The Innovation Research of Campus Food Service Based on Common Delivery Mode

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Abstract. With the increase of the college students' consumption level and service convenience demand, and the rise of various online platforms of takeout-food, the scale of takeout orders for school canteen and surrounding restaurants continues to increase. However, it also brought with a series of problems such as food safety management, campus traffic management, and delivery efficiency. This article proposes to build a model of common distribution, develop a logistics information platform, improve distributing efficiency and supervision level, and set up regional distribution stations, save the cost of distribution, and also optimize the planning of take-out distribution routes on the basis of distribution stations.

Introduction

According to the statistics from the National Bureau of Statistics, the market size of China's catering was 3.2 trillion yuan in 2015, a year-on-year growth of 16.0%, which was a substantial increase over the past 14 years. Considering that a lot of users have developed a habit of online ordering and eating takeout-food, and the constant optimization of the service process for those food companies, the catering market in China will growth rapidly in 2018. According to the Irene’s forecast, The growth rate of China’s catering industry will remain at a level slightly higher than 10%, and the market share will also reach 12.4% in the future.

This article will according to the empirical analysis of college students' take-away demand, inspires the traditional food service in canteen which could also embrace the new age of Internet + , the key is how to solve the service of final "one kilometer", and look for win-win situations between harmonious and stable state at the university and meet the demands of individuation of college students.

Proposes to build a model of common distribution, in order to unify and standardize school delivery, meanwhile plan the delivery logistics, site selection, and design the packaging more simple and easy for takeout food. Besides, develop information platform to let the distribution become more efficient and the supervision level become much higher. In addition, establish regional distribution stations, reduce the cost of logistics distribution effectively, in the same time improve the delivery speed and let the campus management become more convenient, and take on the delivery tasks of meals for merchants, so that they could concentrate more on the food.

Status Analysis of Campus Take-away

The development of the take-away delivery originated in 1999 when Sherpas was established in Shanghai and began to order take-away through the Internet. Take-away via Internet began to appear as the Internet became popular gradually. Those merchants start to open up the market through Internet sales as another way, which push up the sales. In 2009-2010, Internet delivery platforms with different models such as Eleme, Dao Jia Mei Shi Hui, etc. were established some models differently; in 2011-2012, Yi Tao Food and Zero Line went live; from 2014-2015, the giants that dominate the Internet market were entering the market in order to have a piece of cake in the takeout market. Those companies such as Baidu, Alibaba, Metuan, and Eleme are all focused on the development of the market, active investment and financing activities.
Nowadays, with the increase of college students' consumption level and demand facilitation, meanwhile the promotion of consumption subsidies for online takeout platforms such as the Mei Tuan and Eleme, has stimulated the development of the frequency of food ordering. Furthermore, canteen and restaurant around the university has already scaled up[1]. College students have become one of the main high-frequency consumer groups in the takeout market. According to a special report that is about online takeout market in 2015, the student campus market share accounted for 26.6% in the fourth quarter of 2015.

Secondly, another important factor that choose online meal-ordering platform is saving time. Due to the regular schedule of class and rest, those canteens are overcrowded frequently, and the students need to wait more than half an hour to eat. Compared to such canteens, it is more convenient to order meals and also an effective way to share the pressure of meal time [2].

At the same time, we could also see much objectively that with the development of the school's take-out market, it has also brought with it a series of problems such as the inability of school food security, the difficulty of management, and the high cost of take-away delivery. According to the surveys, the peak period of college delivery is mainly concentrated at 7:00-8:00 in the morning, 11:30 to 12:30 at noon, and 4:30-6:30 in the afternoon. Besides, during this period, the proportion of takeout order was more than 17%. It means that a large number of orders must be processed and delivered in just one or two hours.

As online ordering becomes more mature, the management of college also needs to advance with the times and become more humane. On the one hand, it is necessary to strengthen the management of campus while also adapting to the needs of students. Because of the concentration of the dining time of students, the distribution works are intense, and it is necessary to develop the common delivery in an organized way.

Feasibility Analysis of Common Distribution

The lack of self-managed Delivery

At present, most of the take-away delivery services in campus are provided by independent proprietor in canteen or restaurants which around the campus. Each of them is operating independently. In the terms of takeout delivery, most of employees are work for part-time, and a small number full-time staff for delivery. The part-time distribution of staff in the store will cause the production time and delivery time of the takeout to be not taken into account; hiring full-time delivery staff, due to the small amount of take-out by a single store, it is difficult to achieve full-scale delivery, resulting in increased delivery costs for each single take-out, if it can reach full capacity. Delivery cycles must be extended, which will lead to a long time for waiting and affect the quality of service[3].

Secondly, in addition to the timeliness of the merchant's own distribution, it is difficult to ensure its effectiveness. Another inadequacy is lack of corresponding professional technology and equipment for takeaway delivery. When the takeaway is delivered to the student's hands, the quality and taste of the meal cannot be guaranteed. Even some restaurant only use plastic bags to package their meals, which result in a large amount of leakage of some meals with soup. While the meals may not be equipped with the corresponding tableware. If it’s hot, the quality of the meals cannot be guaranteed, and even caused the food become bad, which easily causing food accidents.

Based on the analysis above, the main problems of merchant self-distribution in campus include the following three aspects:

(1) High cost of delivery staff, and staffing is unreasonable. Most of the restaurants are equipped with delivery personnel and delivery vehicle. They are often delivered by one man, with bicycle or car. The cost is very high. The time for ordering meals is only two or three times a day. Orders will delayed when lack of staff and it will be needless in free time when the time not too busy.

(2) Unreasonable route planning, wasting of time cost. The orders of one restaurant are scattered, vehicles could not carry a big amount of meals. If there is not a reasonable route plan, one
person always repeats the route back and forth, which result in the turnaround time becomes long, wastes of time and reduced business profits.

(3) Concern about food hygiene, there are no professional distribution tools, and caused a big damage rate of food. Meanwhile self-distribution merchants do not have professional distribution tools, which food was destroyed.

**Advantages of common distribution**

**Concept of common distribution.** The common distribution was first produced in Japan and its development was fully reflected. The definition of common distribution by the Ministry of Transport in Japan means “in the city, in order to rationalize the logistics, the use of a transportation system is carried out by a truck transporter under the cooperation of several regular shipment requirements” (the Ministry of Transport Countermeasures Headquarters "Common Transportation System Import Promotion Outline"). Japanese Industrial Standards (JIS) interprets common distribution as "to improve the efficiency of logistics and many companies deliver together."

Common distribution is also referred to as third-party logistics shared service. It refers to multiple customers joining together to provide delivery services by a third-party logistics company. It is under the unified plan and unified scheduling of the distribution center. Common distribution is a distribution activity implemented by a number of companies. The essence of common distribution is to reduce operating costs and increase the efficiency of the use of logistics resources through the scale of operations. common distribution means that companies adopt multiple ways to carry out horizontal integration, intensive coordination, seeking common ground while reserving differences, and benefit sharing.

**Advantages of common distribution.** The main goal of common distribution is to rationalize distribution. It can be divided into two types: the common distribution with the business as the primary state or with the third-party distribution company as the principal state. For the investigation of the distribution needs of university restaurant, the common distribution model that bring in third-party distribution companies has been recognized.

According to the survey, students’ will waiting 30 to 50 minutes for lunch delivery, which is the time from the start of the take-out order to the time to get the takeout. In order to calculate much conveniently, 40 minutes is selected as the longest waiting-time for take-out. 40 minutes includes production time and delivery. Usually, a meal takes 5 to 10 minutes for just cooking and 3 minutes for delivery. (does not include the time to wait for students to take meals). If each merchant delivery individual, the delivery time is in 8 minutes $\leq 40$, only 5 meals can be delivered at a time. This will not be fully loaded and the production time will be too long. Therefore, common delivery can reduce the production time and it is the method suitable for school delivery [4].

The common distribution model of take-away in campus, which build a information platform of third-party logistics. So that all parties can share information and select regional distribution stations to save the cost of logistics effectively. On the basis of the distribution station, the third-party logistics can be used for planning routes of distribution and saving the time. The third-party logistics also needs to standardize the delivery and distribution tools. The packaging tools that could be involved include the shelves in the merchants, the layered bags suitable for backing, and the boxes suitable for discharging the trains to ensure hygiene of meals. For example: to solve the problem of food safety in the process of delivery that carry out sealing work like a seal after the take-out of the lunch box. After the orderers get it, they can first check whether the take-out is in a sealed state. If not, they can refuse to accept it. This can clearly define the responsibility. The scope provides the basis for problem solving later. The introduction of third party logistics distribution model, the professional nature not only protect of hygiene and safety delivery of meals, but also conducive to school management and supervision.

Food and beverage takeout and distribution have extremely high requirements for the time, equipment, and the staffs of delivery. Therefore, to solve the above problems for delivery of merchants of self-operated, it is necessary to invest a large amount of money in the early stage, and at the same time, maintain and improve the quality level and stability which will also require lots of
money. The use of common distribution of the meals for the merchants, on the one hand, can ensure to control the services. On the other hand, due to the overall controllability of the distribution process, it will also avoid the problems of long delivery time and poor delivery quality, then increasing satisfaction of consumer. For those merchants, it is hard to undertake such high costs for a long time because of the small scale of their own orders. Therefore, common delivery becomes an inevitable choice for them to delivery in the campus.

Social benefits. The school's take-away cooperative delivery model operates in line with the general direction of serving teachers and students in colleges and universities, and subsidizing students who have difficulties in living. The poor students can earn living expenses through their own hands and reduce the burden on their families. The situation of students with difficulties could provided by the school students' office. The leader of this project could select the difficult students with excellent study and excellent composition for a group of the food delivery team. The food delivery team is organized by the leader, which establish a WeChat group. The leader could selects the student according to their classes every day. According to the actual value of food, that extract as a labor fees of delivery mans, the much higher the value, the much higher the labor fees. The project leader analysis of food delivery location comprehensively, to arrange one person to delivery to the place where close enough. Besides, it can reduce the number of food delivery team, it is easy to manage, and ensure the income of delivery staff. During the gradual promotion of this delivery mode, the number of meals orders has gradually increased, the food delivery team has gradually expanded, and ensure the delivery staffs with the way step-by-step[5].

Overview of Optimization Methods

The Analytic Hierarchy Process

The Analytic Hierarchy Process (AHP) is a combination of qualitative analysis and quantitative analysis, which is multi-objective decision analysis method with high efficiency. In the process of selecting the distribution and logistics model, when there are many influencing factors and they interact with each other, AHP can be used for analysis those subjects. The Analytic Hierarchy Process was proposed by American mathematician named Satty in the 1970s. In the certain circumstances, this approach makes full use of the opinions and experience of experts, and enumerated the vital qualitative factors in a quantitative form in order to evade the one-sided conclusions that only adopt qualitative or quantitative analysis. AHP is divided into corresponding factors based on the essence of the project, and the factors are grouped and layered according to their relationship and subordination, forming the specific hierarchical level, and the factors of each layer dominate the factors in next layer. The highest level can be seen as the target of system, and the level in the tail end is a solution to the problem. Converting the evaluation result into system or a digital processing to form a judgment matrix, and the priority degree of the program measure weight is obtained by the single-criterion sorting method.

Figure 1. AHP implementation process flow.
The basic steps of the AHP (as shown in Figure 1):

First, determine the overall goals, make clear to select and take the approach, evaluate the scope involved, and achieve the objectives of the strategy, guidelines, constraints and so on.

Second, according to different goals, choose influencing factors much more important, divide the analysis system into several levels, and divide it into several sub-layers as needed. After research and analysis, determine the corresponding goals; and look for influence of the goal; made clear to achieve the final goal.

Third, use the method of comparison between the two, determine the importance of factors in the hierarchy and establish a corresponding judgment matrix. It is quantified according to the ratio scale to form a data judgment matrix.

Fourth, judging by comparing them in twos and making them with the same number. Analytic hierarchy process systemizes and digitizes thinking process of people. If the consistency is lower than the standard, the levels to be implemented must be re-contrary; then the consistency of the indicators should be weighed against the consistency of the indicators. Then use multi-level analysis to calculate and balance.

Fifth, from the perspective of the evaluators on issues, conduct a hierarchical total order consistency test; determine the relationship between the same layer factors relative to the upper layer factors through the pairwise comparison judgments, sort the weights through mathematical operations, analyze the results of calculation, and define the overall Plan to make the final decision.

3.2 Standard Process Design

In the distribution phase, a time-based standard process design SOP (Standard Operation Procedure) is generally used to depict the analysis of the company's logistics and distribution process. Based on the SOP model, the time index of the process can be extracted to analyze the time-consuming situation in the process. It describes the steps and requirements of a process or an event in a standard, unified modus to regulate and guide the execution process. Use the SOP innovative thinking method to measure the standard operation process of the logistics and distribution process. For the more time-consuming steps in the process, an optimization design method is adopted and the extra time is reduced to achieve the purpose of optimizing the process. Use the SOP innovative thinking to measure the standard operation process of the logistics and distribution process. Taking optimal design method to reduce extra time for those steps that time-consuming in the process, to achieve process optimization.

As shown in picture 2, $P_i$ is a function of $t_i$, and the output transition of $t_i$ is $P_{i+1}$, so that all the time consume in the $T_i$ process equal to the time from $T_{i-1}$ to $T_i$. These two factors, the time of input transition and the time of output transition, constitutes to entire time when the business process of the SOP occurs. The sum of the time of all the activities in the model is the running time of the entire model. The formula for the total time of the delivery process is: $T = \sum_{i=1}^{n} T_i$, where $T_i$ is the time of the NO.$i^{th}$ activity, n represent the total number of activities, and the sum of the time Ti at each transition is the occurrence of the total time.
References


