



Evaluation System and Application of Sustainable Universities in China Under Dual Carbon Background

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Abstract. In the context of dual carbon emissions, the focus of sustainable university construction in China needs to be changed. Based on the existing sustainable university evaluation system, this paper studies and constructs the sustainable university evaluation system in China, and analyzes the case, and finds that there is still a lot of room for universities to make efforts in the aspects of information disclosure and low-carbon campus construction.

Keywords: Dual Carbon · Sustainable University · Evaluation System

1 Introduction

To achieve the goal of “dual carbon” is an extensive and profound systematic reform of China’s economy and society. As a high energy consuming institution with tens of thousands of people, universities have a bounden responsibility for energy conservation and emission reduction [2]. At the same time, as a leading institution dealing with global warming and sustainability issues, the university undertakes the mission of protecting future generations from the threat of climate change [1].

However, there are relatively few systematic studies on sustainable university in China, and the relevant practices are scattered, and all of them focus on the development stage of green campus and low-carbon campus under the national green development strategy. It cannot meet the new requirements of the current national double carbon development strategy for universities. This paper attempts to systematically sort out the development evaluation framework and evaluation index system of sustainable university from China, and provide theoretical basis for the sustainable development of university and its supporting contribution to the whole society as one of the important economic subjects of the society. Therefore, in the context of dual carbon strategy, this paper studies and constructs a sustainable university evaluation system in China on the basis of existing sustainable university evaluation system, and carries out case analysis. This promotes the construction of sustainable university evaluation system and provides research experience and a good beginning for promoting the construction of relevant

evaluation system. The innovation of this paper lies in the inclusion of the double carbon construction requirements into the evaluation system, and the establishment of a Chinese, systematic index system.

2 Materials and Methods

Climate change and low-carbon campuses were part of the original sustainable University initiative. Sustainable university, namely, “Select universities dedicated to sustainable development” [8], refers to the integration of sustainability factors into the operation, education and research of universities [6], besides, special financial support and personnel allocation are provided, and the above factors are incorporated into the daily operation of the whole university by building the governance structure of sustainable development of the university and providing organization and management guarantee [3]. As the concept of sustainability was accepted in China, the concept of green university was born [9]. In China, Tsinghua University took the lead in carrying out green university construction in 1998 [4]. At present, the green university refers to the university which is guided by the concept of sustainability, permeates the concept of sustainability into all aspects of the university and cultivates sustainable talents through green education, green campus and other measures [10].

The international sustainable evaluation system has experienced long-term development, and there are more than ten kinds at present. At the same time, domestic scholars have carried out a series of studies on green universities, and many universities have also carried out relevant practices. Zhu Bifeng studied the adaptability of STARS to Green campuses in China. Tsinghua University focuses on scientific research and development and personnel training, and carries out the construction of a green university from three aspects: green education, green technology and green campus. In close cooperation with UNEP, Tongji University has gained a leading position in China and is also widely recognized internationally [11].

After a long time of research and development, the foreign system is relatively perfect, and the application and practice process is longer. At the same time, due to the private nature of foreign universities and the differences in foreign government governance structures, the evaluation of public universities under The Chinese government management system is not fully used, but the operation, education, research and social participation functions of domestic and foreign universities are the same.

Based on this, this study suggests that double carbon development strategy in China, the Chinese definition of sustainable university for - guided by the concept of sustainable, including the scope of the three development goal of one to three, through teaching, research, operation and social participation in four functions, all aspects to infiltrate the school (including low carbon campus construction, build a carbon neutral science and technology innovation system, to cultivate carbon-neutral talents, strengthen the application and transformation of scientific and technological achievements, etc.), can serve the four dimensions of university, city, talent industry and international, and ultimately promote the realization of the dual carbon goal. Based on this concept, this paper proposes a sustainable university evaluation system in China under the dual carbon strategy.

3 Results and Discussion

The construction of evaluation index system follows the basic principles of systematicness, comprehensiveness, combination of near and far, and combination of quantitative and qualitative, and draws on existing studies (STARS, 2019; GASU, 2005; SDGs, 2015–2030). According to the principle of sustainability and the actual role of universities, a universal sustainable university evaluation index system is constructed. First, the scores of campus, city, talent industry and international dimensions were calculated, and the total score of each dimension was 100. According to the scoring standard, the indexes are divided into qualitative indexes and quantitative indexes. Qualitative indicators are scored according to the judgment score. If they meet the given conditions, a certain score will be given; otherwise, no score will be given. For example, CO1 publicity, if there are sustainable publications and/or publicity materials, a score will be given; quantitative indicators score data by plugging it into a given formula. This paper does not list the specific scoring rules, please ask the author for a complete evaluation system.

Campus is a very important dimension for the evaluation of sustainable university, which is also the most direct effect of constructing sustainable university. In 1996, China put forward the concept of “green school”, which is an important content in the implementation of China’s sustainable development policy, an inevitable requirement for energy conservation and emission reduction and the realization of ecological society, and also the direction of energy management and environmental protection in colleges and universities [7]. But now, with the requirements of The Times and the implementation of the double carbon strategy, China’s green campus construction gradually turned to the stage of sustainable campus. Therefore, under the guidance of the university’s sustainability goal, the impact on the university is mainly reflected in the operation aspect. In view of this, this paper mainly constructs the evaluation index of campus dimension from the operation field. (1) SO1 publicity (2) PROFESSIONAL development and training of SO2 staff (3) SO3 assessment of sustainable development culture (4) SO4 water (5) SO5 microclimate (6) SO6 food (7) SO7 emissions (8) SO8 transportation (9) SO9 health (10) SO10 management (11) SO11 waste (12) SO12 construction (1) 3) SO13 energy (14) SO14 procurement (15) SO15 ecology.

City is the symbol of modern civilization and an important space and action unit to promote low-carbon economic transformation and high-quality economic and social development [13]. Therefore, the dual carbon strategy provides a valuable opportunity to build a modern city. As an important social subject, universities not only influence urban construction in land use, functional zoning, road traffic and other fields, but also transport innovative talents, green technology and social services for urban development. Therefore, indicators (1) CR1 research and scholarship are constructed from the following aspects (2) CR2 supports sustainability research (3) CR3 research is open (4) CS1 Community partnership (5) CS2 community volunteer work (6) CS3’s support for social innovation (7) CS4 participates in public policies (8) Collaboration between CS5 campuses.

The industry transformation under the dual carbon strategy needs the support of talents and scientific research, which requires universities to train future leaders and lead the development of scientific research. At the same time, the Action Plan for Carbon Neutral Scientific and Technological Innovation in Colleges and Universities issued by

the Ministry of Education also requires universities to “build a pattern of coordinated promotion and integrated development of education, technology and industry”. In view of this, this paper constructs the following indicators (1) TE1 academic courses (2) TE2 learning outcomes (3) TE3 undergraduate program (4) TE4 graduate program (5) TE5 immersion experience (6) TE6 sustainability literacy assessment (7) Incentive measures for TE7 development courses (8) TE8 Campus Life Laboratory (9) TE9 student orientation (10) TE10 Employee Education Program (11) TE11 Student Educator Program (12) TE12 Student life (13) TE13 Continuing education (14) TE14 lecture (15) TE15 Student Association (16) TE16 Student Competition (17) TE17 textbook compilation (18) TR1 industry, education and research.

Sustainability is a global issue that cannot be solved by China alone. We should actively carry out exchanges at home and abroad, absorb advanced technology and experience from abroad, establish a Chinese system sustainable theory, and transfer our experience and innovative concepts, methods and examples to other countries. This is our responsibility and responsibility as a major country. And this process is inseparable from the power of universities. In view of this, the following indicators are constructed (1) IE1 international education (2) IR1 international research (3) IS1 international exchange.

Based on the representativeness and availability of empirical data, Tsinghua University was selected as an empirical case to conduct case analysis. Specific results are shown in Table 1. Considering the lack of reference in scoring, many data of Tsinghua University are not disclosed, such as drinking water standards. This part is mainly analyzed from the perspective of indicator description. Further improvements can be made when the university conducts its own assessment. But this will not affect the effective use of the index system in this paper. The evaluation data came from the official website of Tsinghua University, Tsinghua UNIVERSITY SDG Action Report, relevant literature, etc., and targeted interviews were conducted with relevant experts on green university to supplement the relevant information. The evaluation results show that Tsinghua University has made some achievements in energy conservation and emission reduction at the campus level, effectively promoted the sustainable development of the community at the city level, cultivated carbon-neutral talents at the talent industry level, and actively participated in international exchanges and cooperation at the international level.

Table 1. Tsinghua University score

	index	Tsinghua situation
campus	Publicity	SDG action report
	Water	with reclaimed water irrigation; drinking water card; campus rainwater utilization planning in Tsinghua University
	Microclimate	more than 90%

(continued)

Table 1. (continued)

	index	Tsinghua situation
	Food	vegetable window; using a plate
	Transportation	new energy school bus; bike-sharing; new energy charging pile; kilometer bicycle lane; Tsinghua Science Park Station
	Health	mental health of faculty and staff; smoke-free campus
	Waste	regulations on the Management of Dangerous Chemicals
	Architecture	building campus energy monitoring platform
	Energy	energy-saving lamps; Intelligent light control system; electricity card, drinking water card
	Ecology	the green coverage rate remained stable at around 50%
city	Research and academic	“China Future Urban Innovation Network 2018”; “Carbon Neutralization Research Institute”
	Support sustainability research	creative stimulation; “Chuang+”
	Demonstration	“State Environmental Protection Administration”
	Community partnership	“Rural Revitalization Office”; education
	Community volunteer work	more than 10000 volunteers; carry out “Star Volunteers”; training the backbone of volunteers
	Support for social innovation	“SRT” training; “Kaichuang” entrepreneurial talent cultivation plan
	Participation in public policy	outline of “Green University” planning; Building Energy Conservation Academic Week
	Collaboration between campuses	“Tsinghua University First-class University Construction Plan”; Zhang Chenggang
Talent industry	Lecture	academic dialogue on SDG

(continued)

Table 1. (continued)

	index	Tsinghua situation
	Student associations	there are about 20 associations
	Academic courses	sustainable related courses; major: Architecture, etc.
	Learning achievement	specialized courses
	Project	sustainable specialization; master of Architecture
	Immersive experience	“Green Education”; activities of “Green Association”
	Employee plan	course for Key Personnel of Sustainability Management
	Student plan	new online teaching model
	Student life	construction of “Zero Carbon Think Tank”
	Continuing education	introduction to Environment, Big Data and Urban Planning
	Industry-University-Research	construction of “Zero Carbon Think Tank”
International	International Teaching	“MPP-SDG double degree” program; international students in the school and scholars visiting the school
	International scientific research	DLA; international research project support plan of Chunfeng Fund; research on water networking technology); TBSI
	Cooperation	Wu Hongbo; Zhang Chenggang

4 Conclusions

This paper focuses on the construction of university evaluation system in China under the dual carbon background. From the application practice of Tsinghua University, we can see that the development of Sustainable development university of China has just started, and its development level in information disclosure is low. In talent training and other aspects of relatively perfect development; in the community partnership and other aspects of development is a more significant Chinese characteristics.

The essence of the evaluation of Sustainable universities in China is to guide schools as one of the important social and economic subjects to provide effective and necessary support for the sustainable development of the whole society as well as the school itself. This needs the development and improvement of the school’s own understanding; it is also necessary for the state and government departments to formulate relevant policies and standards to guide schools to strive for a new position of sustainable development.

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References

1. Eagan, D.J., Keniry, J. and Schott, J. (2008), "Higher education in a warming world: the business case for climate leadership on campus", www.nwf.org.
2. Larsen H N, Pettersen J, Solli C, et al. (2013) Investigating the Carbon Footprint of a University-The case of NTNU. *Journal of Cleaner Production*, 48: 39-47.
3. Leith Sharp (2009) Higher education: the quest for the sustainable campus, *Sustainability: Science, Practice and Policy*, 5: 1, 1-8
4. Liang Lijun, Liu Chao. (2015) On the concept and Practice of "green University" construction – An investigation with Tsinghua University as the center [J]. *Education Research of Tsinghua University*, 36(05): 83-87.
5. Liang LJjun, Liu Chao. (2015) On the concept and practice of "green University" construction – An investigation with Tsinghua University as the center [J]. *Education Research of Tsinghua University*, 36(05): 83-87.
6. Ramos, T. B., Caeiro, S., Van Hoof, B., Lozano, R., Huisingh, D., & Ceulemans, K. (2015). Experiences from the implementation of sustainable development in higher education institutions: Environmental Management for Sustainable Universities. *Journal of Cleaner Production*, 106: 3-10.
7. TaiHao. (2014). A study of the problem of green campus construction in colleges and universities. <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201501&filename=1014375392.nh>
8. Van Weenen, H. (2000). Towards a vision of a sustainable university. *International Journal of Sustainability in Higher Education*, 1(1): 20-34.
9. Wang Dazhong. (1998) Establishing "Green University" to achieve sustainable development [J]. *Education Research, Tsinghua University*, 04: 8-12.
10. Wang Lei. (2011) Review on the connotation and evaluation Index System of Green Universities in China [J]. *Journal of Jinling Institute of Science and Technology (Social Science Edition)*, 25(04): 5-9.
11. Xu J. (2010) Green Campus: The road to low-carbon Tongji University [J]. *Forestry and Ecology*, (12): 37-38.
12. Zhu, B., & Dewancker, B. (2021). A case study on the suitability of STARS for green campus in China. *Evaluation and Program Planning*, 84, 101893.
13. Zhuang G, Wei M X. (2021) Urban change in China under carbon neutral goal. *Sustainable Development Economic Guide*, (05): 12-15.

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