK university research evaluation system can be categorized as second approach. From 1986 to date, the United Kingdom carried out a total of six research evaluation. It use peer review as the main method to evaluate, under a clear, continuous, efficient, fair and transparent policy. Its evaluation process has two main steps: The so-called 'units of assessment' (UoA) applied to the Appropriate Committee, and then the review panel is set up to undertake the evaluation. The evaluation results are presented in the form of final report. In order to improve universities' quality of research and funding management, the strengths and weaknesses of each unit of assessment is well described. In the example of Research Assessment Exercise 2008 (RAE). It employed a two-tiered panel structure, 15 main panels oversaw the work of 67 subpanels, and each subpanel is made up by about a dozen academics that assessed the quality of work submitted by the units of assessment (UoAs). For each research-active member of staff in every institution, up to four items could be submitted. The change was intended to focus upon quality rather than quantity. The panels judged the quality of each units of assessment and assigned a rating on a scale from 4* to unclassified. The RAE 2008 fulfils four functions – serving as a competitive source of discretionary income; as a reward for quality and volume of output; as an instrument of policy; and as a tool to increase the global impact of UK research^[2,5,6,8].

The Excellence in Research for Australia (ERA) led by the Australian Research Council (ARC), assesses research quality within Australia's higher education institutions. It is using a combination of indicators and expert review. All universities submit comprehensive information to the ARC about their research activities, including details relating to staff, publications and research outputs, awards, grants, income from industry and other research users, income from the commercialization of research, and other applied measures such as patents. Committees of internationally recognized researchers evaluate this material by institution and discipline. Their expert judgments are informed by a range of indicators and quality assessments are derived from the data submitted. By taking part in ERA, the quality of research data held by universities is believed to be much improved. In addition, universities regularly use ERA outcomes to promote their research strengths, both to Australian and international stakeholders^[4,7,9].

United States as the top nation of global academia was the first to establish national scientific and technology assessment system. It has one of the oldest and most comprehensive evaluation systems. U.S. technology assessment agencies broadly divided into three levels: First, The Congress of Technology Assessment agencies; Second, the state government technology assessment agencies; Third, large colleges and institutes assessment agencies. The main area of assessment include: the current and future impact of technical or scientific program, the impact of various types of causality and current science and technology program. The congress will be informed with the impact of different schemes, relevant data and emerging issues. Assessment procedures include: firstly, a comprehensive assessment team made up by the technical

and risk analysis experts is set up; and critical assessment of each project is designated; then the assessment methods is implemented to analyzed and evaluated the content of each project; and the work plan and research program is drafted by assessment group; then more information through extensive contacts with external experts and risk analysts is obtained; finally, the draft assessment report is submitted to Congress for hearings, the assessment results is released. American Technology Assessment has wide range of area, including science and technology projects, scientific personnel, research institutions and technology policy. The formulation of assessment reports is in accordance with the assessment protocol agreed with the commissioner, including testimony, oral presentation to members of Congress in several forms of written reports and audio-visual material.

Germany, Finland, New Zealand, Ireland, Hong Kong, China and other countries and regions are based on above three approaches to establish their scientific evaluation system.

SUMMARY OF RESEARCH EVALUATION SYSTEM IN CHINA

The current research evaluation system in China

Since the 1990s, the research evaluation approach has gradually dominated by quantitative from qualitative method under the auspices of administration in China. Currently, there is no standardized scientific evaluation system in China; every universities and research institutions use their internal administrative department of universities to perform research evaluation.

At present, the evaluation of the research work is carried out by third-party rating agencies. China Academy of Management Science Scientism Institution release annual report of “Chinese University Evaluation”. In their report, a table of research strength with respect to SCI, EI, A & HCI and other indicators in Chinese institute is published, as well as number of papers and works published, patents granted and national awards received. The research group of “Chinese University Evaluation” has adjusted the evaluation indicators annually since 1997. There were major change of evaluation indicator in “2000 Chinese University Evaluation”: the research and development was replaced with main functions as one of the evaluations’ indicator; the contribution to the community is used as a measure of standard; personnel training and scientific research are used as top two indicators^[10]. In 2007, the weight of national achievement awards and published papers cited have been increased, while the SCI and EI papers has less effect in evaluation method. In 2008, a deduction of scores for the plagiarism was introduced^[11], and EI journals with low impact factor have been removed; it was completely excluded from evaluation equation in 2009^[12].

Another higher-profile rating agency is “Netbig”(China). In their evaluation method, both input and output are implemented with equal weight. There are six first grade parameters including: reputation, academic resources, academic achievement, Students, teaching and material resources. Netbig uses the combination of quantitative and qualitative analysis in their evaluation method. The qualitative analysis is generated by the survey of experts^[13].

A research group was established within the CUAA Institute of Evaluation for university evaluation since 2002. The research group uses three level evaluations in their method, with personnel training; scientific research and comprehensive reputation formed as first level parameter. The research evaluation is focused on the impact and progress of fundamental research projects; major scientific and technological innovation.

The above agencies used quantitative analysis method base on data collection, individual parameter for each indicator gives a certain weight, and the overall scores were calculated and ranked. In the example of parameter’s weight and evaluation method used by the research group of CUAA Institute of Evaluation. “Scientific research” as one of the primary parameter accounts a weight of 48.89 percent. It has three variables with “research base” accounted for 15.56 percent, “research” accounted for 13.33%, and “research” accounted for 20.00%. The overall score of university is calculated by (www.cuaa.net/):

$$100 * \frac{\sum_{i=1}^n X_i * W_i}{\text{MAX} \sum_{i=1}^n X_i * W_i}$$

Where

n-----number of variable

X-----variable

W----Weight in percentage

The Drawback And Suggestion For Scientific Research Evaluation System

While the development of evaluation system for colleges and universities scientific research is rapidly growing. It is also a flawed system that leading to academic fraud. How to build the university scientific research evaluation system, and make it really beneficial to all scientific research personnel needs further research. In recent years, many scholars carried out the beneficial exploration and practice of scientific research evaluation in China.

The review of current scientific research evaluation system in China

Wenhui Zhu believes that the implementation of quantitative evaluation system in scientific research has brought success with the negative effects. He pointed out that the quantitative analysis of scientific research evaluation has violated

the rules of scientific research activities, it is the cause of academic ethic and academic value depreciated, and make scientific research activity became the tool of the steep profits and fame. He suggests researcher should be given freedom to plan and the direction to explore for the forthcoming years within the overall framework of each research activity. It should also be evaluated and supervised by the relevant administration and online platform^[14]. Xiaochun Wu etc. argued the current scientific research evaluation system is a defected design. The simple evaluation method; biased indicators' selection and administrative intervention are the main cause of academic corruption and impetuous environment. They suggested research evaluation should follow the academic characteristics and laws of scientific research; relying on peer evaluation; promoting academic quality; establish an effective supervision and focused on the basis of the different subjects^[15].

The research and review on the creation and significance of scientific research evaluation model and indicators

ChengYuan Zhao explores the relationship between research input and patent output. In his research, the patent applications, especially the invention patent has direct connection with research funds^[16]. In the study of Kai Xu etc., the effect of R&D spending on the number of patent filed and paper published is not obvious, especially less academic papers is published on high level international journals^[17]. That indicated the further room of improvement for the scientific research management policy; patent protection policies and achievements in China. Bing Cao etc. study the significance of SCI as research evaluation indicator. They suggest the parameters provided by SCI should be used scientifically in research evaluation; There should not be a direct comparison between different disciplines; the used of impact factor should be combined with other indicators (like quotation by other scholars) in comprehensive analysis and evaluation. Jinqu He proposed a university science and technology innovation ability evaluation scheme. He used national innovation ability evaluation method with the influence of university science and technology innovation ability. It is based on the availability of resource and facilities; high-quality talent, research team and discipline cluster; the cultural environment and atmosphere and the quality of the communication^[18,19]. Qiong Cai etc. proposed a state-led scientific research evaluation model. A model is persisting with the academic excellence; open and transparent; subject classification evaluation mechanism. It is based on the principle of "quality" and "quantity". The research evaluation model consist 5 departments, namely the national top scientist committee; scientific research evaluation advisory committee; scientific research evaluation committee; academic disciplines evaluation panel and scientific research evaluation coordinating committee^[20].

The impact of overseas scientific research evaluation system in China

Jie Yang analysis research activities at key the colleges and universities in China. The scientific research personnel; scientific research funds input; the number of academic papers published; the transfer of scientific and technological achievements; patent applications and other indicators are used his analysis. A comparison is made with Japan with respect to: the structure of the sources of funding; scientific research funds usage; international academic productivity; yield of patents and other aspects. He concluded the scientific research productivity is lower; the teaching burden is heavier and less fundamental research in Chinese institute than their Japanese counterpart^[21].

Establishment of scientific research evaluation system in China

Ning An etc. used the example of south China normal university in their design of research evaluation system. Their concept is to implement the qualitative and quantitative evaluation method on the same platform with the same principle, the quantitative parameter and value of all indicators can be normalized^[22].

Xiai Zhang classified and quantified evaluation indicators, such as scientific research project, academic journals, books, achievement and reward. Those indicators are combined with the participants weighted correction. The score of participants' respective performance can be calculated as:

$$\frac{(N - S + 1)}{[1 + 2 + \dots + (N + 1) + N]} * P$$

Where

N ----- Number of participant

S ----- Participants' ranking

P----- The total score for the performance

Zhang suggests the annual performance assessments should avoid simple quantity indicator and complicate evaluation procedures for the excellent scientific research personnel. The core element of evaluation system including: the perspective of science and innovation; reduce the segment of scientific evaluation; reduce the quantity and rigid requirements; more comfortable innovation environment; encourage the frontier exploration; tolerate failure and extendable evaluation period; encouraging the development of talent; forming academic innovation team. The main principle is to promote research activities with proposed evaluation system^[23].

CONCLUSION

There has been continuous and gradual progress and improvements in the construction of evaluation system in China. The areas for improvement can be summarized as following:

(1) Institutes' research strength is valued by two scientific indexes in input and output while the ratio of it has been neglected, namely scientific productivity;

(2) The evaluation of input and output has caused deviation; in some scenario the output is biased evaluated. While the selection requirements are too higher or extensive with the unreliable data source which affects the credibility of evaluation results;

(3) The assignment of indicators' weight is very subjective and unilateral, more effective analysis method is needed to give a full description;

(4) Part of valuation's view is very subjective, although the point of view is clear with appropriate guidelines, but the conclusion is partial made;

(5) The selection processes and criteria are not clear for those colleges with specific research work.

Clearly, many unanswered questions remain and will continue to challenge as well as inspire those in the field of research evaluation in China. In this study, an informative and evidence-based overview of research evaluation system at home and abroad is presented. The problems of research evaluation system in China that are in need of refinement and clarification are outlined; an international comparison of research evaluation system is presented. The diverse challenges facing those who evaluate research and those who use evaluation-based evidence to make strategic decisions are well defined.

ACKNOWLEDGMENTS

This paper is one of China national "thirteenth five year" science and technology development planning major subject research which addressed by Zhang Xiangqian (2014DP2024), China Humanities and Social Science Fund which addressed by Zhang Xiangqian (11BJY003) and The program for Fujian Social Science Fund which addressed by Zhang Xiangqian, Express thanks to the Fund support and all the participants.

REFERENCES

- [1] Yu Ding; Review on the National Magistral Research Evaluation Systems in the World. *Meitan Higher Education*. **26(1)**, 81-85 (2008).
- [2] Li Liu; Research on Scientific Research Evaluation in European Universities and its Enlightenment. *Science of Science and Management of S. & T.* **9**, 86-90 (2005).
- [3] Vsnu; Quality Assessment of Research: Chemistry, Past Performance and Future Perspectives *Utrecht: VSNU (Association of Netherlands Universities)*. (1996).
- [4] Geuna, Aldo, R. Ben Martin; University research evaluation and funding: an international comparison. *Minerva.*, **41**, 277-304 (2003).
- [5] www.rae.ac.uk/
- [6] P. Bourke; Evaluating University Research: The British Research Assessment Exercise and Australian Practice *Commissioned Report No. 56 (Canberra: National Board of Employment, Education and Training)*. (1997).
- [7] www.arc.gov.au/
- [8] Yuan Yuan Fu; An Exploration on University Scientific Research Evaluation in England. *World Education Information*. **8**, 27-30 (2007).
- [9] Li Na Gu, Gen Shu Lu; Introduction of Research Evaluation System in Australia. *Journal of Technology College Education*. **25(1)**, 49-51 (2006).
- [10] Yan Yan, Li Xu; A study of the development for research evaluation indicators in "Chinese University Evaluation". *Jiangsu Higher Education*. **1**, 35-38 (2009).
- [11] Shu Lian Wu, Jia Lv, Shi Lin Guo; "Chinese University Evaluation 2008". *Science of Science and Management of S. & T.* **1**, 42-51 (2008).
- [12] Shu Lian Wu, Jia Lv, Shi Lin Guo; "Chinese University Evaluation 2009". *Science of Science and Management of S. & T.* **1**, 22-25 (2009).
- [13] Yan Yan, Hua Ping Geng; A comparison study for research evaluation agencies and indicators system in Chinese University. *Exploring Education Development*. **11**, 96-99 (2004).
- [14] Wen Hui Zhu; Gain and Loss of Universities Scientific Research Appraisal System Quantizes. *Journal of Shenyang Normal University (Natural Science Edition)*. **25(3)**, 388-390 (2007).
- [15] Xiao Chun Wu, Dan Jia; Scientific and Ethical Reflection on Academic Erosion in Universities—On Scientific and Research Assessment System in China's Universities. *Journal of Nanjing University of Science and Technology (Social Sciences Edition)*. **19(3)**, 77-81 (2006).
- [16] Cheng Yuan Zhao; A study on relation between Research input and patent output in higher education institute. *Knowledge Economy*, **5**, 30-31 (2009).
- [17] Kai Xu, Shan Xing Gao; A Study on Scientific Research Inputs-outputs in China University. *R&D Management*. **20(2)**, 97-101 (2008).
- [18] Jin Qiu He, Zhi Jun Sun; Innovation and high education institute technology innovation ability. *Department of*

Management of Science & Technology commission of ministry of education "Forum for management of Science & Technology and innovation ability in high education institute". (April 2006).

- [19] J.L.Furman, M.E.Poter, S.Stern; The Determinants of National Innovative Capacity. *Research policy*, **31**, 899-933 (2002).
- [20] Qiong Cai, Li Su, Yu Ding; Logics of national led research evaluation system. *Science & Technology Progress and Policy*. **26(19)**, 116-119 (2009).
- [21] Jie Yang; Chinese and Japanese Universities Compared in Research Input and Output. *Tsinghua Journal of Education*. **2**, 98-106 (2007).
- [22] Ning An, Kai Xi Den, Lei Mo; On the Establishment of a System for Scientific Research Evaluation in Higher Education Institutions. *Journal of South China Normal University (Natural Science Edition)*. **3**, 131-138 (2008).
- [23] Xi Ai Zhang; A study on research evaluation method in higher education institute. *Science and Technology Management Research*. **9**, 146-148 (2007).