

Article

Sustainable Development at Higher Education in China: A Comparative Study of Students' Perception in Public and Private Universities

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Received: 6 February 2020; Accepted: 10 March 2020; Published: 11 March 2020



Abstract: This research is implemented in the backdrop of the increasing number of private universities established in China over the last decade, and a growing public concern of sustainable development. The private university has a different reputation and source of funding compared with the public one, leading to different perception and practices toward sustainable development. Yet, none of past studies have investigated into public and private universities in the Chinese context, making this study fill this gap through comparing students' perception in Zhongkai University of Agriculture and Engineering (a public university) and Guangzhou College of South China University of Technology (a private university). By using the five-point Likert scale questionnaire, 393 students from the public university and 347 students from the private university participated in the survey. The results reveal that students have greatest concern with sustainability commitment and their university's role for promoting sustainable development, and have least concern with sustainability curricula and research. Compared with students from the public university, students in the private one more often agree on the importance of sustainable development, and have a higher level of perception about commitment, knowledge, attitudes, and practices toward sustainability. The study findings assert that the higher level of perception from private university's students is due to active campus sustainability engagement and positive stakeholder relationship managed by university management. The study implies that higher education needs to decentralize sustainable plans and decision-making to students, staff, and faculty, and public universities need to incorporate more sustainability-related context into curriculum and academic project.

Keywords: sustainable development; Students; private university; public university; higher education institutions; bottom-up approach

1. Introduction

Sustainable development (SD) in Higher Education Institutions (HEIs) has been a global topic in recent decades, with a growing awareness of the role of the university in SD promotion [1]. The growing concerns of resource consumptions at campus level and the growing trend of sustainability promotion in society strengthen the discussion of SD promotion in HEIs [2]. There are various means to SD, such as technology transfer, sustainable production, finance, and consumption that acquire tremendous professional knowledge and technical skills, implying that education is serving as one of the pillars to obtain SD goals [3]. HEIs have played a critical role in achieving transformative changes in society by preparing future professionals, academics, leaders, managers, and decision-makers [4,5]. Particularly, the collaboration with all sections of the university system is essential, which includes education,

research, campus operations, and community outreach [4]. Moreover, an increasing number of SD-related missions and declarations in HEIs have been launched in response to the ongoing concerns of sustainability and to guide universities to perform sustainably [6]. HEIs have started to sign some of the declarations such as Talloires Declaration, the Halifax Declaration, and the Copernicus University Charter for presenting their commitment to SD and to effectively incorporate SD into university systems [6]. Researches also suggested that HEIs usually sign more than one declaration, and those HEIs with greater commitment tend to undertake more SD actions [6].

Analysis of SD on campus varies significantly worldwide, but they all emphasized the unique and critical role of education in promoting SD and raising the awareness of being a socially and environmentally responsible citizen by actively participating in real practices [2]. The face-to-face SD courses are traditionally and commonly adopted by HEIs, while some scholars started to access the effectiveness of using e-learning in SD promotion [7]. It is observed that previous studies that addressed sustainability issues of HEIs are largely conducted in western developed countries [8]. For instance, earlier studies revealed that most students have a positive attitude towards SD in the UK and Australia [9,10]. Similar studies of SD in HEIs began to focus on developing countries like China, Iran, Malaysia, Saudi Arabia, and Turkey in last decade [1,8,11–13]. However, it is vital to notice that the education system in developing countries might be different from that in developed countries. Particularly, China is one of the countries, having a large number of HEIs, which also occupies a vital proportion in the Chinese economy [14]. Given that HEIs make an immense impact on SD promotion on whole communities, Chinese government announced that HEI is a key factor to realize sustainability in the state, and launched several strategic plans and regulations to foster the pace of achieving SD goals [15,16].

Not surprisingly, an organization can cause externalities to various parties, namely stakeholders, which are both internal and external to operation [17]. As a result of these externalities, organizational practices may be influenced by key stakeholders around them. From the perspective of HEIs, the related stakeholders consist of top management of the university, students, staff, faculty, alumni, community, employers, and funding institution [18,19]. The success of sustainable development goals (SDG) cannot be achieved without the engagement and cooperation of various stakeholders [20]. Given that students are one of the crucial stakeholders in campus sustainability promotion, assessing their perceptions and participation of sustainability issues are significant for the university to reconsider and redesign their initiatives to SD. Besides, businesses are now recruiting graduates with a strong sense of sustainability with adequate knowledge and skills, leading to increasing demands of SD in HEIs. Earlier studies investigated the ways of improving campus sustainability through surveying students' perception on SD [11,21]. The higher level of students' awareness to sustainability issues is found to positively impact on environmental practices, whilst the reduction of students' carbon footprint can be attributed to the growing awareness on SD [22]. Some previous studies also focused on examining students' commitment to sustainability, practices in real life, and their views on the role of the university in SD promotion [8,23,24].

HEIs in China actively participate in SD through campus operations and sustainability-related education provided to students [1]. In general, there are two types of HEIs in China, which are private university and public university (By the end of 2019, there were a total number of 2663 regular HEIs in mainland China where 1914 public HEIs and 749 private HEIs. The information can be found at: http://www.moe.gov.cn/s78/A03/moe_560/jytjsj_2018/qg/201908/t20190812_394215.html). Similar to the rest of the world, private universities in China generally receive funds from students' tuition fees and possibly some donations from a third-party, while public universities are fully funded by the nation [25]. Private universities, therefore, suffer a greater financial burden, where over 90% of revenues are from the tuition fees, consequently affecting the campus operation efficiency, recruiting process, education, and research quality [26,27]. Administration freedom is another feature that applies to private universities, where they can arrange a more innovative curriculum and learning environment [28]. It is not surprising that private HEIs in China feel pressures to attain a higher rate

of enrolment for survival because of the limited funds, forcing them to continuously improve their reputation [26]. Previous researchers argued that the greater participation in SD would better improve public image of a university and therefore differentiate itself from other competitors, attracting more upcoming students [29,30].

In the Chinese context, it is not surprising that private HEIs have different sources of funding and social reputation compared with public HEIs. Although there are a certain number of earlier studies that investigated SD of HEIs in the Western countries like U.S. and Europe [12], there are very limited studies in China that explored the comparison between public and private HEIs in SD from students' point of view. As such, this study will contribute to fill this gap by managing a case study on universities in Guangdong province, one of the most developed areas in China. Two Chinese universities are selected for comparison: A public university—Zhongkai University of Agriculture and Engineering (ZHKU), and a private university—Guangzhou College of South China University of Technology (GCU). By using the bottom-up approach, students are surveyed to examine their perception on sustainability issues. The reason for starting from students' perspective is that their value, outlook on life, and particularly their sustainability awareness is intimately fostered by the university.

The rest of this paper is organized as follows: Section 2 presents the literature review; Section 3 entails the methods; Section 4 presents the results and discussion, and the last section presents the conclusion.

2. Literature Review

2.1. SD in Higher Education Institutions (HEIs)

SD was introduced by the Brundtland Commission [31] as "meeting the needs of the present generation without compromising the ability of future generations to meet their needs." Fundamentally, it is recognized as both a challenge and an opportunity for a community's future growth where education and resources are insufficient to promote and execute SD plans. Because of the important role of education in terms of knowledge transmission, it acts as a crucial factor in promoting SD, and particularly, instructing students who are the future innovators [32]. The significance of integrating education into SD has been reflected in UNESCO's declarations of Education for SD, which emphasizes that each decision made by citizens is the optimal choice in consideration of impacts on the economy, equity, ecology, and community [33]. The United Nations Decade of Education for Sustainable Development also requires all related parties in society, including UN agencies, the private sector, and the education field, to collaborate with each other, aiming at integrating SD into education and achieve a sustainable society [3]. According to this, HEIs worldwide are proactively pursuing SDG through teaching and research, community involvement, and in campus operation [34].

To achieve sustainability in HEIs, the College Sustainability Report Card [35] has emphasized the importance of campus sustainability, consisting of four aspects as follows: Ecological, economic/financial, investment priorities, and institutional and energetic. The concept focuses on the operational sides of universities such as transportation, green construction, water consumption, energy consumption, recycling, commitment to emission reduction, sustainability policies, and sustainable practices from students and staffs [35]. Although universities worldwide are making efforts to transform themselves to a sustainable campus, the operation-oriented contributions to SD have been criticized by scholars, saying that universities should move beyond operational perspective and apply SD to education, research, and even extend to the community [24]. With the increasing concerns of corporate social responsibility and green manufacturing, corporations tend to employ graduates with a strong sense of sustainable knowledge and skills, and have the ability to convert theories into sustainability-related practices [2]. Without any doubt, the university is the place where graduates can be trained and exercised by sustainable courses, workshops, and activities, which are the critical determinants of becoming a prospective business leader with SD vision [36].

Due to the growing public concerns of sustainability issues and the demands of SD knowledge and skills on future leaders from businesses, HEIs gradually recognize their crucial roles and responsibility to promote SD and be committed to becoming sustainable. Previous literature summarised that several SD initiatives need to be managed by HEIs, including introduction of policies and strategies to guide universities' sustainable behaviours, implementation of sustainable food program, use of green purchasing, utilization of renewable energy resources and recycling, and integration of SD content into courses and research [37]. In addition, the collaboration of community for actively taking action to environmental sustainability, as well as university sustainability reporting for the public, also need to be undertaken by HEIs [6,38].

2.2. Bottom-up Approach in HEIs for SD

The literature review indicates that “the whole system approach” is more adaptable because the ultimate success of achieving SD in HEIs is the result of the cooperation from all levels of stakeholders [39]. The related group of stakeholders of HEIs is shown in Figure 1. Generally, they can be divided into internal and external stakeholders, who exert impacts on university's decision making and campus operation. The internal stakeholders comprise of university management, faculty, staff, and students. The rest of them are categorized as external stakeholders such as community, alumni, funding agency, government, and NGO who do not directly participate in university activities [39].



Figure 1. Stakeholders of Higher Education Institutions (HEIs). Source: Koester et al. (2006).

SD in HEIs cannot be achieved without the participation of internal stakeholders because they organize SD plans and are also affected by the implementation of SD on a daily basis [40]. There is a debate on choosing between a top-down approach and a bottom-up approach as a method for HEIs to promote SD [41]. Specifically, the top-down approach starts from a top management perspective without the involvement of students and staff during the process of decision making, stressing the important role of university administration to set out vision, mission, and objective for properly implementing SD [42]. Despite that, the top-down approach has merit in leading a rapid change for lower level stakeholders to follow, but it may be more resource-intensive in the way that top management requires more paperwork and meetings to notify the faculty and staff before these messages are delivered to students. As such, this method makes the process more complicated and less cost-effective [40].

Instead, the bottom-up approach starts from students' perspectives, helping to raise the students' awareness and perceptions of SD [43]. It is recognized that student is one of the key stakeholders in HEIs, and they can contribute to SD plans and implementation within the campus [44]. This approach helps to construct a dynamic environment where the interactions between university administration and students are efficient and active. Not surprisingly, the lower level stakeholders such as students and staff have a better understanding of daily campus operation than university management [45]. In addition, the bottom-up approach aims at activating and encouraging the lowest level stakeholders to take environmental and sustainable practices that can further influence upper stakeholders' decision

making and eventually affect the community to change their behaviours to be more sustainable [40,46]. The process of top-down and bottom up approach used in HEIs for SD is shown in Figure 2.

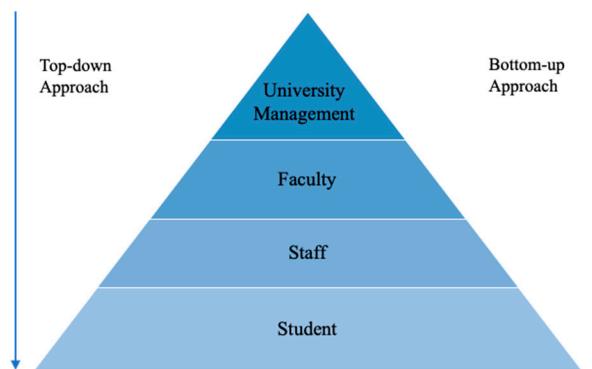


Figure 2. Top-down and Bottom-up approach used in HEIs for sustainable development (SD). Source: Author (2020).

2.3. Students' Perceptions of SD in HEIs

Students' perceptions of SD were examined by previous literature in various perspective including their attitudes, knowledge, and practice, and indicated that most of the students had positive attitudes towards sustainability. [8,9,23,24]. For instance, a study conducted in Turkey found that about 74% of respondents placed the environment as the first priority regarding SD-related decision making [13]. Even so, the studies performed by Azapagic et al. [47] and Kagawa [9] showed that students were still lack of clear and appropriate knowledge about sustainability issues. A similar study implemented in the University of Dammam in Saudi Arabia suggested that students were highly aware of campus environmental sustainability, but had insufficient willingness and motivation to involve in campus SD initiatives [12]. According to Bahaei et al. [8], positive attitudes and adequate knowledge about SD did not guarantee that students would behave in the way to achieve SD goals. Some comparative studies have also been carried out in this field of research. For example, Emanuel and Adams [23] used the survey to compare the difference of college students' perceptions on campus sustainability between public college in Alabama and Hawaii. A study delivered by Cotton et al. [48] compared students' attitudes and behaviours of sustainability issues in the UK and Portugal. In addition, a study conducted in Lithuania revealed that students in the green university more often agreed on the importance of environmental sustainability and have more sustainability practices than students in the non-green university [18].

2.4. SD in Chinese HEIs

Comparing with developed countries, HEIs in China for SD is still at a growing stage, and hence becomes an urgent and significant task for them to achieve campus sustainability [1]. The white paper of China's Agenda 21 of 1994 firstly identified the role of HEIs in achieving SDG, emphasizing the importance of SD-related trainings for better teaching and researching [49,50]. The Higher Education Law of the People's Republic of China in 1998 further stressed the training of researchers for facilitating technological and cultural change in society [51]. In recent decades, the Ministry of Education of China has increasingly launched strategic guidelines and regulations in response to the growing requirements of SD in HEIs [52]. From HEI point of view, SD in China can be dated back to 1998, when Tsinghua University was first declared to pursue the goal of "Green University" [53]. In 2011, the China Green University Network (CGUN) was established in Tongji University, comprising eight public universities and two research institutions to jointly promote SDG [54].

As one of the biggest economies in the world, the Chinese community also experiences a rapid growth in the number of HEIs and students enrolled. Figure 3a shows the increasing number of HEIs in China between 1999 and 2018. The number of new entrants and enrolment in HEIs in China over

time is also shown in Figure 3b. It indicates that there are 2663 HEIs with approximately 4 million new students enrolled, and 16.9 million students currently enrolled at the end of 2018 [55]. Furthermore, the Ministry of Education of China announced that HEIs have achieved a Gross Enrolment Rate (GER) of 48.1% in 2018, and expected that HEIs would be continuously expanding until the end of 2020 [56]. Given the increasing number of HEIs and the growing public concerns of sustainability issues, more and more Chinese HEIs agree on the important role of SD [28]. Chinese HEIs hold the view that campus SD activities are not only linked to research and education practices, but also related to collaboration with enterprises and local community [50]. The promotion of future innovation for social development and environmental preservation is also emphasized by Chinese HEIs [57]. Recently, excessive resource consumption on campus raised public concerns since the average energy and water consumption per HEI's student in China is 4 times and 2 times of the average value of Chinese residents [53]. Accordingly, a growing number of Chinese HEIs begins to realize the importance of SD education and campus greening [28,58].

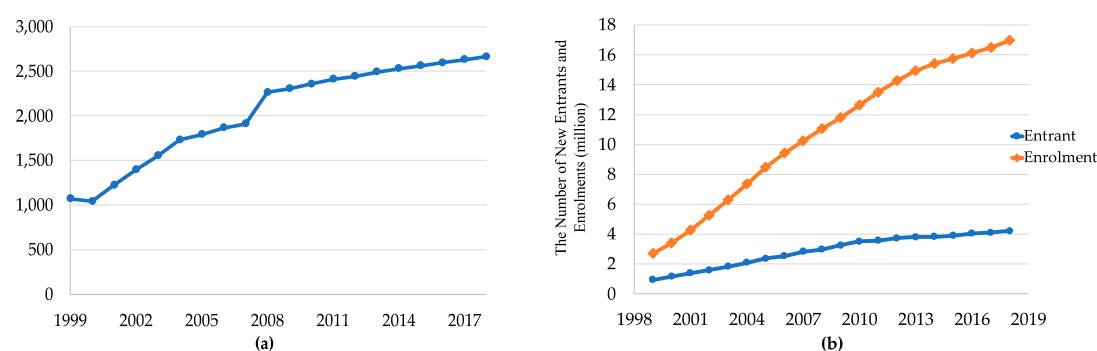


Figure 3. (a) The number of Regular HEIs in China from 1999 to 2018. Source: National Bureau of Statistics of China (2019); (b) the number of new entrant and enrolment in HEIs of China from 1999 to 2018. Source: National Bureau of Statistics of China (2019).

Generally, public HEIs in China are not-for-profit and fully funded by the nation, receiving more assigned scientific resources and having more talented faculty and staffs, and therefore have higher ranking compared with private HEIs. Conversely, private HEIs in China have to acquire adequate tuition fees or alternative sources of funding to facilitate education, scientific research, and sustainability practices [28]. Moreover, university administration in private HEIs are more concerned about the enrolment rate and graduates' employment rate since they are some of the critical factors that parents of students and potential funding agencies are evaluating on [51]. They are also stressed to improve university image and reputation in order to attract more students and future funding opportunities [29,30].

There are limited studies investigating SD in Chinese HEIs that use a bottom-up approach with a focus on the awareness raised by the students. Among those limited studies that have used a bottom-up model, a study conducted in Shandong University revealed that students generally concerned about sustainability issues, and they were likely to agree on the importance of environmental sustainability and attached less importance to sustainability-related curricula [1]. Similar findings have also been found in He et al. [59]'s research, which showed that students had positive attitudes toward environmental sustainability, and were willing to participate in environment-friendly initiatives. Yuan et al. [53] also extended the SD research to lower level stakeholders including students' parents, staff, and alumni.

3. Methods

3.1. Study Area

A public university in China, Zhongkai University of Agriculture and Engineering (ZHKU), and a private one, Guangzhou College of South China University of Technology (GCU), were chosen to compare students' perception of SD. In order to gain permission from these two universities, we have respectively sent requests to the "Sustainable Development and Planning Section" office of ZHKU and the department of students' affairs of GCU in early September. The consents were received in a timely manner.

Founded in 1927, the ZHKU has a total student population of 21,579 studying in 17 schools and is one of the centuries-old universities to promote agricultural development in mainland China. The main campus of ZHKU is located in Guangzhou city, the capital of Guangdong province, and a distance of about 3 kilometres from the city centre. In order to advocate SD, ZHKU has established a specialized division, so called "Sustainable Development and Planning Section", to promote campus sustainability. The division is governed under rector office and actively involves in clarifying ZHKU's sustainability visions, developing annual target of sustainable manners, and directing sustainable activities. The private university, GCU, which was founded in 2006, is located in Huadu district of Guangzhou city, with a distance of about 10 kilometres from the airport and 40 kilometres from the city centre. GCU is one of the top three private universities in Guaguadong province, offering 41 undergraduate programs within 13 schools, and has over 22,000 students. GCU has developed solid connections between SD and curricula by integrating sustainability education into academic program. Compulsorily, all GCU's bachelor programs are required to include at least one sustainability course in their curricula, regardless of majors in art, business, science, or engineering.

3.2. Survey Instrument

For understanding students' perception on SD, a survey using self-administrated questionnaire was delivered during October 2019 in ZHKU and GCU (Appendix A), respectively. The construct of survey is based on the integration of Emanuel's questionnaire [24] and the Sustainability Assessment Questionnaire (SAQ) [60] for assessing students' personal commitment and practices, and their perception about university's achievement on some important dimensions of campus SD. In order to optimize the survey's validity for Chinese HEIs, we made some modifications in terms of Chinese language conversion and cultural gap alleviation. The survey comprises of five sections with a total of 24 questions. The first section is concerned with the demographic information of respondents. The second section, consisting of three items, is established to investigate students' commitment to SD. The third section provides two sustainability-related multiple choices, in order to examine students' instant knowledge of sustainability issues. The fourth section explores the attitude of students on the extent to which the university, the degree program, and individual engagement comply with sustainable principles. Three subsections are developed to examine, for instance, the university's role in promoting SD, the curricula and research covering sustainability issues, and students' involvement for SD in HEIs. The last section is to discover students' sustainable practices, by asking whether or not they currently recycle, carry out energy saving practices, use environmentally friendly products, and/or have green transportation.

Unlike the first section, which relates to respondents' current demographic information, the questions in the second section, fourth section, and fifth section are closed-end, demanding respondents' answers on a five-point Likert scale, which ranges from 1 (represents strongly agree) to 5 (represents strongly disagree). The questions in the third section are also rigidly structured, requiring respondents to choose the most correct option from lists of five terms that they do or do not associate with sustainability. In order to validate the questionnaire, three academic experts in the field of business education were asked to preliminarily review the content in line with the established goal of the questionnaire. Some questions have been modified based on experts' comments and suggestions.

The pilot survey was then delivered to a small group of 30 students, for checking whether or not the questionnaire is clearly interpreted without ambiguities. Minor revisions were also made after the pilot test, and then finally acquired a modified Chinese version of the survey.

The questionnaire was distributed to students through classroom, which allows us to directly get access to students and gather information, as well as point of view, promptly. We dispensed the questionnaire during the autumn semester of the 2019–2020 academic year. It takes less than five minutes for students to complete.

3.3. Sample

Respondents of this study consist of a total of 393 and 347 students in ZHKU and GCU, with response rates of 79.3% and 84.2%, respectively. The sample of the total student population represents 1.8% in ZHKU and 1.6% in GCU. All respondents from ZHKU and GCU are currently pursuing only bachelor's degree, and no postgraduate takes part in the survey. Respondents are from School of Management of ZHKU and International Business School of GCU. The reason for only administrating questionnaires to students with a business major is that we could not assure acceptable number of respondents who are majoring in science and engineering subjects. We also confirm that the nature of participation is voluntary, and the information collected from respondents is confidential.

3.4. Analysis

In terms of statistical analysis, the frequency distribution is conducted to analyse students' responses to each question. The percentage is used in illustrating frequency distribution, for acquiring standardized comparisons between two universities and among questions. The Pearson's chi-square statistic is also implemented to examine whether or not the distribution is statistically different to one another. All analyses are found at the 0.05 level of significance, indicating that there is a statistically significant difference among questions analysed.

4. Results and Discussion

4.1. Demographics of Respondents

The demographic characteristics of respondents is shown in Table 1. The participants are largely female in two selected universities, representing by 63.9% and 60.8% of students in ZHKU and GCU, respectively. Among the respondents from ZHKU, about 42.2% of students studying management major, followed by accounting (34.4%), international trade (12.5%), investment (7.1%), and marketing major (3.8%), while the students at GCU are only majoring in international trade (38.6%), accounting (35.7%), and investment (25.7%). About 35.9% of ZHKU's participants are second year, 32.1% are third year, 17.0% are first year, and 15.0% are fourth year students. The majority of the respondents at GCU are third year students, which constitute about 51% of the sample, followed by fourth year (20.1%), second year (17.9%), and first year students (11.0%).

Table 1. Demographics characteristics of respondents.

Variable	ZHKU	GCU
Sex		
Male	142 (36.1%)	136 (39.2%)
Female	251 (63.9%)	211 (60.8%)
Major		
International Trade	49 (12.5%)	134 (38.6%)
Accounting	135 (34.4%)	124 (35.7%)
Management	166 (42.2%)	
Investment	28 (7.1%)	89 (25.7%)
Marketing	15 (3.8%)	
Grade		
First year	67 (17.0%)	38 (11.0%)
Second year	141 (35.9%)	62 (17.9%)
Third year	126 (32.1%)	177 (51.0%)
Fourth year	59 (15.0%)	70 (20.1%)

When analysing demographic characteristics between ZHKU and GCU, the results in Table 2 demonstrate that the probabilities of Pearson's chi-square (χ^2) of sex variable is higher than 0.05, indicating that there is no statistical significance difference of gender between the public and the private university. With probabilities of 0.01 or less, there is statistical significance in both major and grade variable between different universities.

Table 2. Pearson's chi-square statistic for demographics characteristics.

Variable	n	χ^2	p
Sex	740	0.391	0.736
Major	740	250.861	<0.01
Grade	740	45.592	<0.01

4.2. Commitment toward SD

This section aims to investigate students' awareness and concerns with SD for the public and the private HEIs in China. In general, students' commitment is examined through their point of view regarding SD at present, and that for the future. The results in Table 3 reveal that the majority of the respondents in two universities agree or strongly agree that they are currently concerned with SD (84.2% in ZHKU; 91.6% in GCU). Nearly two-thirds of the participants in ZHKU (66.4%), and over four fifths of the students in GCU (82.7%), believe that the conservation of environment is more important than economic development. Additionally, there is a large number of students in both ZHKU (87.8%) and GCU (94.8%) that agree or strongly agree that the community is necessary to relieve negative impacts on environment for future generations of people. Comparing the public (ZHKU) and the private (GCU) university, results depict that students of GCU have a higher level of commitment of SD than their ZHKU's counterpart.

Table 3. Students' commitment toward SD.

Commitment Towards Sustainability	Strongly Agree or Agree		Neutral		Strongly Disagree or Disagree		χ^2	p
	ZHKU	GCU	ZHKU	GCU	ZHKU	GCU		
I am quite concerned at present about the wasteful consumption of natural resources and the destruction/pollution of the environment	84.20%	91.60%	7.10%	4.00%	8.70%	4.40%	16.53	<0.01
I believe that the protection of the environment is more important than economic growth	66.40%	82.70%	21.10%	11.50%	12.50%	5.80%	7.69	<0.05
I believe that we must conserve our resources for future generations of people	87.80%	94.80%	5.90%	2.60%	6.30%	2.60%	23.45	<0.01

4.3. Knowledge about Sustainability Issues

In order to investigate respondents' understanding and knowledge about sustainability issues, two forms of questions, consisting of both five-point scale and multiple choice, are implemented in this section. Firstly, the respondents were asked to determine the extent to how well they generally know about sustainability. The results in Table 4 show that over half of respondents in ZHKU (59%) and GCU (51%) indicate that they do not have a great deal of knowledge regarding sustainability issues. Less than a quarter of the respondents in ZHKU (14%) and GCU (28.5%) have high-level insights on sustainability issues. To examine respondents' instant knowledge of sustainability, respondents were then suggested to choose the most correct option from lists of five terms. About three-quarters of respondents of ZHKU (68.9%) and slightly over half of respondents of GCU (53.9%) can correctly select the term which associates with sustainability topic. In case of asking students to point out the term which is unrelated to sustainability, 80.2% of ZHKU's respondents and 71.2% of GCU's respondents answered correctly. In general, despite that there are more GCU's students that indicate higher extent of knowledge toward sustainability issues, they have lower accuracy of sustainability-related choice questions in comparison with their ZHKU counterparts.

Table 4. Students' knowledge about sustainability issues.

Knowledge about Sustainability	Strongly Agree or Agree		Neutral		Strongly Disagree or Disagree		χ^2	p
	ZHKU	GCU	ZHKU	GCU	ZHKU	GCU		
Five-point scale: I know about sustainability	14.00%	28.50%	27.00%	20.50%	59.00%	51.00%	6.63	<0.05
Multiple choice:								
Identify the term which do NOT associate with sustainability								
Answer correctly	68.90%	53.90%						
Answer incorrectly	31.10%	46.10%						
Identify the term which DO associate with sustainability								
Answer correctly	80.20%	71.20%						
Answer incorrectly	19.80%	28.80%						

4.4. Attitude Related to SD

Given that students' willingness toward SD may play an important role for HEIs to promote campus sustainability [1,23], this section examines students' attitude related to SD. Three aspects of questions are constructed, consisting of respondents' perception regarding university roles in promoting SD, the curricula and research covering sustainability issues, and students' involvement for campus sustainability. The results in Table 5 shows that about 87.8% and 93.9% of students in ZHKU and GCU believe that the university needs to prioritize sustainable activities in the day-to-day operations. By the time we asked students' perception on whether or not the university contributes to social well-being as well as support disabled, over three-quarter of students (70% in ZHKU and 79% in GCU) acknowledge the critical status of HEIs in working for the social good. Concerning environmental issues within campus, over half of respondents in ZHKU (58.0%) and two-third respondents in GCU (66.3%) believe that the university is necessary to develop sustainable solutions to environmental problems. Students of GCU also have their eyes on international collaboration, demonstrating that about 63.4% of respondents are interested with jointed degree programs, oversea exchange, and twinning experiences, while less than a half of respondents in ZHKU (44.3%) hold a positive point of view.

Students' perception about the extent to containing sustainability issues into curricula and research is further examined. Nearly half of respondents in ZHKU (42.8%) and in GCU (47.6%) believe that the university is accountable to provide courses which address topics associated with SD. The question is then extended to students' individual degree programs. About 29.5% of respondents in ZHKU and 44.1% of respondents in GCU acknowledge that the degree program they are currently pursuing needs

to embrace sustainable skills and knowledge. Similarly, there are not many students committed to the contribution of research and academic projects to environmental sustainability. Only 29.0% of respondents in ZHKU, and 19.3% of respondents in GCU hold positive point of view.

The last part in this section is to examine students' perception about individual participation in making the campus sustainable. Respondents were firstly asked to decide whether or not they would offer assistance to create sustainable campus. The two universities demonstrate similar level of students' willingness, indicating 72.5% of consent in ZHKU and 72.3% in GCU, respectively. In terms of the extent to which students are interested in engaging in social activities organized by the university, respondents of GCU report a higher percentage of willingness (63.7%), whereas less than half of respondents in ZHKU (49.6%) were willing to involve in SD. Lastly, students were presented with a question which concerns the wish to support and participate in their university's initiatives for protecting the environment. Over half of respondents in ZHKU (57.8%) and over two-thirds of respondents in GCU acknowledge the importance of environmental conservation promoted by the campus.

Table 5. Students' attitude related to SD.

Attitude Related to Sustainability	Strongly Agree or Agree		Neutral		Strongly Disagree or Disagree		χ^2	ρ
	ZHKU	GCU	ZHKU	GCU	ZHKU	GCU		
University's role in promoting SD								
I believe that my university should make sustainability a priority in campus planning, development and day-to-day operations	87.80%	93.90%	8.40%	3.20%	3.80%	2.90%	28.43	<0.01
I believe that my university should contribute to social well-being, tolerance, fulfillment of needs of disabled, social activities	70.00%	79.00%	10.20%	15.00%	19.80%	6.00%	21.08	<0.01
I believe everyone in my university should support sustainable solutions to environment problems	58.00%	66.30%	16.00%	14.70%	26.00%	19.00%	10.03	<0.01
I believe that my university should promote the cooperation with other national and foreign universities and businesses	44.30%	63.40%	34.40%	16.10%	21.30%	20.50%	6.79	<0.05
Curriculum and research covering sustainability								
I believe that my university needs to offer courses which address topics related to sustainability	42.80%	47.60%	32.30%	28.50%	24.90%	23.90%	7.20	<0.05
I believe that my university needs to integrate sustainability aspects into my study program	29.50%	44.10%	34.40%	26.20%	36.10%	29.70%	6.82	<0.05
I believe that my university need to promote research and project related to environmental sustainability	29.00%	19.30%	43.00%	51.00%	28.00%	29.70%	7.45	<0.05
Students' involvement for campus sustainability								
I want to help to create a sustainable campus	72.50%	72.30%	21.90%	15.90%	5.60%	11.80%	24.31	<0.01
I am interested and take part in social activities organized by the university	49.60%	63.70%	29.80%	17.30%	20.60%	19.00%	18.63	<0.01
I will support and participate in my university's initiatives to protect the environment	57.80%	70.60%	27.50%	20.50%	14.70%	8.90%	6.61	<0.05

Generally, more of GCU's respondents than ZHKU's respondents demonstrated a higher awareness and proactive attitude related to SD. Interestingly, more ZHKU students than GCU's counterparts have a neutral attitude among the university's role in SD, sustainability courses taught, and personal involvement for campus sustainability.

4.5. Practices Regarding SD

To investigate students' perception about day-to-day practices moving toward SD, five questions are presented, including whether or not respondents currently take measures for sustainability, and their willingness to have a variety of sustainable practices in the future. The results in Table 6 report that less than a quarter of respondents in ZHKU (31.8%) and over a half of respondents in GCU (58.5%) are practicing recycling at present. As far as energy conservation practices, about 53.9% of respondents in ZHKU and 67.4% of respondents in GCU state that they would like to save energy in daily life. There are more than half of respondents in ZHKU (58.0%) and in GCU (68.3%) that agree or strongly agree to the use of environmentally friendly product. The use of "green transportation" is also examined. Two-fifth respondents in ZHKU (41.5%) and nearly two-third respondents in GCU (63.7%) consent to have energy-efficient vehicles. The last question is to investigate the extent to which respondents need to improve their current energy-use practices. About 34.9% of respondents in ZHKU and 53.3% respondents in GCU are likely to have more energy-saving activities in everyday life. In general, this section provides evidences that GCU's students gain higher level of perception of sustainable practices in comparison with ZHKU's students.

Table 6. Students' practices regarding SD.

Practices Regarding Sustainability	Strongly Agree or Agree		Neutral		Strongly Disagree or Disagree		χ^2	ρ
	ZHKU	GCU	ZHKU	GCU	ZHKU	GCU		
I am currently recycling	31.80%	58.50%	52.40%	24.20%	15.80%	17.30%	52.10	<0.01
I will adapt to energy conservation practices	53.90%	67.40%	23.70%	23.10%	22.40%	9.50%	16.82	<0.01
I will use environmentally friendly product	58.00%	68.30%	23.90%	25.10%	18.10%	6.60%	20.01	<0.01
I will use "green transportation"	41.50%	63.70%	50.40%	27.70%	8.10%	8.60%	7.01	<0.05
I need to change my any of current energy use practices to be more sustainable	34.90%	53.30%	54.70%	31.40%	10.40%	15.30%	13.94	<0.01

4.6. Ranking of Students' Perception for Achieving SD

In order to further investigate the extent to which respondents regard a concrete question of SD as important, the mean value is computed for each question. The lowest score assigned represents the higher importance perceived by students and vice versa. For instance, the question "I know about sustainability issues", which scores the highest mean value of 3.49, is considered by respondents as the least important factor for achieving SD. The result of mean value is also examined by the T-test. The statistical results indicate that each pair of mean values is significantly different at the level of $p<0.5$. The ranking of questions in terms of their mean values is shown in Table 7. It indicates that respondents attach greatest concerns with the preservation of resources for future generations. This is probably due to the largest population in China, where the imbalance between population growth and energy usage is frequently exposed by media [61]. The current overexploitation may result in the fact that students begin to think about the adverse impact on future generations. The second most important SD factor happens to the university's role for promoting SD. The majority of respondents believe that their university is necessary to involve in sustainable planning and development on a daily basis. This finding is also in line with studies from Yuan and Zuo [1] and Dagiliüte et al. [18] which agreed with the leading position of university's mission to foster SD. The environment-related SD factor is ranked afterwards, consisting of five items covering aspects of individual environmental concern and university's engagement into environmental protection. The finding indicates that the respondents hold neutral perception in terms of environmental sustainability, which is inconsistency with earlier studies, such as a survey delivered in a university of Saudi Arabia [12] and an investigation targeted in a Turkish university [13]. These two prior studies both revealed that students regarded environmental sustainability as the highest priority.

Table 7. Ranking of SD questions surveyed to students.

Questions	Mean
I believe that we must conserve our resources for future generations of people	1.45
I believe that my university should make sustainability a priority in campus planning, development and day-to-day operations	1.46
I am quite concerned at present about the wasteful consumption of natural resources and the destruction/pollution of the environment	1.6
I want to help to create a sustainable campus	1.79
I believe that the protection of the environment is more important than economic growth	1.84
I believe that my university should contribute to social well-being, tolerance, fulfillment of needs of disabled, social activities	1.85
I will support and participate in my university's initiatives to protect the environment	2.11
I will use environmentally friendly products	2.24
I will adapt to energy conservation practices	2.33
I believe everyone in my university should support sustainable solutions to environment problems	2.33
I will use "green transportation"	2.36
I am interested and take part in social activities organized by the university	2.37
I believe that my university should promote the cooperation with other national and foreign universities and businesses	2.43
I need to change my any of current energy use practices to be more sustainable	2.56
I am currently recycling	2.58
I believe that my university needs to offer courses which address topics related to sustainability	2.68
I believe that my university needs to integrate sustainability aspects into my study program	2.97
I believe that my university need to promote research and project related to environmental sustainability	3.07
I know about sustainability	3.49

Certain questions are low-ranking, indicating that respondents attach less importance to these SD factors. As shown in Table 6, students are indifferent to sustainable practices, and have less willingness to participate in SD. It is not surprising because of the top-down administrative approach widely employed by Chinese higher education [1]. Without self-imposed engagement, student's perception toward sustainable practices might be lower. Near the bottom of the ranking, it is found that respondents regard curricula and research covering sustainability close to the least important. This finding is supported from earlier research conducted by Dagiliūte et al. [18] and Yuan and Zuo [1], which both illustrated that sustainability issues in curriculum and research is the least important SD factor. Nevertheless, a prior study empirically showed that integrating sustainability issues into courses was positively related to students' perception of sustainability [62]. To improve SD in education, teachers need to be involved, as the ways suggested by Calder and Cugston [63], in designing proper pedagogy and research to create effective SD environment. The least important factor in our findings is the question "I know about sustainability issues". The majority of respondents acknowledge that they do not have "a bit" and "a great deal" sustainable knowledge.

4.7. Comparison of Students' Perception on SD between the Public and the Private University

In terms of the comparison of students' perception on SD between the public and the private university, four sections consisting of SD commitment, knowledge, attitude, and practices are compared. The results in Table 8 show that there are statistical significances in the mean values of knowledge, attitude, and practices toward sustainability between the private university (GCU) and the public university (ZHKU). The mean values of the private university for these four sections are all lower than that of the public university, indicating that students from the private university more often agree on the importance of SD. Admittedly, the source of funding of private universities in China mainly depend on the tuition fees paid by students, significantly distinguishing from that of public universities, where government fully funds the expenditures. As such, continuously attracting students becomes a critical mission for private universities to compete against other competitors [51]. Another reason for pressures on the number of new entrants in private universities is that they are not traditionally recognized as famed or top-class education providers by the business sector, parents, and students. In light of this situation, private universities are increasingly chasing image differentiation, enabling them to distinguish from public universities within the HEI's market [64]. Not only better infrastructure

and facilities in the campus, but also SD promotion helps private universities to improve their image and reputation, and finally gain competitive advantages [65]. Thus, students in the private university (GCU) are more submerged in a sustainable campus that is more likely to perceive the importance of sustainability than students in the public university (ZHKU). This finding is in line with an earlier study in the context of U.S., which suggested that universities with higher level of sustainability awareness and advanced environmental program could earn promising advantages, such as more state grants and higher number of students [66]. Nevertheless, such issue is still in dispute. For instance, a prior research with adverse findings suggested that incorporating social responsibility into activities was not a factor for American universities to differentiate themselves to achieve competitive advantage [64].

Table 8. Ranking of section of SD surveyed to students.

Section of Sustainability	Mean		<i>t</i>	ρ
	ZHKU	GCU		
Commitment toward sustainability	1.68	1.57	1.574	>0.05
Knowledge about sustainability	3.67	3.28	3.147	<0.05
Attitude related to sustainability	2.4	2.27	-6.940	<0.01
Practices regarding sustainability	2.56	2.25	-4.968	<0.01

The superior importance of SD perceived by students from the private university can be explained by stakeholder management, which is used to analyze how an organization effectively allocates its resources to manage the relationship with stakeholders in order to enhance their welfare [67,68]. Compared with public universities, private universities are financially stressed, demanding intensive inflows from tuition fees and business practices. It is not surprising that actively developing SD helps universities to obtain sound relationships with other key stakeholders, such as students' parents and educational bureau who can create, develop, and maintain the link with critical resources [69]. Thus, private universities can benefit from SD through satisfying stakeholders' needs and social trustworthiness that gain competitive advantages [68]. Taking the private university as an example, the established SD guideline in GCU requires all students to be educated in at least one sustainability course during the four-year study so that they are more often exposed to sustainable training and promotion, and thus more often agree the importance of SD. Even though the public university always integrates SD into university policy, less incentive and engagement from students and staffs may lead to inefficiency and ineffectiveness for carrying out SDG.

Even so, not all questions of sustainability are valued higher important by students from the private university than that of the public university. To be specific, there are more students from ZHKU that believe that the university is obligated to promote research and projects related to environmental sustainability. This is probably due to the fact that most of public universities in China are characterized as "research-oriented", encouraging students to start research from undergraduate study, whereas private universities such as GCU are more often labelled as "vocation-oriented". It is also interesting to notice that there is a larger proportion of ZHKU's students that correctly identify the term which do or do not associate with sustainability. The possible reason is that students from ZHKU would have more solid knowledgeable foundation, as reflected in their Higher College Entrance Examination grades. In 2019, the minimum grade of new entrant for ZHKU is 469 out of 750, indicating 31 higher than that of GCU [70].

5. Conclusions

HEIs may influence on society to a significant extent and contribute to SD through fostering students' personal identity and value. This study probes into students' perception about SD on one public and one private university. Four sections consisting of commitment, knowledge, attitude, and practices toward SD are examined for comparing students' opinions of ZHKU (public university) from that of GCU (private university). In general, students from these two universities have greatest concern

with the commitment regarding the preservation of resources for future generations, followed by the university's role for promoting SD. In contrast with earlier studies, which suggested the highest priority for environment sustainability, there is a neutral concern with environment-related issues among our respondents. It is also found that students lack willingness to proactively practice sustainable activities in their daily life, and generally perceive the least important to promote SD into curricula, programs, and research. In terms of the comparison between the public and the private university, students in the private university more often agree on the importance of SD than their public counterpart.

The current study provides several implications to promote SD in Chinese HEIs. First, the top-down approach to address sustainability issues is criticized by the lack of incentive and students' participation [52]. Policies and action plans only designed by university administration hardly represent students' perception on SD. Instead, a bottom-up approach is better to utilize, by the ways of decentralizing decision making to students, staff, and faculty. The self-imposed sustainable plans and provisions are more accurate and reliable than estimates prepared by university administration who have less intimate knowledge of courses, projects, programs covering sustainability issues, and day-to-day campus SD. The bottom-up approach also helps to construct a dynamic environment where interaction between university administration and students is efficient and active. In this regard, some communication tools such as anonymous SD-related questionnaires can be carried out for constructing a bridge between university administration and students. Incentives on students' SD engagement can be also developed. Second, the less concern with sustainability-related curricula and research among students presents opportunities for universities to consider implementing inclusive education, such as offering a wide choice of sustainability courses and embedding some sustainability credits in total graduation credits. Particularly, students in the public university are found to have lower level perception of sustainability curricula, reflecting that public universities need to engage environmental preservation and social well-being into general education purpose. Third, regulatory authorities need to launch policy guidelines to mandate university administration for SD promotion. For instance, the Ministry of Education can establish a set of best SD practices, helping Chinese HEIs to benchmark themselves. In addition, the local bureau of education can form an independent section/department to periodically regulate and assess university's sustainable practices. Testimonials and awards can also be given to HEIs with best SD practices.

As usual, some limitations need to be acknowledged. First, the survey of this study using self-administrated questionnaire is only based on literature review. There are only twenty-one questions of SD designed in the questionnaire, implying the insufficient size to cover all aspects of students' perception about SD. Given students' lax attitude and the lack of incentives to complete the questionnaire, we try to minimize the number of questions in order to shorten the completion time and gain more commitment from respondents. Second, the number of universities selected in the current study is inadequate. The sample biases may arise due to only one public and one private university being compared. It would be better to have more universities for achieving more representative and reliable results. Third, only students majoring in business participated in the questionnaire, generating some bias to represent all students with different backgrounds. Future research may extend to figure out how HEIs practically incorporate environmental preservation and social well-being into general education purpose. Other stakeholders, such as faculty, staff, and alumni, and different types of universities, such as research-oriented and vocation-oriented universities, can be investigated. Future direction can be also linked to a cross-county analysis of SD in HEIs. From practitioners' point of view, university administration of Chinese HEIs can run some SD-related communication mechanisms, such as regular check of campus SDG implementation and assess students' feedback on SD issues.

Author Contributions: M.Y. carried out the conceptualization, supervision, and review and editing. J.W. carried out writing of original draft. P.M. carried out the methodology. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Excellent Ph.D Research Project of GCU-SCUT under grant number 2019035BGS.

Acknowledgments: The authors acknowledge scientific support by PostDoc Research Mobility in University of Hradec Kralove and internal project Excellence 2020, Faculty of Informatics and Management, University of Hradec Kralove, Czech Republic.

Conflicts of Interest: The authors declare no conflict of interest.

Appendix A

Table A1. SD questionnaire surveyed to students in ZHKU and GCU.

Commitment
1. I am quite concerned at present about the wasteful consumption of natural resources and the destruction/pollution of the environment
2. I believe that the protection of the environment is more important than economic growth
3. I believe that we must conserve our resources for future generations of people
Knowledge
4. I know about sustainability
5. Please identify the term in the following group that you do NOT associate with sustainability a) Recycling; b) Conservation c)"Green" building d) Nuclear energy e) Wind turbines
6. Please identify the term in the following group that you DO associate with sustainability a) Pollution; b) Solar energy; c) Chemicals; d) Pesticides; e) Plastics
Attitude
a. University's role in sustainability
7. I believe that my university should make sustainability a priority in campus planning, development and day-to-day operations
8. I believe that my university should contribute to social well-being, tolerance, fulfillment of needs of disabled, social activities
9. I believe everyone in my university should support sustainable solutions to environment problems
10. I believe that my university should promote the cooperation with other national and foreign universities and businesses
b. Curriculum and research covering sustainability
11. I believe that my university needs to offer courses which address topics related to sustainability
12. I believe that my university needs to integrate sustainability aspects into my study program
13. I believe that my university need to promote research and project related to environmental sustainability
c. Students' involvement for campus sustainability
14. I want to help to create a sustainable campus
15. I am interested and take part in social activities organized by the university
16. I will support and participate in my university's initiatives to protect the environment
Practices
17. I am currently recycling
18. I will adapt to energy conservation practices
19. I will use environmentally friendly products.
20. I will use "green transportation"
21. I need to change my any of current energy use practices to be more sustainable

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