DOI 10.54220/v.rsue.1991-0533.2023.80.4.029

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ПРОБЛЕМЫ ВЫСШЕГО ОБРАЗОВАНИЯ И ПУТИ ИХ РЕШЕНИЯ В ОБЛАСТИ УПРАВЛЕНИЯ В ЭПОХУ БОЛЬШИХ ДАННЫХ В КИТАЕ

Аннотация

Большие данные являются источником изменений во всех сферах жизни общества, в том числе и в управлении высшим образованием, которое в настоящее время сталкивается с беспрецедентными проблемами и возможностями. Большие данные способствуют прорыву в методах обучения, реинжинирингу процессов и инновациям в области оценки высшего образования. В силу этого возникает вопрос, как приспособиться к глубокой интеграции информационных технологий и управления организациям высшего образования в эпоху цифровизации и компьютеризации экономики и сформировать стандартизированный режим управления, что является неизбежной тенденцией развития управления высшим образованием, его переходу от традиционного к современному укладу. С этой целью в статье рассматриваются основные проблемы, с которыми сталкиваются университеты в результаты развития больших данных, и предлагаются меры по соответствующему совершенствованию в области управления организациями высшего образования, что является неотъемлемым условием для достижения университетами и дисциплинами качества и привлекательности мирового уровня.

Ключевые слова

Большие данные, высшее образование, стратегия.

Zhang Yanan

PROBLEMS AND COUNTERMEASURES OF HIGHER EDUCATION IN MANAGEMENT IN ERA OF BIG DATA IN CHINA

Annotation

Big Data is at root of change in all areas of society. Including higher education management, currently facing unprecedented opportunities and challenges. Big Data has facilitated innovations in teaching methods, process transcription and higher education evaluation. This raises a question, how to adapt to deep integration of information technology and higher education management in era of digital and computerized economy, and form standardized management system, which is inevitable trend, higher education management from traditional to modern. To this end, article explores major challenges facing universities in development of big data and proposes measures to improve organizational management of higher education accordingly, which is prerequisite for achieving international level of universities and disciplines and attractiveness.

Keywords

Big Data, higher education, corresponding strategies.

Introduction

China's higher education has entered stage of popularization. Goal of China's modernization drive in 2035 is to build a high-quality education system and put innovation in university education management at core of modernization drive. This paper tries to analyze factors that affect management of Chinese colleges and universities from theoretical perspective, and puts forward that key points of education management of colleges and universities in era of

big data are to accelerate establishment of information sharing platform, optimization of teachers and talents, and equal emphasis on power and responsibility of government. Over the years, academic circles at home and abroad initially focused on business big data, government big data and medical big data, etc. It was not until 2014 that relevant research on education management big data began to emerge. Due to rapid development of digital informatization, people's life has changed a lot, and higher education will undergo great changes in future. Spain's higher education institutions will also be changed by influence of informatization [1]. Continuous and rapid development of technology will lead to radical and even subversive changes in the field of higher education. Colleges and universities must attach importance to innovation and application of technology in education, and reform their organizational structure to adapt to changes and innovations, so as to better cope with new challenges brought by changes in social environment and times [3]. Great changes in college education, online education, inclusive thinking and educational innovation in network era [11]. Big data in education has value of modern, refined and standardized management for colleges and universities [15] believes that big data in education has strategic value and application value. At microlevel, big data in education can improve education quality, promote education equity, realize personalized learning, optimize resource allocation, and assist scientific decision-making in education [6].

Materials and methods

Problems existing in development of big data management in Chinese universities

1. Lack of professional talents

Figure 1 shows that at the end of 2018, there is still a shortage of 600,000 big data core talents in China (excluding Hong Kong, Macao and Taiwan). Moreover, distribution of big data talents is uneven, mainly concentrated in Internet and finance, resulting in a severe shortage of big data talents in transformation and upgrading of manufacturing and other industries. Looked from overall, digital China construction, cloud with cloud on transformation and upgrading of industry, enterprise, all of these have a huge demand for talent on big data showed a trend of rapid growth and demand, and number of personnel training and speed is difficult to meet demand of reality, lead to talent gap big data continues to increase, predicts that by 2025 national big data core talent gap of 2.3 million people.

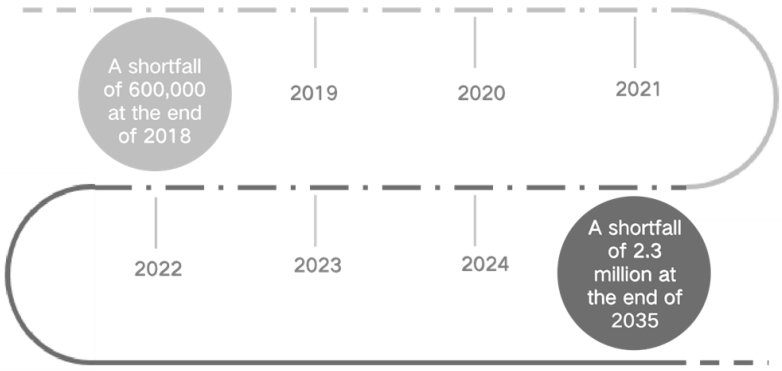

Figure 1 — **Big Data talent gap** [4]

Talent is foundation of China's development and has a bearing on its long-term development. As General Secretary Xi Jinping often says, «A single flower does not make a spring [12]. China's universities first carry out training of postgraduate students in big data, and then they recruit undergraduate students. In 2012, Capital University of Economics and Business, Together with Peking University, University of Chinese Academy of Sciences, Renmin University of China and Central University of Finance and Economics, jointly established collaborative Innovation Platform for Master's

Training in Big Data Analytics, taking lead in establishing a master's training system in big data in China. In 2014, Capital University of Economics and Business further opened «Major of Statistics (Big Data Analysis)», including information Management and Information System (big data) and statistics (Big data Analysis) two undergraduate majors.

In September 2015, State Council issued Outline of Action for Promoting Development of Big Data, which began to deploy work related to big data and promote steady development of big data industry. 13th Five-Year Plan also explicitly proposes the implementation of national big data strategy to achieve data resource sharing. On February 16, 2016, Ministry of Education issued the Notice of Ministry of Education on Filing and Approval Results of Undergraduate Majors in Colleges and Universities in 2015, and announced the new major «Data Science and Big Data Technology» in «List of Newly approved Undergraduate majors».

Statistics from Ministry of Education show that from 2017 to 2019, 32 new majors in data science and 196 new majors in big data technology were added, followed by 250 [10]. Recently, Ministry of Education announced the registration and approval results of undergraduate majors in 2020. According to the list, a total of 62 new majors in data science and big Data technology will be added in 2021. As of March 1, 2021, a total of 693 majors of data science and Big data technology have been approved, and 142 majors of big data management and application have been approved. There are thousands of majors directly or indirectly related to big data, and opening of related majors shows an increasing trend from 2016 to now [8].

As college of Big Data is a newly opened major, it is still in exploratory stage in terms of infrastructure, faculty, curriculum system and other aspects, and has not formed an independent and perfect system in terms of training programs. Before big data by independent division, computer science and technology, software engineering, electronic information, automation, and other professional are opened data processing, data mining, such as basic course, though this is attached to a subject of curriculum have tiger balm of instrumental properties, but lost particularity of big data as a professional setting, As a result, uniqueness of research direction, research methods and research questions involved in big data is greatly weakened, and final results are often inconsistent with expected goals. For example, in setting of core courses, major of Big data needs to reflect characteristics of interdisciplinary subjects, and at the same time, it cannot «cast a wide net» teaching. Simply mixing mathematics, computer and statistics courses together is likely to become «more but not better». On other hand, construction of big data laboratories in universities is also inadequate. At the same time, in view of urgency and high relevance of big data technology in industrial application, colleges and universities should actively cooperate with enterprises, share basic database, build big data management platform, etc., so as to facilitate academic research activities.

2 Data center information Barrier

Development of Chinese government's big data has gone through three stages:

Before 2010, informationization construction represented by Sanjin Project; From 2011 to 2016, we stepped into big data platform construction and data integration, and a large number of platforms were established under leadership of governments at all levels. Since 2017, data asset management and application has become a new theme. From perspective of the trend, government's big data application will gradually move towards the direction of «big supervision and big service» in the future, in order to achieve more accurate and efficient supervision and more convenient and in-depth services.

In the future, through a combination of 5 g, artificial intelligence, big data, cloud computing and Internet of things, etc. Various kinds of information technology, temporizing digital economy and construction

of government, cities brain, safe landing, social credit, perception and traffic management, social public opinion management, and other applications, to improve government service ability, will become the government big data point where the opportunity of development.

Gartern, a longtime it researcher, also believes that «Big data refers to massive, rapidly growing and diverse wealth of information that requires new processing models to ensure better decision-making power, insight and process optimization» [5]. In fact, big data can be regarded as a resource, a technology or even a way of thinking from both theoretical and practical perspectives. As important resource, it is «an information resource that can reflect the movement state and state change of material world and spiritual world» [14].

As a technology, it «is feature and picture of development of information society to a higher stage or to a higher stage» [13].

Chinese government has a large amount of data. As collector, manager and owner of government information, government has information advantages. However, due to limitations of information technology and segmented system, information network between several government departments at all levels is often self-contained, and division phenomenon is serious.

Therefore, it is difficult to realize the interconnection, data opening, information sharing and business coordination among data.

Chinese government holds 80% of high-value public data. How to activate these massive data resources is the key to development of government big data in future. However, lack of big data thinking is primary challenge facing current government governance transformation. This is mainly reflected in two aspects: first, government has not fully recognized the huge potential value contained by big data, resulting in either waste of data resources, or helpless in face of complicated big data. Premier Li Keqiang has expressed concern about the situation. «At present, more than 80 percent of China's information and data resources are in hands of government departments at all levels», he said [9].

Second, there are biases in understanding of big data. Although some government departments recognize important role of big data, their understanding of data is still confined to level of «sample thinking» and «causal thinking», and «overall thinking» and «relevant thinking» that truly reflect requirements of big data have not been established. This shows that the most important thing for transformation of government governance in era of big data is timely transformation of concept of big data.

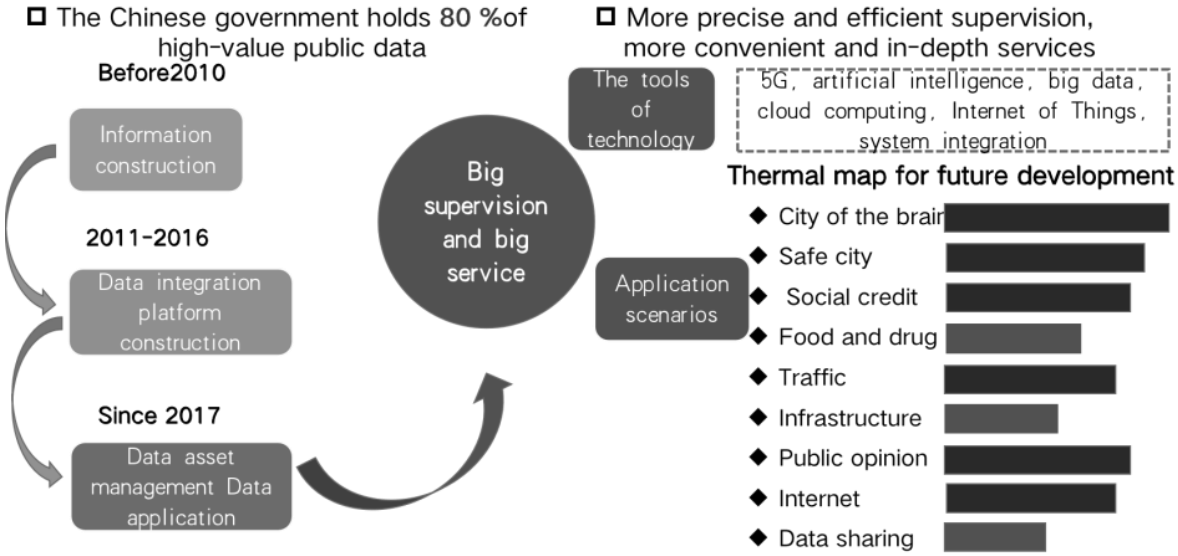

Figure 2 — **Data center information barrier** [5]

3 Educational management team's thinking is solidified and lack of innovation consciousness

According to survey of 243 colleges and universities in China about construction of educational informatization, most colleges and universities mainly purchase complete sets of software products, and will tend to outsourcing, cooperative development and self-development for a long time in future. From above data, it can be seen that way of thinking of university management team is in urgent need of transformation. «In comparison with teachers and teaching management personnel, almost two-thirds of full-time teaching management personnel show high anxiety, much trouble and tension. Teachers and administrators had significant advantages in mental health, risk-taking, emotional stability and extraversion». [7] Advent of era of big data has overturned the previous education model, which means that old pattern of education will be broken and a new pattern will be constructed. For education managers, their way of thinking and work content need to constantly adapt to new educational changes. At the beginning, some educators, especially front-line teachers, could not adapt to new changes, and concept of big data was unclear. Without preparation, there was a sense of professional crisis.

According to CCID Consulting, number of new big data-related patents in China has been rising rapidly since 2015. Number of newly added patents in 2018 alone reached 7,887, of which invention patents accounted for 77,0 %, utility model patents 21,7 % and authorized inventions 1,3 % [2]. Further analysis shows that enterprises and research institutes are the main force of big data innovation. Data shows that in 2018, they contributed 7,273 patents in total, accounting for 92,2 % of annual increase [2]. According to survey, online teaching platform products are replaced with a high proportion. Many schools say they have changed or are planning to change network teaching platform. Network platform selection is very important, in teaching course is not much information there is no universal, platforms, replace platform problem is not big, but if course materials online platform has been very abundant, relocation of resources will become a big problem, so how to choose right from start platform and reasonable development and application is of crucial importance.

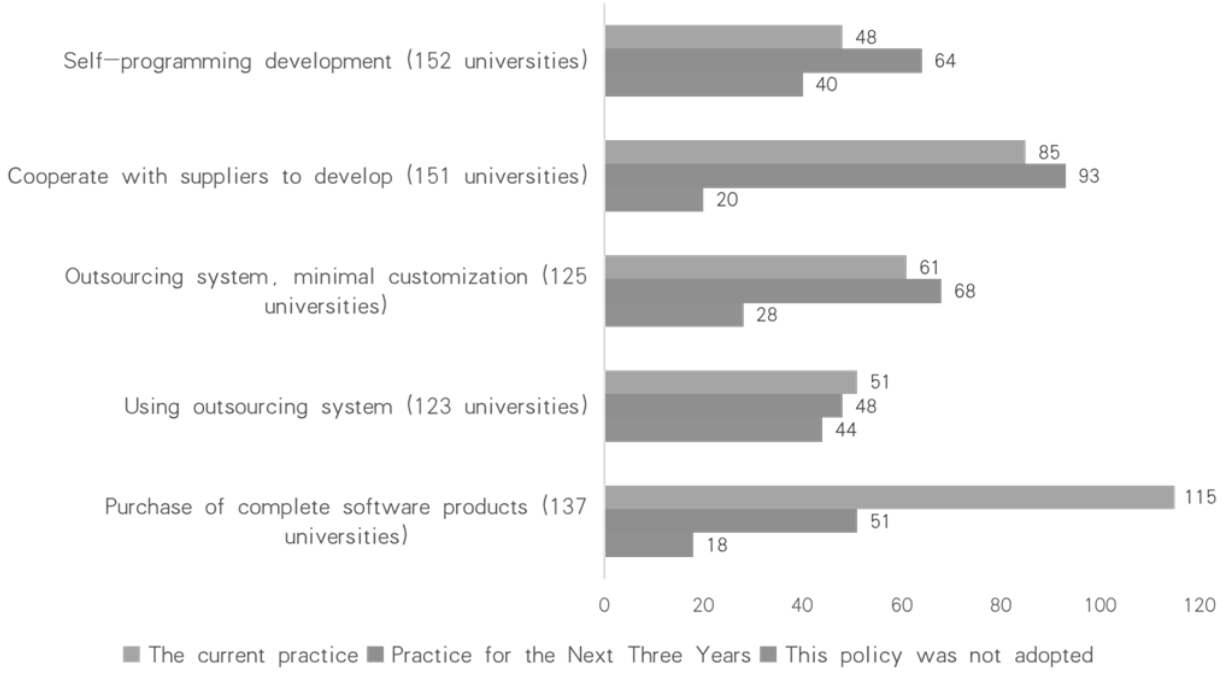

Figure 3 — **Degree of digitalization of educational management** [16]

Results

Countermeasures and suggestions for development of big data in Chinese universities

1. «Personalized» talent training is bound to become development trend of higher education

As early as 2015, State Council issued Outline of Action for Promoting Development of Big Data, making arrangements for big data-related work and promoting the steady development of big data industry. As the main force of big data education, colleges and universities should grasp every national policy and actively implement it. At the same time, in cooperation with enterprises, to cultivate high-quality skilled personnel as goal, follow school-enterprise cooperation mechanism of «win-win to promote development», adhering to principle of «resource sharing, complementary advantages, responsibility sharing, benefit sharing», through development of multi-dimensional and multi-level cooperation, establish stable school-enterprise cooperation. This will lay a solid foundation for strategic cooperation between two sides in the field of education. In addition, it is necessary to cultivate and bring up high-quality talents for big data application. Diversified training methods can be adopted, that is, to support domestic institutions of higher learning to set up big data-related disciplines and specialties, and cultivate big data technology and management personnel; Support vocational schools to carry out big data-related vocational education and cultivate professional talents; Universities and research institutes are encouraged to provide professional training for in-service personnel in terms of skills related to big data industry, and shorten the period for universities to cultivate talents to meet the demand for talents in data industry.

Finally, based on its own advantages and industry basis, it should seize opportunities in professional construction, training room construction, internship base construction, vocational certification, skill competition, student internship, student employment and other aspects, draw on students' opinions extensively, improve reward system, so as to quickly create international level big data talents.

2. Accelerate the opening and sharing of government data resources

Open and sharing of government data resources is an important measure for countries around the world to implement big data development strategy. As core producer and owner of public data, government can accelerate open and sharing of government data, release value of government data and accelerate integrated development, which is conducive to accelerating marketization of data industry. It can be predicted that open sharing of government data resources will give birth to huge economic and social values, thus forming a huge demonstration effect. Integrated development here includes not only integration of big data with other industries, but also integration of big data enterprises with governments and social organizations.

To form a complete industrial chain and ecological system, big data needs support of many industries. Therefore, it is particularly important to establish a linkage mechanism between big data industry and development of other industries, establish national and regional big data industry alliances, and strengthen cooperation of enterprises in all links of big data industry chain.

Development of big data industry needs to give full play to strengths of government, enterprises and social intermediaries. Enterprises should play a dominant role in process of industrial development, and government should provide policies and services according to needs of enterprises. Social intermediary organizations should not be ignored. Government departments should strengthen cultivation and support of big data industry associations, scientific research institutions, industrial alliances and other organizations, and give full play to their role in theoretical research, technology research and development, social research and other aspects, so as to make them another important force to promote development of big data industry.

3. Establish development concept of big data education management in colleges and universities, and innovate the education management model

In era of big data, what is most needed is not big data, nor big data technology, but big data thinking and concepts. Development of big data must be linkage of data, technology and thinking. Development of big data in university education management depends on expansion of big data resources, application of big data technology and formation of big data thinking and ideas. Therefore, establishing concepts of data opening, data sharing, data crossover and data cooperation is premise for healthy development of big data education management in Chinese universities.

Discussion

University IT is basic facilities and guarantee of big data education management, and its mission and important roles are two: one is connection function, «connecting» teachers and students, people and resources, teachers and students and schools; Second, it supports «teaching» and «learning», making it efficient and innovative. Therefore, universities should first strengthen infrastructure construction and provide a platform for integration of new big data technology and higher education practice. Secondly, colleges and universities should strengthen cooperation with enterprises with strong scientific and technological strength to combine theoretical knowledge produced by colleges and universities with new big data technology to drive new development pattern of big data in higher education. Finally, colleges and universities need to strengthen the cultivation of talents related to big data, not only in theoretical research, but also in practical talents who master the application of new technologies.

Conclusion

With accelerating arrival of 5G era, new infrastructure construction pattern of global digital economy is facing profound changes. Approaching era of big data has greatly improved the management of college education in China. Only by attaching importance to use of big data and influential factors of big data in management and allowing the actual application of big data, can efficiency of management work in colleges and universities be improved. In addition to implementation of management work, colleges and universities should understand the situation of students, and according to actual situation of students to formulate a reasonable, scientific work plan, so as to promote the smooth development of college education construction, system construction, cultural construction.

Bibliographic list

1. *Bell, S.* Editorial // Open Learning: Journal of Open, Distance and e-Learning. — 2016. — № 31 (2). — P. 87–90.

2. Big Data Industry Ecological Alliance and SaEDI Consultant. White Paper on Development of China's Big Data Industry 2019 [Electronic resource] // Computer Future: Computing Power Drives The Internet of Everything : World Computer Conference 2019. — URL: http://www.caict.ac.cn.

3. *Douce, C.* Editorial // Open Learning: Journal of Open, Distance and e-Learning. — 2017. — № 32 (1). — P. 1–5.

4. Foresee 2022: China's Big data Industry Panorama map in 2022 [Electronic resource]. — URL: https://en.qianzhan.com.

5. *Laney, D.* Importance of «Big Data»: Definition // Gartner. — 21.06.2012.

6. *Li, X.* Revolution is quietly taking place in education // Journal of East China Normal University, 2016. — P. 35–50.

7. *Lu, Y.* Investigation and Analysis of Status quo of Psychological Quality of Teaching Administrators in Colleges and Universities // Journal of Hebei Institute of Technology. — 2020. — № 1. — P. 69–70.

8. Ministry of Education of People's Republic of China. 2.0 action plan about print and distribute education informatization notice [EB/OL] [Electronic resource]. — URL: http://www.moe.gov.cn.

9. Government's «talk» is «action» on issue of information disclosure // Beijing Daily. — 13.05.2016.

10. Working Group Office of National Medium — and Long-term Education Reform and Development Plan, Ministry of Education. Outline of National Medium — and Long-term Plan for Education Reform and Development (2010–2020) [EB/OL] [Electronic resource]. — URL: http://old.moe.gov.cn.

11. *Wang, Z.* Fragmentation and Reconstruction. — Beijing, 2015.

12. *Xi, J.* Working Together for Better Future for Asia and World [Electronic resource] // Boao Forum for Asia Annual Conference 2013. — URL: http://ie.chinaembassy.gov.cn.

13. *Xie, J.* Formation of information Society: Big Data Promotes creative Society // Guangdong Social Sciences. — 2016. — № 5.

14. *Yang, S., Zhou, K.* Big Data Management problem: Resource management based on Big Data // Journal of Management Science. — 2015. — № 5.

15. *Zheng, Q.* Smart Education and Big Data. — Beijing, 2016.

16. Zhongguancun Internet Education Innovation Center. Status quo of Informatization construction of 243 Chinese Universities [EB/OL] [Electronic resource]. — URL: http://www.dlh.com.cn.