Journal of applied science and engineering innovation Vol.1 No.5 2014
ISSN (Print): 2331-9062
ISSN (Online): 2331-9070

Innovative Applications of IE Technological in the Service Sector: the Case Study- A Case of Panzhihua University Canteen Service System

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Keywords: IE technical, college canteen, service system, process analysis, path analysis

Abstract: College canteen, the traditional and special system in service, has large flow of people, crowded dining, long queuing time and other common issues at the dining peak period. In this paper, Panzhihua University canteen was used as a case, to explore innovative applications of IE technology in the canteen service system, and to evaluate the improvements for canteen service efficiency indicators. The paper provides certain reference value in theory and practice for improvements and promotions of the university canteen service system.

Introduction

Service industry plays an increasingly important role in social and economic development. With the rapid development of service industry, advanced service system showing a fast, comfortable, safe, low cost and other features. For example, the food service business, "aunt dumplings" used ten years to make a book over 380 pages of standard operating procedures, and created a miracle that error value of each boiled dumplings quality control less than 4%; McDonald's made a full use of IE technology in the operating system of the factory shop, and created a quick service that customers get meals from ordering within 59 seconds. College canteen is a traditional and special system in service, an essential part of school to achieve the functions of teaching, research and life, and responsible for the students to provide food security. As is known to all, "The stability of the country at the university, the stability of the college at the canteen. " At present, most colleges across the country exist some common issues at the meal peak period, such as large flow of people, crowded dining, and long queuing time, which lead to the low satisfaction in students with the quality of service and efficiency of university canteen. For these problems, I referred to a large number of literature and found that few research literature have used IE technical in the canteen service system improvement. In this paper, Panzhihua University canteen was used as a case, to explore innovative applications of IE technology in the canteen service system, and the improvements of canteen service efficiency.

Research design

There are three canteens in Panzhihua University, and they basically meet the needs of teachers and students, but the peak dining widespread congestion and more prominent. In this paper, I select the most prominent congestion canteen, the fist canteen, for the study, and use the way of process analysis and the arrangement and the path analysis to do analysis and improve, and evaluate the improvement.

Investigation

The first canteen in Panzhihua University is the most prominent one in the three and the layout shown in Fig. 1:

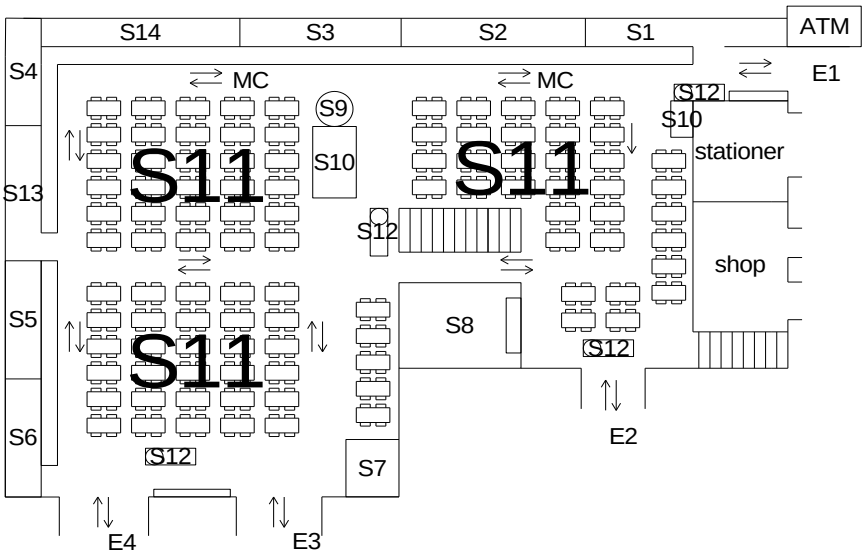

Fig. 1 Canteen layout

There are four entrances to the canteen, namely E1 (entrance 1, located in the east), E2 (entrance 2, located in the south), E3 (entrance 3, located in the south), E4 (entrance 4, located in the south); canteen inside is divided into 13 zones as service area, namely: S1 (rice area), S2 (meat area), S3 (vegetable area), S4 (cold dish area), S5 (pasta area), S6 (to take food area), S7 (milk tea shop), S8 (cake shop), S9 (free soup), S10 (tableware area), S11 (dining area), S12 (recovery area), S13 (washing area), S14 (free area). In the peak period, 11:30-12:20 and 17:00-18:00, the main channel MC is very congested. Specific performance in: (1) The main channel is crowded, and crossover phenomenon is serious; (2) The queuing phenomenon of the rice window is serious, sometimes, the captain lines up to the dining area, blocks the channel to the canteen from E1 entrance; (3) The meat and vegetable area are very crowded, and there are no order to get in and out; (4) Students, buying meals, stay longer on the channel.

Analysis and Improvement

We randomly selected 200 students from grade 1 to 4 in different departments of Panzhihua University to get the common meal combinations through questionnaires; statistical results are shown in Table 1:

Table 1: Meal combinations statistics

Meal combinations	Number of people	Proportion
Rice + vegetables	146	73%
rice + Vegetables + soup (free soup)	43	21.5%
Other (pasta, take food)	11	5.5%
Total	200	100%

In the survey, we found that the reason why people do not want to eat free soup is that the taste of it is not good, if it tastes a little better, 80% of the students in the survey are willing to eat.

Therefore, we selected the meal combination, "rice + vegetables + soup (free soup)", for the study, and recorded the whole process from entrance to purchase. Entrance flows statistics show that human traffic of entrance E1 is the largest, and occupies more than 2/3 of the flows of the all cafeteria entrances, therefore, E1 was selected to get in, the process of sharing food is shown in Fig. 2, and the logistics routes and facilities layout diagram are shown in Fig. 3.

Work Name: canteen process Start: into the canteen from E1 End: seat down Methods: the current method Researchers: IE team Date :2013-11 Reviewer: IE team	Statistics			
	Divisions	Frequency	Time [s]	Distance [m]
	Machining	7	18.13	——
	Inspection	3	9.07	——
	Transport	5	56.68	56
	Wait	3	32.72	——
	Store	1	1.57	——

Job Description	Distance [m]	Time [s]	Num	Process series				
				Ma	In	Tr	Wait	Store
1 to tableware area	12.3	10.16		○	□	⇨	D	▽
2. wait		4.76		○	□	⇨	D	▽
3. select the plate		6.4		○	□	⇨	D	▽
4.select the chopsticks		2.98		○	□	⇨	D	▽
5. to rice area	4	5.26		○	□	⇨	D	▽
6. wait		12.02		○	□	⇨	D	▽
7. share rice		3.55		○	□	⇨	D	▽
8. to cold or hot dish area	23.9	17.92		○	□	⇨	D	▽
9. wait		15.94		○	□	⇨	D	▽
10. share food		5.97		○	□	⇨	D	▽
11. to free soup area	7.8	10.12		○	□	⇨	D	▽
12. select the soup bowl		4.07		○	□	⇨	D	▽
13. ladle soup		4.23		○	□	⇨	D	▽
14.select seat	8	13.22		○	□	⇨	D	▽
15. sit down		1.57		○	□	⇨	D	▽

Fig. 2 Flow process chart of sharing meals: Machining=Ma; Inspection=In; Transport = Tr.

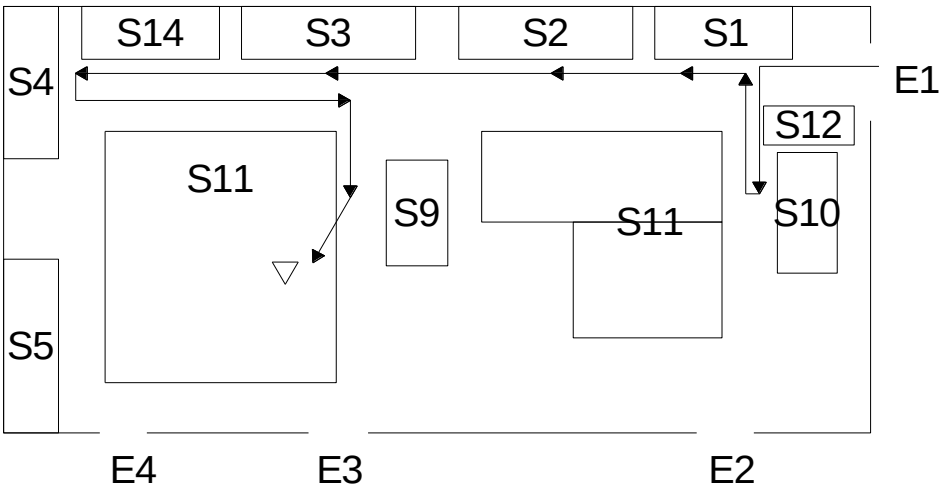

Fig. 3 Share meals logistics routes and facilities layout diagram

Through the purchase meals process and route analysis , found several problems existing in canteen service system : (1)In the entire purchase meals, the most time-consuming are moving and waiting, moving accounted for 48% of the entire time, for 56.68s, waiting accounted for 32.72s, for 23.7%, and with 23.7% of waiting in the main channel, for 27.96 seconds, seriously affecting the smooth flow of the main channel; (2) Purchase meals move route is longer, for 56m, and crossover phenomenon is serious, on the one hand, with the layout of the site, on the other hand, with the field management of dishes. Majority of students do not know the date of the sale of dishes , to learn along the main channel and then decide to buy it again; (3) tableware, rice, and meat and vegetables area congestion phenomenon is serious, the plate selection further aggravated congestion of tableware area, and the congestion of vegetable and meat dishes area is a major cause of buyers "view" , " looking " and "thinking" too long before buying; (4) " rice area - recovery area - tableware area" close together , on opposite sides of the main channel, and near the main entrance E1, very congested .

Through the analysis of the existing problems, using "5W1H" technology and "ECRS" optimization principles to put forward improvements as follows:

(1) Re-layout tableware area. Plates are placed on the rice area, the staffs "pick up" to save students "choose" time; chopsticks are placed in four places, respectively, "vegetable area", "meat area", "cold dish area" and "pasta and take food area", oriented vertically, easy to pick up, while reducing the selection chopsticks time;

(2) Strengthening tableware health management standardization, first to enable students to use at ease, the second is to reduce the "pick" frequency and time, to shorten the students share meal time and improve system efficiency;

(3) Adjusting the position of the recovery area E1 to E2, E3 or E4, to guide the students to put plates in the recovery area after dining and away from the E2, E3 or E4, in order to alleviate traffic entrance of E1;

(4) Improve the seating layout; seating is currently set out only vertical, if you want to horizontal out is not convenient. Improving seating set to make it convenient for vertical and horizontal moving to shorten the route first, and reduce congestion when find a seat second;

(5) To strengthen the on-site canteen service system management, the name and the price of the date sale dishes are marked before the correspondent windows, to save the students "looking", "think" and "selection" time, at the same time, exchanging the position of "cold dish area " and" free area " to shorten the route of students buy food and improve system efficiency;

(6)The rice area queuing is serious, the time of buying rice is 3.55s, while the waiting time is 12.02s, and much greater than the service time. So I suggest the rice supply window should be increased, and the optimal number of available rice window supply can be calculated by queuing theory.

The improved process of sharing food is shown in Fig. 4, and the improved logistics routes and facilities layout diagram is shown in Fig. 5.

Work Name: canteen process Start: into the canteen from E1 End: seat down Methods: the current method Researchers: IE team Date :2013-11 Reviewer: IE team	Statistics			
	Divisions	Frequency	Time[s]	Distance [m]
	Machining	5	16.67	——
	Inspection	0	0	——
	Transport	4	35.98	37
	Wait	2	19.99	——
	Store	1	1.57	——

Job Description	Distance [m]	Time[s]	Num	Process series				
				Ma	In	Tr	Wait	Store
1 to tableware area	12.3	8.64		○	□	⇨	D	▽
2. wait		12.02		○	□	⇨	D	▽
3. share rice		3.55		○	□	⇨	D	▽
4. to cold or hot dish area	11.9	8.96		○	□	⇨	D	▽
5. wait		7.97		○	□	⇨	D	▽
6. share food		5.97		○	□	⇨	D	▽
7.take the chopsticks		1.46		○	□	⇨	D	▽
8. to free soup area	7.8	10.12		○	□	⇨	D	▽
9. take the soup bowl		1.46		○	□	⇨	D	▽
10. ladle soup		4.23		○	□	⇨	D	▽
11.select seat	5	8.26		○	□	⇨	D	▽
12. sit down		1.57		○	□	⇨	D	▽

Fig. 4 The improved flow process chart of sharing meals: Machining=Ma; Inspection=In; Transport = Tr.

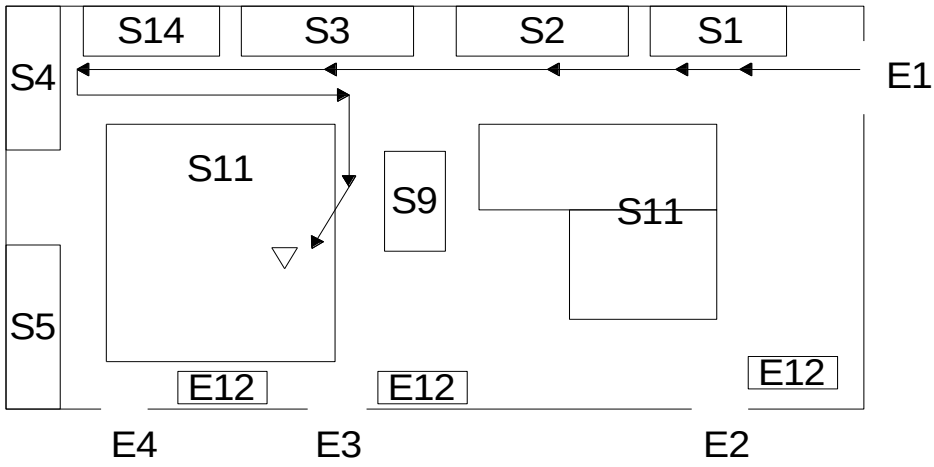

Fig. 5 The improved share meals logistics routes and facilities layout diagram

Improved Evaluation

Through these improvements, getting the following effects:

(1)Reduce the canteen purchase system service time. Taking typical meal combination " rice + vegetables + soup (free soup) for an example, at the beginning, the process from entrance E1 to purchase meals accounts for 118.17s, after improvement, the entire time shorten as 74.21s, saving 37.2% ;

(2) Reduce the moving distance. The distance of entire purchase meals process is shortened from 56 to 37 meters, for 33.9% ;

(3) Shorten the move time , through the improvements of the site layout and the strengthening of site management, making the purchase of meal time decreases from 56.68s to 35.98s, reducing by 36.5% ;

(4)Reduce the number of checks. By strengthening health management standardization of tableware, and re-layout tableware area, making inspection becomes unnecessary, and the number of check has reduced from the original three times to 0, and the time spent on checking has been saved ;

(5)Shorten the waiting time, through improving the tableware area layout and the sharing meals site management, making the purchase meal waiting time reduces from 32.72s to 19.99s, reducing by 38.9% ;

(6)By shortening moving distance, reducing the number of checks , and saving travel and waiting time , making the service efficiency and quality of canteen meal purchase systems have been greatly improved, along with student satisfaction has also been greatly improved.

Summary

To improve the world without end, as both traditional and special service system - college canteen, the ordering system service efficiency and quality of it has been a reality problem that students expect to promote. The paper used the layout and the process of sharing food as a starting point, through the process analysis and the arrangement and the path analysis to shorten the distance of the entire purchase meals, and save the entire time. This article will continue to seek the improvement of the most congested part in the follow-up study, and evaluate the system after improvement by using queuing theory.

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