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## A Novel Thought and Method of University Evaluation

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### Abstract

How to evaluate universities effectively has been attached great importance to education departments and high schools. University evaluation should advocate university spirit, guarantee and develop university key function; contain the thought of both “sparkling plug on developmental contents democracy and centralization” and “develop mode of self-innovation”, it is beneficial for universities to develop according to objective and subjective situations; it can be used to abstract and analyze university developmental mode, it is helpful for classified management.

**Index Terms:** University evaluation; university spirit; university function; individual agent evaluation; democracy agent evaluation

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### 1. INTRODUCTION (HEADING 1)

Not only is evaluation foundation of decision making, it is also important for inducting organizations or individuals to adjust and remodel behaviors. In recent years, university evaluation in China has been attached great importance to Education Ministry and high schools<sup>[1-4]</sup>. However, in view of finance, reputation and status and so on, people pay too much attention on evaluation ranking results to ignore university developmental trend, advantages, disadvantages, changes, and how to persistently harmonize development has been gradually watered down. While the phenomenon that high school attach great importance on teachers' scientific research achievements but despise on teaching effectively is quite universal and serious. Therefore, ministry of education has made the policy that professors have to take on undergraduate courses<sup>[5]</sup>. However, some universities do not really understand scientific research function on teaching. Especially for some research-oriented universities, they could deal with the relationship between scientific research and teaching badly. Therefore, exporting on appropriate university evaluation thought and university evaluation system innovation have great practical

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significance; it has strategy significance on adjusting the value of education workers and adjusting the teachers' education behavior of high schools.

## **2. University evaluation Guiding thoughts**

On the basis of predecessors' research results<sup>[6-7]</sup>, the author considers that university evaluation should advocate university spirit, guarantee and develop university key function. Modern university develops and grows by the need of passing on knowledge, university spirit is the product of history development, it has profound history contents, and the key function of university improves by evolution step by step.

### *A. Main connotations of university spirit*

In the long evolution process of university development, university running habits that seem happen by chance are sure things, and these habits heritage little by little, they become fundamental value disciplines and beliefs circulated sequentially. They become internal and stable spiritual heritage, which has a positive impact on human mode of thinking and values. Although there are different customs among different countries, the spirits of universities are almost the same, the common features are academic freedom, be practical and realistic, personality equality, animadvert and innovation.

Although academic freedom is always adored by scholars, it is not so absolute. Academic freedom is not erroneous spreading or lack of theoretical value standard, but based on practical and realistic scientism, it is critical innovation based on personality equality. It either emphasizes on scientific researchers' assurance, or tolerates both failure and academic biases; it advocates academic critique and innovation. Academic freedom spirit can provide university relaxing and comprehensive atmosphere, and it cultivates and shapes unique personality charm, idealistic spirit is beyond reality, it does not refuse to change, it dare to explore new ground, the critical spirits that not yield to authorities of all kinds, even devote oneself to the truth.

What "To be practical and realistic" emphasize is scientific spirit about objective things, observing and analyzing things with rational judgments, and bowed to the truth. Far back in the Middle Ages, universities with the trend of rationalization that is the earliest originator of scientific spirit, it reflects the behavior code intellectuals that ask and explore for satisfying the curiosity constantly. After that, scientific spirit turns to be the main motive power of university development relying on its objectivity and certainty finally. Under the guidance of scientific spirit, scientific gains emerge continuously, and in the process of passing on scientific fruits, which makes people perceive and understand the world better, and also get to know oneself once more.

Personality equality means what universities advocate is the value on behavioral norms about the relationship between human and nature, human and society, human and the others, human and oneself, and behavioral norms based on the above value<sup>[8]</sup>. Nowadays personality equality has developed to the degree of perfect match of human religion and scientific inquiry.

However, criticism in university should be the prelude of innovation, innovation based on right criticizing is the life force for university spirit. University is a place that is used for exploring, discovering and passing on new knowledge. University innovation should play an important role in society, and it becomes the main power of society culture development. For this reason, university innovation should not be to innovation and innovative things, university innovation should be pursuit for the truth and bearing the social responsibility, and innovation achievements are just byproducts with practical value freely. Therefore, innovation is not university goal but a natural result of university development.

### *B. Re-understanding for university function*

Along with the science and technology advance requirements continuously, high schools gather huge amounts of different kinds of high-level scientific and technological talents, the functions pass on knowledge no longer, high schools have already undertaken special missions, they undertake the assignment of inheriting and carry forward human civilization, create and pass on new knowledge, new theories, new thoughts, promote human society scientific culture development constantly and cultivate high quality talents. At the same time, high

schools have already become the important basis of knowledge innovation, technological innovation, and theoretical innovation; high schools become vital bridges communicated with and used for reference each other of national culture and the advanced achievements of world civilization, they are important basis for national cultural.

And so, to sum up, the present universities have three main functions, that is: cultivating high quality talents through knowledge and culture transmission, creating progressive thinking, theory and knowledge through freely exploring; stimulating social sciences & culture development by spreading of the scientific researching achievements. about the three main functions, the third function is social function, which is also the purpose of high schools existing and activating, the first two university functions are the methods for carrying out the third function (but not limited to); at the same time, the third function is guidance for the first two functions, that is to say, it is important to cultivate high level talents, create advanced thinking, theory and knowledge be beneficial to healthy development for human scientific and social development.

Without question, to the first two university functions, university should put cultivating high quality talents first; it is the key factor that differentiates from full-time research units. Based on traditional concepts, university is the place for imparting science and knowledge, cultivating different kinds of talents, university's attraction lies in that the people fostered in the university have honorable social sentiment, abundant scientific knowledge and proper problem-solving skills, consequently the university can earn social respects. These university functions indeed influence people's behavior at large, whatever in which country, when people want to obtain knowledge and improve skill abilities, at the first time, people will think about universities, they spend quite a lot of time, energy, opportunity cost and economic costs on being educated at school, influenced by the concept of "a good scholar can become an official", parents in China not only pinch and screw, but also encumber property and contract a loan to make offerings to adult children for schools. These behaviors are all based on the belief that university education provide the educated knowledge and skills which can enhance social position and respectable income, as well as the university education can make educated useful in the social construction. Therefore, education is always the first function of schools, especially for high-level university, even if Research University, the function of cultivating talents should not play second fiddle, it can almost say, in university, there is no other function can be mentioned in the same breath as the function of cultivating high-level talents.

Nowadays, a great many universities pay much attention on creating advanced thinking, theories and knowledge, that is to say, universities take the second function effectively working seriously. Especially for universities in the period of China with the carrying out of reform of opening to the outside world policy, almost all the university evaluations take research quality and research level as the most important contents. Admittedly, through high-level research fruits, as a matter of fact, universities can obtain social attention and support greatly, because these research fruits can result in people's life quality and work efficiency improvement, people know university contribution through media or tracing to its source, consequently being thankful, respectful and aspired; However, to learners, put into practice in real life is hoping oneself having the ability, that is to say, through oneself innovative work, advance oneself value at the same time contributing to society. For this reason, the ability and level of scientific research are university competitive power; they are also scholars' goal for schooling. However, if there is no connection between existent or potential high-level scientific research and learners, namely learners can not come into connection with high-level research and development products similar to advertisement, in that way, high-level research and development ability is only a signboard for learners, if things go on like this, the innate character of university must be disappeared with short of learners.

Thus it can be seen, universities should correctly deal with the relationship between scientific research and knowledge transmitting, scientific research is a necessary road for teachers to learn and promote the development level of self, schools 'decision makers should pay more attention to the research process of teachers in deed; but the way of evaluating teachers' performance could pay more attention to the high-level achievement with actual value (and the new achievement is learned from others). Learners have the actual or potential survival and developmental ability through mastering and utilizing high-level scientific researching fruits in university, University graduate is well equipped to fulfill the survival and development task with potential or real competence, whether spreading of universities 'scientific and technology achievements further, or creating new results with social needs, they will reflect university level and enhance actually prestigious university. Therefore, scientific study in Chinese universities is a process for accumulating and creating new products, it is a necessary way for further enhancing teaching quality. While socialization and industrialization of scientific research fruits

embody values of university education activities the most popular and direct behavior and results. Knowledge level and innovation contribution of students groomed by university education showing are the best expression of the third function of university<sup>[9]</sup>.

### 3. Contents of university evaluation

Through the above analysis, university evaluation should firstly embody university spirit and core function by the evaluation content. University core function could be specifically expressed as scientific, advance, systematic practicability, applicability (developmental) and the contribution to society. But considering from the angle of socialist market economy, the status of university spirit and university evaluation should notice its scientific and objective characteristic, and make learners' satisfaction as an evaluation indicator. With the implementation of the university advocated mental state from relevant academic freedom, seeking truth from facts, respect personality and criticism and innovation of the system, policy and its implementation in examination.

The knowledge that a university passing on is broad concept, it not only includes professional knowledge and skills to the narrow sense, but also including the propositional thought and value. The scientific of knowledge mostly means coincides between findings and development and changing rules of related things; the advancement of knowledge is a relative concept; it mainly consults the advancement compared with the same kind knowledge in the world wide. The knowledge systematic means that the whole sidedness and the relationship among different kinds of knowledge. The practical applicability of knowledge means that knowledge can solve real problems; the applicability of knowledge mainly behaves as the adaptability for the future. Out of question, in the market economic, market demand is the premise of things existing and developing, so learner's satisfaction degree can be evaluated as one aspect of the university evaluation, that is to say, the relevant data should be taken measures from the learner group. Besides, this paper thinks that the satisfaction degree of learners is more meaningful than employment rate, moreover, it has socialist market characteristics, and it can replace the indicator of employment rate recently.

### 4. Implementation of university evaluation

According to individual advantage evaluation method [10], "Developmental pattern sparkplug independent innovation" mainly incarnates university evaluation and analysis methods. The features of evaluation and analysis methods is the following, based on the common evaluation index system, from the point of individual advantage characteristic, through maximally admitting individual performance results, carrying out individual advantage characteristics quantitative description—advantage evaluation weights structure, and derives objective "individual agent" evaluation and analysis method, objective "democracy agent" evaluation , analysis method and "pattern deducing" method, the logic relationship and task procedure is showed:

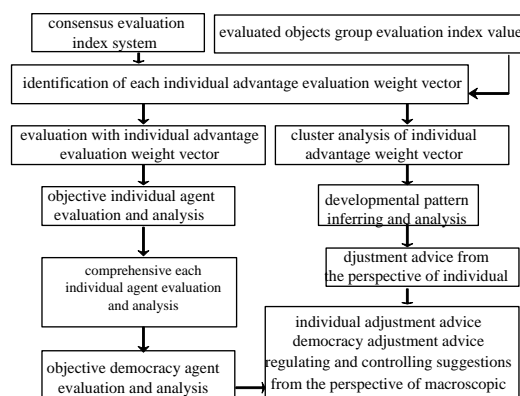


Fig 1 logic of evaluation method

### 5. Evaluation model and illustrative example

In accordance to the guiding thought, the value parameter with different objects makes the best evaluation result from the point of view of each object. The model is:

$$\begin{aligned} \min \{ & d_i^2(\bar{x}_i, \bar{x}^*) = \sum_{j=1}^p w_{ij}^2 (x_j^* - x_{ij})^2 \} \\ \text{s.t. : } & \sum_{j=1}^p w_{ij} = 1 \\ & w_{ij} \geq 0, j = 1, 2, \dots, p \end{aligned} \tag{1}$$

The solutions of model (1) is as following: 1) If at least one actual value equals to ideal value, the sum of the indicators which reach ideal value is 1, other index weights are all 0; 2) If there is no evaluation value reaching ideal value, the weight can be obtained by:

$$\begin{aligned} w_{ij}^* &= \frac{\lambda_i^*}{(x_{ij}^* - x_{ij})^2} \\ \lambda_i^* &= \frac{1}{\sum_{j=1}^p \frac{1}{(x_{ij}^* - x_{ij})^2}}, \\ i &= 1, 2, \dots, n; j = 1, 2, \dots, p \end{aligned} \tag{2}$$

If there are m indicators, n evaluated objects, According to the established evaluation indicators and model, the weights are determined, n kinds of weight vectors are calculated; for each weight, there is an evaluation result, so we can get n evaluation results for each evaluated object. The evaluation model of evaluated k based on object its advantage structure is:

$$d_{ik}(\bar{x}_k, \bar{x}^*) = \sqrt{\sum_{j=1}^m (w_{ij}^*)^2 (x_j^* - x_{kj})^2} \quad k = 1, 2, \dots, n \tag{3}$$

There into: according to ith individual advantage characteristic indicator weights, evaluated k's evaluation result.

$$D_k = \frac{1}{n} \sum_{i=1}^n d_{ik}(\bar{x}_k, \bar{x}^*) = \frac{1}{n} \sum_{i=1}^n \sqrt{\sum_{j=1}^m (w_{ij}^*)^2 (x_j^* - x_{kj})^2} \quad k = 1, 2, \dots, n \tag{4}$$

Ranked  $D_k$  by ascending, n evaluated objects ranking order can be obtained.

Since this kind of evaluation methods appear more than one, and they are like some normal evaluation methods (such as linear weight sum method, goal programming methods), different evaluation methods have different proposals, the choosing of evaluation methods should respond to specific value proposition. As a result, this paper can not decide which evaluation method be used. But in order to illustrate the problem, taking following as an example.

TABLE I: RESEARCH UNIVERSITY CONSTRUCTION PERFORMANCE EVALUATION INDICATOR SYSTEM

Research university construction performance	personnel training	number of Doctorate awarding $X_1$
		number of Nationwide excellent doctoral dissertation $X_2$
	Scientific Research	national grade awards $X_3$
		number of Paper SCI Indexed $X_4$
		numbers of patent awarded $X_5$
	Subject construction	number of state key laboratory $X_6$
		number of national key discipline $X_7$
		number of state Grade A discipline $X_8$

TABLE III: DEMOCRACY EVALUATION RESULT

di,A	0.05	0.18	0.40	0.23	0.37	0.34	0.28	0.40	0.38
di,B	0.27	0.05	0.43	0.35	0.37	0.34	0.27	0.42	0.36
di,C	0.12	0.13	0.29	0.20	0.27	0.27	0.15	0.30	0.27
di,D	0.08	0.14	0.31	0.18	0.30	0.29	0.17	0.33	0.30
di,E	0.16	0.10	0.30	0.21	0.26	0.27	0.15	0.29	0.27
di,F	0.12	0.09	0.34	0.24	0.29	0.24	0.21	0.28	0.29
di,G	0.38	0.12	0.47	0.38	0.39	0.49	0.07	0.49	0.40
di,H	0.35	0.16	0.90	0.65	0.75	0.50	0.58	0.10	0.85
di,I	0.16	0.10	0.30	0.22	0.27	0.26	0.16	0.30	0.26

TABLE II: INITIAL DATA

	X1	X2	X3	X4	X5	X6	X7	X8
A	2370	32	10.75	6873	38	12	81	26
B	1605	31	23.41	7033	198	13	49	24
C	1188	4	2.25	1023	40	1	18	14
D	1781	22	3.66	3694	60	5	40	20
E	1126	9	2.41	2631	86	4	16	14
F	1120	10	6.66	5344	30	7	28	12
G	2038	15	6.75	4519	197	6	24	28
H	743	8	1.83	9680	40	2	19	13
I	1123	6	4.25	1565	83	5	20	14

## 6. Conclusion and discussion

By the analysis of university evaluation status, the author considers that university evaluation should advocate university spirit, guarantee and develop the university core functions. On that basis, the contents of university spirit and university function have been explained in detail. In order to put university evaluation result into action, this paper puts forward a new evaluation and analysis method, which has the thought of “development contents with advocating democratic centralism”, and “development ways with independent innovation”, this kind of methods make for university development based on characteristics of subjective and objective condition; at the same time, it can extract and analysis actual running pattern of university, it is benefit for educational administrations to guide in categories.

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