Research on the Construction of a "New Ecology" of University Catering

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Abstract: With the goal of establishing morality and nurturing people, university catering is thought to be one of the key components in the construction of "double first class" universities, which supports and leads the reform of education modernization. In this study, the common problems in the university catering were analyzed, and research was done through questionnaires and interviews. This study takes Beijing colleges and universities as the research object to understand the needs of students and teachers and aims to build a "new ecology" of university catering, and vigorously promote the construction of green campuses.

Keywords: University catering; Education modernization; New ecology; Green campus

1. Introduction

In recent years, in response to a series of problems, such as the quality, quantity, type and price of dishes, tableware hygiene, environmental hygiene, sales specifications, dining order, miscalculation, waste, and so on, which were reported by teachers and students in colleges and universities, the Ministry of Education in 2020 issued policies to eliminate food waste. These policies emphasized on the enforcement of related laws and taking effective measures and establishing long-term solutions to eliminate waste. We should also popularize and provide education on cultivating the habit of saving, so as to create a society that loves saving and hates wasting.

On April 29, 2021, the Law of the People's Republic of China on Combating Food Waste was passed in the 28th meeting of the Standing Committee of the 13th National People's Congress [1], which turns food wastage from a moral issue into a legal issue. Article 5 of the Anti-food Waste Law clearly puts forward the need to use information technology to help fight against food waste: catering service operators can utilize information technology to analyze the food demand and scientifically manage food procurement, transportation, storage, processing, and many more by building central kitchen, distribution center, or by other measures. In this way, the satisfaction towards the food served will be improved, and the reform of university catering can be realized. With that, teachers and students will be motivated to "take charge of their plates," which will drive the innovative development of the catering industry.

2. Problem analysis

In March 2022, the author distributed online questionnaires and conducted online interviews with students from 20 universities, including Peking University, Tsinghua University, Renmin University of China, Beijing University of Science and Technology, China University of Geosciences (Beijing), and North China

Electric Power University. 23,268 students filled out in the questionnaire, and 21479 valid questionnaires were collected, with a recovery rate of 92.31%. Undergraduate students accounted for 72%, while others accounted for 28%. The content of this questionnaire is based on the renewal of university catering, and 30 questions were set up, which were divided into five parts: the understanding of the new ecology, the new intelligent platforms and standards.

According to the data collected through the questionnaires and interviews, more than 90% of the students showed great interest in smart catering. Furthermore, they were very willing to talk about the problems of their schools' catering and were very open to the renewal of university catering. They were also eager to reconstruct the catering system in their own schools. However, there are a few problems in the renewal of university catering.

2.1. The infrastructure is lacking, and an intelligent platform needs to be built

Infrastructure is the carrier of the construction of the "new ecology" the material basis for the development of a green campus. With the increase of enrollment in colleges and universities, the investment in hardware has increased, but the speed of construction could not keep up with the students' needs. According to the data, 71.1% of students' schools do not have intelligent settlement systems. 13% of the students' schools have intelligent settlement systems, but there are no new standards, but they need to be further developed.

2.2. The education on food wastage is lacking

In the catering management, we should take honesty, openness, and communication as the basic principles to implement intelligent management supported by big data as well as pay attention to the democratic and educational role of management. Students are not only the forerunners of the rule of law in China, but also the impetus for active participation [2]. According to the data analysis, 68% of the students said that they had a bad appetite and could not eat, so they had to give up, while 38% of the students thought that they or their classmates have a lack of understanding of the food culture, and waste is inevitable. Therefore, it is necessary to adopt new ideas and methods to correct uncivilized behavior and bad habits. Besides, it is also important to initiate the development of smart catering and implement incentives such as a point reward system for meals.

2.3. Unfavorable dining behavior and lack of personal culture

Dining behavior is a part of food culture, which can fully display the comprehensive quality of students. However, the data shows that 97.2% of the respondents' schools have not held any themed activities around food waste. In fact, if the schools were to organize these kinds of activities, the respondents would actively participate in them and actively promote food culture. Personal culture is the basis of food culture, which relates to students' values, pursuits, dining behavior, and overall image. Organizational behavior and culture also emphasize on the implementation of specific behavior activities [3].

2.4. Lack of ecological awareness

According to the survey data, due to the poor ecological education, while college students have some sense of ecological responsibility, they generally have a poor understanding of ecological civilization and ecological rule of law. They are also unaware of overconsumption, such as luxury consumption and consumption comparison, and lack sufficient understanding of the practical measures to build a socialist eco-civilization [4]. Campus culture and professional education complement each other. Without the promotion of campus culture, the effect of education on ecological civilization will be greatly reduced.

2.5. Lack of institutional supervision

Some prominent problems in the construction of green campus are mostly related to the imperfection of the catering ecological civilization system. There is still a lack of effective top-level organizational structure and scientific planning on how to implement the concept of ecological civilization and solve the problem of the lagging institutional construction. The division of labor and coordination, resource integration, institutional system among different departments of colleges and universities needs to be further improved. [5]

2.6. Low merchant standards

High-quality catering enterprises that are honest, have good performance, and are law-abiding and professional should be selected using scientific methods during canteen outsourcing [6]. The catering center should supervise and train the outsourcing units in accordance with the relevant national policies and regulations, industry standards, and the terms of the agreement signed between the school and catering enterprises, so as to ensure continuous improvement and optimization, so as to achieve good risk management.

In short, food quality, personnel quality, family income, conservation awareness, environmental education, reward and punishment mechanism, and comprehensive evaluation reflected in the survey data are the focus of the constructing the new ecology of university catering. These focuses directly reflect the existence of certain problems in the operation mode, intelligent management, energy conservation and environmental education, and "three complete education" of catering. These problems are all included in the scope of the education of all members of universities. Therefore, this makes the construction of a new ecology of university catering is necessary.

3. Construction of a new ecology

Science and technology empowerment and ecological innovation are the new models of the current social development. The situation of various industries is also progressing along with the social advancement, and university catering is also one of them. It will be an inevitable trend for colleges and universities to focus on the overall chain, strengthen scientific and technological innovation, constantly explore the use of new technologies, new processes, and new equipment, and to integrate information technology, the Internet of Things, artificial intelligence into canteen management, and so as to renew the college catering system (**Figure 1**).
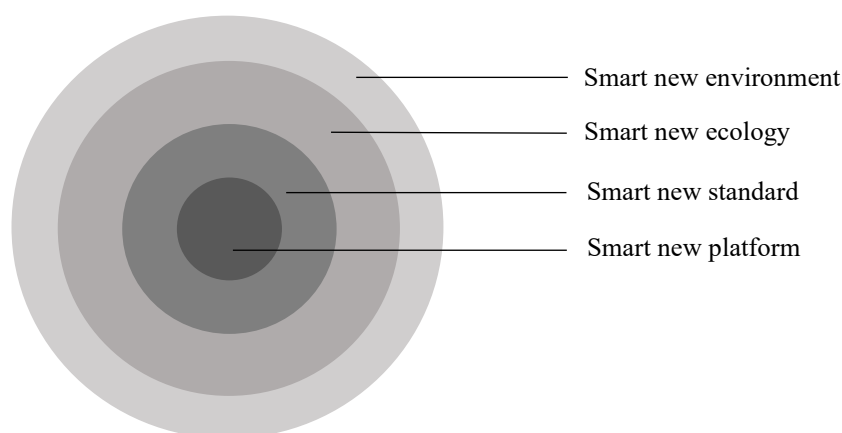

Figure 1. The new structure of university catering

3.1. Building a new intelligent platform based on big data

The construction of smart canteen should be supported by big data and focus should be on building a big data platform for school catering. At present, the smart canteen has moved from the 1.0 era of replacing part of human labor with intelligent equipment and improving work efficiency to the 2.0 era of realizing the big data integration of the whole catering chain, assisting managers to make better decisions, and is moving towards the 3.0 era of "taking charge of our own plates."

In some universities in Beijing, there were significant changes brought by the construction and upgrading of the smart canteen from the dining style of teachers and students to their dining experience. The use of intelligent settlement desk (1.0 era) has significantly saved time and labor. The function of the smart restaurant is further expanded and upgraded (2.0 era). The basic data of each dish is recorded in the background management system. Through data analysis, customer preferences can be understood. Leftover dishes are eliminated, while new ones are constantly introduced. This would improve the overall quality of canteen dishes and reduce food waste. In the 3.0 era, we will truly realize big data utilization and build a long-term mechanism to reduce food and beverage consumption. On the one hand, in the smart canteen, basic information such as the types and flavors of dishes in the school cafeterias and restaurants can be input into the system as the basis of data analysis; besides, personal dining and consumption habits, consumption records, and food sales data of teachers and students will be imported into the system. Through big data, it is possible to identify dishes that are popular. Based on data analysis, a report can be created to help the canteen achieve high-quality supply and further promote the reduction of food waste.

Of course, the value of data is way more than that. When big data meets cloud computing, the smart canteen can even become a smart canteen for every teacher and student, hence achieving "customization." The information system accurately records the consumption behavior of teachers and students. Through the comprehensive analysis of their consumption habits, taste, quantity, time, price, evaluation, and other preferences, a unique personal dining data report can be created for each teacher and student. In this way a customized catering service can be provided for each teacher and student, and healthy eating can be promoted, thus comprehensively improving the quality of catering services.

3.2. Develop a new form of intelligence through catering management

In the research of smart catering in universities, the unified standard of smart catering management platform is indispensable. The Code for the Construction of Intelligent Canteens in Colleges and Universities has entered the stage of soliciting opinions, which will further promote the work of curbing food waste and make college canteens become an example for reducing food waste.

At present, all enterprises have their own ecosphere, such as Xiaomi Ecosphere and Huawei Ecosphere. The university catering industry should also have such a smart ecosphere to make this ecosphere a standard. It is not an independent application, but the underlying system that carries the application. A standardized intelligent catering management platform will open up all links from raw material procurement, warehouse storage, distribution, production, and processing, finished product sales, to satisfaction evaluation, and realize the efficient management of the whole chain. In this way the scientific decision-making and service efficiency and the management of campus catering can be improved. As a result, a resource-saving intelligent canteen can be constructed. The food-saving system and waste reduction at the consumer end helps the construction of a long-term mechanism to combat food and beverage waste on campus.

3.3. Creating a new intelligent ecology with "educating people" as the cornerstone

The intelligent canteen is an important part of the intelligent logistics in colleges and universities. Intelligent canteens should be constructed through intelligent logistics platform. Only by establishing the overall intelligent logistics can the advantages of intelligent canteen be fully demonstrated. It is the main goal of

"educating people" that connects the intelligent logistics. The purpose of logistics in colleges and universities are not only to provide high-quality service and management, but also to educate people. Management, service, or the creation of environmental atmosphere are all important parts of education for the staff.

If the intelligent logistics is based on comprehensive evaluations by students, the data of their behavior can also be included into the system. For example, when a student is eating in the cafeteria, if the system detects that the student has a lot of leftovers, the information will be recorded. In time, if the behavior of wasting does not improve, the student's score will be affected. This will raise their awareness towards the Clean Your Plate Campaign and participate in anti-food waste more consciously.

3.4. Electronic payment opens a new era of wisdom

Digital RMB has the characteristics of "breaking the walls of transaction," high security and credibility, green, low carbon, and high efficiency. It comprehensively links and connects financial flow, information flow, capital flow, logistics, etc., and provides a payment method for all consumption scenarios. Besides, it easily links with different medias such as linking to the campus one-card, making it "one-card +," which provides better privacy and security. The arrival of the era of "big card" will also promote the development of smart canteens from the bottom.

The university campus is a unique platform for digital RMB, which can be organically integrated with the construction of smart campus, and may also produce "spillover effect," in which it can be used outside the campus. Digital RMB will actively promote the construction of smart canteens, smart logistics, smart campus, green campus and zero-carbon campus while bringing about payment reform.

The construction of smart campus in the new era will promote the comprehensive, systematic and profound reform of the education of colleges and universities. In the near future, colleges and universities across the country will gradually enter the era of smart canteen 3.0, which is an era in which various effective resources of the Internet society are integrated with the whole process of campus catering operation. At that time, the smart campus big data platform and the social platform with the goal of educating people will be formed. Off-campus data will be shared to the campus catering system, and resources from netizens will be to the campus catering system, so as to realize the complete transformation from decision-making by humans to decision-making by big data. The needs of teachers and students are identified according to the perfect big data system, and catering services that cannot meet those needs will be eliminated. The preferred food items and catering companies are retained, thus changing the way of dining in campus from "eating whatever that is available" into "having whatever the students like," and fully realize the beautiful vision of "taking charge of their own plates."

With the comprehensive integration of science and technology into the new trend of daily life, the school catering service resources will become more and more intelligent. With the purpose of satisfying the needs of students and teachers, smart university catering integrates advanced technologies such as mobile internet, big data, cloud computing, etc., which will kickstart high-quality catering and build a new campus catering ecosystem.

4. Conclusion

From the comprehensive analysis of the survey results, there are problems of different degrees in the operation mode and the construction of catering culture in colleges and universities. It is hoped that that colleges and universities can rely on big data and eliminate traditional catering, and reconstruct the new ecological framework of catering. Besides, colleges and universities should strive to be people-oriented, traceable, and eliminate waste, achieve harmonious coexistence between human and nature, and lead the innovative development of college catering and the overall catering industry.

Disclosure statement

The author declares no conflict of interest.

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