The Enlightenment of Indian Institute of Technology: Autonomy, Selection and Practical Education

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ABSTRACT. Indian Institute of Technology (IIT) is one of the most famous universities in the world, and its history witnessed the development of Indian higher education. The unique management mode and educational philosophy have played an important role in its success story and given a strong boost to become one of the world-class universities. This paper explores the successful experience of IIT, which can be summarized in the following three aspects. Firstly, a high degree of autonomy and academic freedom ensure a good academic reputation. Secondly, based on rigorous selection and assessment, the IIT students work their way to the top of their profession. Lastly, the emphasis on practical education and the system of industry-university-research integration work together to promote the productivity transformation of academic achievements. These distinctive characteristics of management and talent cultivation system boost the development of IIT and make it outstanding. The success of IIT can be used as a reference and provide enlightenment for the construction of world-class universities in China. It inspires universities in China to make changes in the management system, entrance selection and talent cultivation.

1 Introduction

It is necessary to analyze the successful experience of higher education development in various countries worldwide. Learning from outstanding educational philosophy, personnel training, and university management and combining the actual situation at the same time is an inevitable choice for higher education to maintain vitality and progress. From the perspective of the current situation and history of higher education, India and China are both ancient civilizations with frequent communications in history and similar development contexts in modern times. Therefore, exploring the successful experience of Indian universities is of great practical significance, which will enlighten China's construction of world-class universities.

The Indian Institute of Technology was founded in 1951 during the reign of Nehru and now has 23 campuses across India. In the 2006 Times Global University Rankings, its Technology & Engineering ranking is second only to MIT and the University of California, Berkeley, ranking third in the world and first in Asia. It is called "the jewel in the crown of Indian science" and represents the status and influence of Indian higher education globally[1].

This paper believes the success of IIT lies in its unique educational philosophy and innovative management model. As a developing country with a similar starting point and environment for higher education development, in-depth investigation and analysis of the characteristics and management model of IITs will benefit the construction of world-class universities in China.

2 The Analysis of IIT's Management and Educational Philosophy

A university's educational philosophy and management model influence the school's talent training method and daily operating mechanism, determining whether it can stand out in the fierce competition in the changing times. Looking at the actions and achievements of the Indian Institute of Technology since its establishment, it can be found that compared with universities in China, the educational philosophy and management model of the Indian Institute of Technology have distinct characteristics. It attaches great importance to great autonomy and academic freedom, pays attention to the rigorous standards of student selection, training and assessment, and values the transformation of educational achievements and the cultivation of professional talents.

2.1 Management: High Degree of Autonomy and Academic Freedom

Indian Institute of Technology have great autonomy and enjoy a high degree of freedom in terms of faculty appointments, student selection, and curriculum design [2]. In 1956, shortly after the establishment of the school, the Indian Congress passed the famous Indian Institutes of Technology Act (IITsAct), which designated the Indian Institute of Technology as a national key institution and gave it the status of an autonomous university.

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Overall, its governance structure can be divided into three levels: Inspectors, IIT Council, School Management Committee and Council. First of all, the inspector is the President of India. In theory, he is at the highest level of the governance structure and has the right to intervene in all the university affairs[3]. In practice, the inspector is mainly an honorary position and is indicative. The Institute makes more scientific decisions based on its situation and needs. Secondly, the Council of Indian Institutes of Technology is the central institution that governs all campuses, responsible for coordinating the affairs of the branch colleges and not interfering in each college's internal administrative and academic affairs. It is composed of the presidents of the campuses, representatives of major government departments and members of Congress. Finally, the IIT Management Committee is the center of power, with full authority to manage and control the school's daily administrative and academic affairs. Members of the IIT Management Committee are mainly composed of experts, scholars and professors, making daily decisions according to specific problems. The main members of the association are professors and researchers. Based on the "academic ontology" orientation, they jointly formulate the policy of the school's academic activities [4].

In this three-tier governance structure, academic power is completely dominant, and there is no virtual hierarchical relationship or administrative leadership between the inspectors, the council and each college, nor does it interfere with the specific decision-making process[5]. With the support of all social parties, a macro autonomy model of "triangular coordination" has been formed.The downward shift of the power center has overcome the interference of administrative power on academic practice to the greatest extent, ensuring that academics and professors govern the college, which maintains the college's intrinsic qualities as an academic organization.

Different from the autonomous management model of the Indian Institute of Technology, the management models of some universities in China are bureaucratic, showing the characteristics of utilitarianism and instrumentalization. The managers of administration and academic development are independent of each other with little communication. At the same time, many colleges and universities are funded by the government, which restricts their development and lead to more obvious bureaucratic features. With administrative functions continuously strengthened, the concept of hierarchy is becoming more and more obvious, which greatly affects the long-term development of academics.

In contrast, under its highly autonomous model and the concept of "academic ontology", the Indian Institute of Technology attaches great importance to academic freedom, giving full space for academics and teaching. The decentralized power and transparency procedure also make sense when hiring teachers, which benefits talent discovery in a time-saving way. Moreover, teachers in IIT are free to choose the research direction, teaching content and teaching methods. At the same time, the evaluation of teachers focuses on teaching performance rather than only

the number of publications to guide teachers to devote themselves to scientific research and focus on talent training[6]. Everyone in the college takes the free development of academics as a priority, and there is no concept beyond academic development at all[7].

2.2 Talent Training: Rigorous Selection and Assessment

In order to ensure that every student has the same opportunity to be admitted, the Indian Institute of Technology holds the "Joint Entrance Examination" (JEE). This form of examination is organized by the college, but there is no privilege, and it has become famous worldwide in recent years: more than 300,000 middle school students apply for JEE every year, but the admission rate is less than 2%[7], which is called the most rigorous examination in the world. To ensure fairness, JEE uses the most impartial and objective test when setting the questions. Subjects include mathematics, physics, and chemistry, with questions created by educators after careful consideration. Moreover, different branch campuses take turns as question setters, and there is no repeated thinking path, let alone similar questions[2]. Students admitted successfully should not only meet the requirements of the total score but also reach the standard line of each subject. After the written examination, they also need to pass the interview assessment. The strict entrance examination system fully guarantees the selection results and ensures all students stand out, which is one of the virtual factors for the success of the IIT.

Besides, IIT also pursues a Spartan training program. Unlike the scholastic year system adopted by other universities in India, all IIT campuses conduct academic achievement evaluations on a credit-based system, and credits are measured proportionally according to the importance of the course. Students must complete 180 credits before graduation. A school-wide examination is held every 5 weeks with the results ranking[8]. The professors of IIT also have very strict individual requirements for the students. Sometimes, even a whole year of hard study is still not too much to earn the credits[9]. Nearly 20% of the students enrolled give up their study due to the academic pressure and rigorous assessment.

In comparison, the College Entrance Examination (CEE) is the most common way for Chinese students to enter top universities. In addition to some special admissions programs, only a few universities have the right to independent enrollment. Almost all students are evaluated under the same set of criteria and then choose universities based on test scores and university admission scores, which is less personalized. Moreover, the academic pressure and requirements for graduation are much less than that of the Indian Institute of Technology, which means the graduation rates stay high.

Building a world-class university requires colleges and universities to pay more attention to the width and depth of talent cultivation and create a rigorous academic style and atmosphere. At the same time, highlighting the characteristics of the university as much as possible in the

admissions assessment is beneficial to the selection of suitable students.

2.3 Achievement Transformation: Integration of Production, Education and Research

The transformation of university training achievements is of great significance for making full use of resources and guiding social development. Therefore, one of the keys to constructing world-class universities is practical education, which means cultivating practical talents, connecting school resources and social needs, as well as realizing the transformation from theoretical achievements to production practice.

Indian Institute of Technology places great emphasis on practical education for students. Internship bases are established on each campus to provide opportunities for students to be close to a real working environment and experience the work on the front line of production, which is helpful for students to correct misunderstandings during learning in class. At the same time, the market's needs are more obvious and clear for the Institutes so that they can be more targeted and timely when cultivating talents[2]. In order to provide students with the best practical training and internship, IIT draws on the successful experience of the Massachusetts Institute of Technology (MIT) and has made great adjustments based on the characteristics of IIT and the needs of Indian social development. For example, it takes IIT students 300 hours to prepare their graduation thesis, instead of 120 hours for MIT students[1]. It is considered to be consistent with the guidance of the Indian government.

Therefore, the talents trained by the Indian Institute of Technology not only have profound theoretical knowledge but also can have a good command of practical skills. Such an achievement transformation path fully reflects the advantages of the Production-Education-Research integration and facilitates the interaction between university, market and society, in which case, a healthy interaction model is formed (Figure 1).
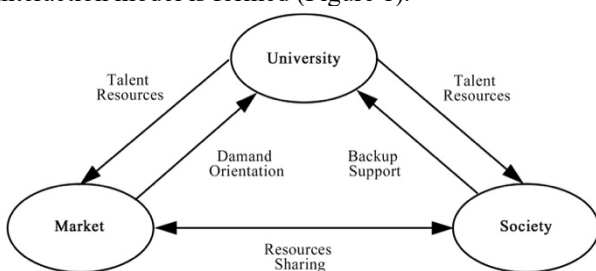

Fig. 1. The Interaction Model of the Production-Education-Research Integration of IIT

In this interaction model, the society sectors provides backup support for daily activities of the Institutions, and the market demand for talents guide the teaching staff to adjust training plan and make it more targeted. Conversely, the IIT's academic achievements and outstanding graduates become valuable talent resources, which feed back the society and meet talent market requirements.

Also, students' innovative consciousness and independent thinking are also considered top priorities. Professors focus on systematic theories and specific

solutions to problems during knowledge transfer. However, when assigning homework, they require students to think independently and create their own unique new methods and strategies based on the ideas taught by teachers[1]. There are no multiple-choice questions and no standard answers in the specialized courses exams of the Indian Institute of Technology[6]. Through the cultivation of creative thinking, IIT students have developed rich imagination, accurate judgment and independent innovation ability.

It is the mission and responsibility of world-class universities to realize the transformation from knowledge to productivity and to cultivate excellent talents with the spirit of exploration and innovation. Through university-enterprise cooperation and the integration of production, education and research etc., the barriers to transformation are broken, which is also a common training method in many universities in China. For example, offer operational skills training courses, organize junior students to participate in internship programs, and build practical workshops. However, there is still a long way to go in the completeness of design and the implementation of plans.

3 Enlightenment

Although the establishment of the Indian Institute of Technology was not as early as some universities in the United States and the United Kingdom, its achievements are amazing. The development policy and social environment of China and India are similar; however, few universities in China have achieved such impressive results. Therefore, the experience of the Indian Institutes of Technology is of great inspiration for China to construct world-class higher education.

3.1 Promote Autonomous Governance and Academic Ontology

The Indian government implements the management strategy of "doing nothing" to the Indian Institutes of Technology, which is an essential guarantee for the free development of academics. However, colleges and universities in China are under the guidance of the government sector. Little autonomy is delegated to the university president, leading to the continuous enhancement of bureaucracy and administrative functions. Therefore, the original responsibility of higher education, educating, has been weakened.

Following the administrative management model results in the lack of right to independently manage the university and pursue academic autonomy. The administrative tendency becomes the biggest obstacle to cultivating innovative talents[2]. As a result, the university has lost its development direction, and it is difficult to become a world-class one.

Therefore, in order to make a breakthrough and become one of the world's most outstanding universities, the original management and leadership system should be adjusted. It is vital to realize the university's management by educators, professors and experts to ensure the free development of academics effectively. Specifically, the

government should grant independent legal person status to universities from top to bottom and realize the shift from management to governance and service. From the perspective of macro-autonomy of universities, the reform of the higher education management system and mechanism in China lies in the independent status of universities legally granted by the government and the guarantee of the autonomous status of universities[10]. The government should change the previous approach of taking charge of everything and play the role of an encourager and a guide during the construction and development of social organizations, rather than a leader, let alone a direct operator[11].

3.2 Formulate Distinguished Enrollment and Training

As the starting point of entering a university, enrollment directly affects the process and quality of talent training to a certain extent. To ensure the talent cultivation quality of higher education in China, the selection and assessment system is to be improved. The admission policy must be adapted to local conditions, thus allowing many more people the chance of higher education. At the same time, the university is responsible for strengthening the supervision and management of graduation to ensure the delivery of compound and applied talents to society.

Based on IIT's experience, universities will benefit from a certain amount of flexibility built into the admission system. As the institutions for delivering knowledge and nurturing academic innovation, universities should select students with proper cultural knowledge, correct moral values, as well as good physical and mental health. Moreover, individualized enrollment requirements should be set in different colleges on the basis of the unified overall standards for the College Entrance Examination. For example, adjust the proportion of scores in each subject, conduct interview assessments etc. Relying on paint-by-numbers policies is not efficient, and the guidance of the Ministry of Education should be classified and targeted. In terms of talent cultivation programs and assessment requirements, world-class universities should maintain high standards of graduation, set up diversified curriculum plans and perfect training programs. It is not reasonable to lower graduation requirements and sacrifice competitiveness in the job market for a high graduation rate.

3.3 Implement Practical Education

The IIT highly emphasizes practical education, which is the key to its worldwide popularity. In order to be widely recognized, it is necessary to cultivate innovative and compound talents with practical ability. At present, it is difficult to achieve a breakthrough for theoretical-oriented teaching in China's institutions, which calls for the integration of universities, society and enterprises. It requires colleges and universities to provide sound equipment and teachers for students' practical learning and focus on combining courses with employment.

To be specific, the curriculum construction should focus on strengthening students' practical abilities. While improving students' academic accomplishments, they should also enhance their knowledge application and improve their comprehensive quality. For one thing, the curriculum setting should highlight the application and focus on the combination of theory and practice. The teaching content should reflect the latest achievements and cutting-edge requirements in the application field of disciplines according to the market's needs. For another, based on an employment-oriented concept, building a talent training model combining academic, technical and vocational and relying on production to realize achievement transformation are of great significance[2]. Universities, enterprises and society need to adopt a three-dimensional cooperation method to carry out practical education and further boost students' innovative abilities.

4 Conclusion

Both China and India are developing countries faced with the essential tasks of developing economies, enhancing international competitiveness and cultural influence. However, it is obvious that the higher education practice of China and India is quite different. And comparing the development of higher education in both countries will provide references. Compared with the autonomous management in the Indian Institute of Technology, some China's universities have shown bureaucratic features and utilitarianism tendency. Also, for Chinese students, it is much easier to finish their courses and graduate from university than IIT students. As for the transformation from teaching and studying to production, various measures have been taken in both countries, which have achieved some success.

After exploring the success of the Indian Institute of Technology, the enlightenment can be summarized into three aspects: autonomy, selection and practical education. Firstly, a high degree of autonomous structure ensures full academic freedom to retain an excellent academic reputation. Secondly, the strict talent selection system and rigorous training style cultivate outstanding high-level talents. Finally, the integration model of production, education and research encourages students to receive practical education and realize the transformation from theoretical learning to social productivity, which also forms a positive interaction between the government, schools and society.

In the process of further development, some suggestions are instructive to cultivate applied students with high competitiveness. Firstly, the government sectors should decentralize and enable colleges and universities with autonomy legally to achieve academic freedom. Also, personalized enrollment standards are to be established to ensure the quality of students and improve the requirements for graduation. Finally, it is necessary to further implement the integration of production, education and research, strengthen practical education and innovative education.

REFERENCES

1. S. Deb, The IITians: The Story of a Remarkable Indian Institution and How its Alumni are Reshaping the World. Penguin India, 2004.

2. Che Rushan, Ji Hongbo. Cultivation and Enlightenment of Elite Talents in Indian Institute of Technology. University Education Management, 2013, pp. 5-7. DOI: 10.13316/j.cnki.jhem.2013.01.015

3. Li Jianzhong. Internal Human Resource Allocation and Management in Indian Universities. Comparative Education Research, 2001, pp. 6-10. DOI: 10.3969/j.issn.1003-7667.2001.12.002

4. An Shuanghong. Indian Higher Education: Problems and Trends. Heilongjiang Education Press, 2001, pp. 178-185

5. Huang Biquan. Research on Management Characteristics of Indian Institute of Technology. Central South University, 2007. DOI: 10.7666/d.y1327960

6. Li Shuohao, Liu Mengyue. Enlightenment of the Talent Training Characteristics of Indian Institutes of Technology to China's "Excellent Engineer Education and Training Program". Heilongjiang Higher Education Research, 2012, pp. 14-16. DOI: 10.3969/j.issn.1003-2614.2012.08.003

7. Xu Wenjing. An Analysis of the Entrance Examination for Indian Institutes of Technology. Education and Examination, 2010, pp. 4. DOI: 10.16391/j.cnki.jyks.2010.01.019

8. Xiao Fuyuan. Indian Institute of Technology: Millionaire's "Making Machine". Life Sixteen Seven, 2009, pp. 34-35.

9. Chen Yiyi. Research on the Characteristics of Indian Institute of Technology. Hunan Normal University. DOI: 10.7666/d.y1472822

10. Xiao Naitao, Chen Tingzhu. An Analysis of "Dual Autonomy" of First-Class Universities: Based on the Investigation of the Governance Structure of Indian Institutes of Technology. Jianghan Academic, 2020, pp. 76-84. DOI: 10.16388/j.cnki.cn42-1843/c.2020.01.009

11. Fang Changchun. The Role of Government in the Formation and Development of Social Organizations. Jianghan Academic, 2019, pp. 6-8. DOI: 10.16388/j.cnki.cn42-1843/c.2019.02.002