

## Design of Public Self-service Laundry System in College Dormitory

Li Hesen, Luo Ying

Hubei Institute of Fine Arts, Wuhan, 430205, China

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**Abstract: Objective:** The paper conducted theoretical discussion of a new public self-service laundry model, and tried to change and solve the status quo and problems of laundry during the student group life in college dormitory. **Method:** Related data were obtained through various methods such as literature search, data statistics, investigation & observation, interview and taking pictures onsite; the paper specifically described and analyzed the laundry problems faced and generated in college student dormitory; the paper experienced the complete process of laundry of college students through participatory observation, which can seek the basis in consideration of new intelligent public self-service laundry model; then, by studying the college student group users' laundry requirement and their individual experience of the dormitory living environment and method, the paper proposed the basis to design and consider the public self-service laundry model, and conducted design conception. **Conclusion:** From the design, conception and deep completion of this scheme, it actually delivered one idea: categorization of group lifestyle is one of the preconditions for co-construction of ecological environment, which makes symbiotic design feasible; the idea and method to solve the college students' laundry problem based on theoretical illustration have also provided certain reference and basis for design of sharing service.

### 1. Introduction

Laundry is an important component in students' daily lives. However, hand washing of clothes takes both time and energy, which make occupy the time that could be used for learning. It requires a large amount to pay for a laundry machine, which is also difficult to move, and it tends to become an idle item. The coin-inserting laundry machine is gradually replaced by public laundry spots due to management and sanitation problems. At present, it is very common to provide self-service laundry facilities in Chinese colleges, especially for colleges in developed cities such as Beijing, Shanghai and Guangzhou. Almost each college dormitory has self-service laundry machine, which has improved the living standard of college students and achieved great results, but there are also many problems. Although it is difficult for the laundry machine for private family use to become a carrier in public consumption, in concentrated living areas such as campus, dormitory or apartment, and for groups with similar lifestyle such as students, works or troops, sharing of similar life equipment could be a possible solution and business model that can benefit various parties. Based on that, by referring to current public laundry platform and traditional laundry shop and combining modern intelligent lifestyle, through interview of users and investigation of targets, the paper utilized the principles of service design and interactive design, and tried to design public self-service laundry service system which can provide good experience for college dormitory.

### 2. Analysis of the status quo of public laundry service

At present, the Chinese self-service laundry market is at the transition stage from initial development to growth. As a main market segment of self-service laundry service, the public laundry service at college student dormitory has just started in recent years, Similar software systems have been introduced in the market, and their advantages, shortages and core innovations are summarized in Table 1, which have attracted interest from many companies. For example, Youxi and Xiaoyou Laundry are some the platforms targeting the campus market, and both Youxi and Xiaoyou Laundry provide private laundry rental service in the form of free hardware but with

service charge. Both services can effectively solve the problem of “difficulty to do laundry“ in college student dormitory, which can save the time and energy spent on laundry by the students. Through related service management, it has also effectively prevented the sanitation problem, and accumulated certain experiences of success. The laundry service platform, such as the brands of Youxi and Xiaoyou Laundry, can provide laundry machine rental service to students, and although it has solved the problem of private laundry, there is still a problem that the laundry machine takes room of dormitory. Another example is the laundry platform that applies to all people-Haier Laundry and Yixiba. Haier Laundry provides self-service laundry, collection and delivery service; Yixiba has introduced the common laundry model of foreign country into China, and it tries to provide a new lifestyle. However, these platforms involve high service charges, which do not apply to the low-end consumers. In our daily lives, with the popularization and introduction of mobile intelligent device, intelligent control has been gradually increased in many laundry service platforms, which has established intelligent laundry service.

### **3. Basis for the design and consideration of public self-service laundry service in college dormitory**

#### **3.1 User features**

As the target user group of public self-service laundry system on campus, the college students have their own special features, which are mainly represented by: in college, most students would use their spare time to improve their ability or in entertainment, and very few would spend time organizing; most college students are only child at home, their independent organization ability is weak as they grow up, and they need long time for adaption after they go to college; at present, the college students would generally choose a lifestyle that can provide independence and convenience and save time, so that they can spend more energy in study, which can alleviate the burden of chores; the group of college students who focus on study generally live on the allowances from their parents, and unavoidable social consumption for basic necessities of life are their main expenditures, so different from other social groups, the special consumption of college students decides that “cost effective“ consumption is the main factor that they consider; in this new age, the college students have strong desire for exploration and ability of learning, they have strong adaptability to intelligent consumption, and in particular, various intelligent payment methods have created a new lifestyle on campus, which has provided more options to the college students. According analysis of data obtained through questionnaire survey, it can be seen that most students have the requirement to wash their clothes, pants, socks, etc., and some students even have the requirement to wash their shoes or special garments. In order to meet most students’ laundry requirement, some colleges provide laundry machine service paid by putting in coins or using bank card in the dormitory, and the laundry mode is relative simple, easy for operation and very convenient; later, the laundry shop or dry cleaning shop which provides human service was introduced, which can satisfy the students’ various requirements for laundry services, but the dry cleaning shop which charges based on laundry type and item is much more expensive than the previous favored laundry machine paid by inserting coins, so the dry cleaning shop off campus has not become the main option of college students. Based on the college students’ rigid demand for laundry, the business model of relative cheap but mature public laundry point has been introduced on campus. Therefore, with intelligent mobile terminal APP as the operational platform, the public self-service laundry service model is not only feasible, but can also satisfy the college students’ laundry requirement based on their current lifestyle.

#### **3.2 Behavior process**

Generally speaking, the laundry behavior process can be described as: (1) Collect dirty laundry; (2) Put dirty laundry into the laundry machine; (3) Put water and detergent; (4) Clean with laundry machine, dewater and complete; (5) Take out the laundry, put it into the dryer for drying or take the laundry back to air it. Through observation and interview of college students during the process of

doing laundry, we found that when there were many students doing laundry and when the laundry time was concentrated, the main problems were as follows. First of all, it was the crowdedness of laundry. Most students did laundry at their spare time, the time was highly consistent, and no matter whether the student used the laundry machine bought in the dormitory or coin-inserting laundry machine, or had their laundry done in off campus drying cleaning shop, they needed to wait. At some public laundry points, some students were not willing to wait in line and used basin instead, as a result, the environment near laundry machine became chaotic and disordered, and some students may jump the line because there was no management onsite. Secondly, it was the waiting problem during laundry. In general, it took 25-45 minutes to do laundry, which indicates there was waiting during the process of doing laundry, and at public laundry points, the problem that the users had nothing to do during the waiting was obvious. The users whose dormitory was far from the laundry point would choose to spend their time around the laundry point in order to prevent going back and forth and climbing stairs. Thirdly, it was the problem to take out laundry. Although the laundry time can be estimated, many users failed to take out their laundry in time, and as a result, the cleaned laundry was left in the laundry machine, which occupied the equipment. Therefore, the design of new public self-service laundry service system should aim to improve the efficiency of user's laundry behavior process, which can effectively alleviate the problems mentioned above.

### **3.3 Service scenarios**

Regardless of the difference in building construction and planning and the scale of laundry room, as public hardware facility, the laundry machine, equipment and related supporting facilities within the public laundry point should be solid and durable, and related personnel should be assigned to provide regular maintenance and management. In particular, when there are many people waiting on the line, ordered management should be provided to ensure orderly laundry service of users. Therefore, in order to reasonably arrange the laundry space and ensure efficiency laundry, the quantity of laundry points should be designed according the number of students living in college dormitories and laundry demand, and the quantity of laundry devices in laundry point should be estimated according to regular number of people doing laundry, including the laundry machine, drier, shoe cleaning machine, etc. The hardware facilities in public self-service laundry point should be simplified. In the self-service scenarios with no other people participating, there should be obvious guiding system to provide reminder, and from when the user enters the self-service laundry point, to when the laundry equipment starts operation and until when the user leaves the self-service laundry point, there should be clear reminder of related steps of laundry procedure, which can reduce the difficulty for user in self-service scenario and improve the laundry efficiency. Different equipment areas should be equipped with corresponding instructions for operation with illustrations, which will be easy to understand. In the service scenarios, there should be supporting network environment. In order to ensure that the public self-service laundry points of the same brand have the same visual features, the indoor space and outdoor environment should adopt uniform design style, which will be easy for identification and interpretation of design concept.

### **3.4 Service blueprint**

Before doing laundry, the user can search for associated self-service laundry points through the software system. The software system will obtain the user data and confirm the current location of user based on authorization and consent; the background navigation system will select and show several self-service laundry points near the user for reference, and intelligently recommend the optimal choice; if there is no idle laundry equipment in nearby laundry points, the user can line up or reserve service in the software system. The real-time synchronous operation of software system and equipment in laundry point can be supported through update of background data, and once there is idle laundry equipment, the software system will send reminder to notify the user. After receiving the laundry command, the user arrives at the laundry point, and conducts related operation of laundry according to the illustration and instruction of service scenarios provided in the laundry point. The user should connect equipment according to the command (through measure such as scanning a QR code), seek cleaning model of laundry equipment in the software system and make

payment. After the successful payment, the background intelligent control system will start the laundry equipment, the software will show the operation of laundry equipment fed back by background in a real-time and synchronous manner, and the user does not need to wait for the laundry to be done beside the laundry equipment. As the laundry is about to be done, the software system will send reminder to notify the user to take out the laundry at the laundry point, which can prevent remained laundry from affecting the laundry operation of next user .

## **4. Design cases of public self-service laundry service**

### **4.1 Problem description**

Take the dormitory in a college in Guangdong Province for example. Four to six students lived in one dormitory, almost every dormitory bought a laundry machine, some placed it on the balcony, and some put it in the public corridor. One laundry machine was placed at the door of each dorm; there were related small facilities around the laundry machine, which almost took one third of the corridor space, and the open installation of water pipes was all over the corridor; the inlet openings of various laundry machines were connected to the faucets of public bathroom, the connection of water pipe at both ends required long-term fixation, which caused long-term occupation of many faucets of public bathroom, and they could not be used normally; many external water pipes were exposed, the previously not capacious corridor looked more chaotic, and it had also increased the difficulty for cleaning and sanitation; the water pipe that passed through the corridor also affected the walking students, and at night, the students may be tripped by the pipe; based on long-term observation, we found that many students did laundry after 10:00 P.M., which was very common, the power consumption was relatively concentrated, it tended to cause tripping if the circuit design was not reasonable, and at night, the noise made by laundry machine may also affect the rest of other people; the frequency of laundry machine being used during the daytime was very low, which indicates that the laundry machine in each dorm was at idle state most of the time, and it also occupied massive space in the dormitory building. Because these laundry machines were bought by the students, they needed to sell or abandon them after graduation, or sell them as scrap, which would cause waste of resources. According to the above analysis, it is not difficult to see that even though each dorm was equipped with a laundry machine, it was shared by many people, it also required lining up to do laundry, and the laundry machine may also cause various problems of residence, environment, maintenance, living and waste of resources. To sum up, in order to prevent various problems mentioned above, a feasible solution to alleviate the above problems is to design public self-service laundry point.

### **4.2 Design conception**

Based on the description of user features, lifestyle change and laundry problem of this college described above, according to the characteristics of student group, the design of public self-service laundry service system can be conducted on the following aspects: 1) Considering the security and smoothness of wireless network in the service environment of public laundry point, the laundry point is equipped with special Wi-Fi within limited time, so that the user can smoothly use APP to complete the laundry service procedure in the laundry shop. In order to prevent the user to stay in the laundry point only to get online, the Wi-Fi can only be connected when using the APP. 2) In order to reduce the crowdedness problem when doing laundry, the line-up and reservation functions of self-service laundry point can also improve the laundry status of user in a certain degree. When the user needs to do laundry, it can check the equipment information in laundry point nearby in the APP, then choose to go to the laundry point to start lining up, and during lining up via APP, it will remind the user not to miss the laundry time. In the meantime, it is also equipped with the laundry reminder function, and when the laundry is about to done and operation is completed, it will remind the user to take laundry at the laundry point, which can reduce the staying time of cleaned laundry. 3) When the user uses the APP, it wishes to achieve what it wants to do as soon as possible. The APP will save and record related reactions according to some long-term behavior and habits of user,

which will make it convenient for further use by the user. 4) During the design of service system for self-service laundry point, efforts should be made to maximally simplify the operation procedure, reduce difficulty of operation, improve the service efficiency so that the user can pleasant complete the service procedure, and improve the user's laundry experience. 5) A small rest area will be provided in the self-service laundry point, which can provide short waiting space and rest to users preparing to do laundry or whose laundry is almost done. 6) During the service procedure, the user mainly uses the APP and equipment. When the user uses it for the first time, it needs to conduct real-name registration and log-in in the APP and select required laundry service. The system will recommend nearby self-service laundry points to the user based on intelligent positioning. If there is no idle laundry equipment nearby, the user can line up or reserve service in the system. 7) In the specific interactive interface of APP, optional input can be conducted via the menu; the output form can adopt various languages such as vision, hearing and touch. Through vision, the operation of each laundry machine can be monitored in a real-time manner; through hearing and touch, it can remind the user that the machine operation is completed via audio notice or vibration.

According to the problem that needs to be solved, by combining the conception basis and operational logic during interactive process mentioned above, conceive the preliminary design plan, and design the information architecture of self-service laundry point. Based on the interface characteristics at mobile terminal, maximally compress the information hierarchy, and ensure the ease to use. Therefore, the functional modules of self-service laundry point can be classified into three modules: "laundry service", "order record" and "personal data". (1) "Laundry" module: Under the precondition of completing registration, after the user triggers "Laundry" command in the "Laundry" module., three service options-"Clean clothes", "Clean shoes" and "Drying"-will be popped up for the user to choose from. After the user selects one option, the system can locate idle laundry point nearby. After selecting corresponding service type, the user can submit the order, and click to make the equipment start working. In addition, if all machines in nearby laundry points are occupied, the user can choose reservation according to the specific situation of nearby laundry points; at corresponding time, the user will be reminded to go to related laundry point to do self-service laundry; after the laundry is done, the APP will also send a notice to remind the user. (2) "Order" module: This module has relatively simpler design in procedure. After choosing this module, the user can click and check the order. In addition to the record of all orders, the APP will also list several items selected recently, so that the user can choose common service in a faster and more convenient way.(3) "Personal" module: The page of personal data includes related information of "My" that can be seen in the information architecture. In this module, you can check the account balance, directly recharge the account, edit and modify certain basic information, exit personal account and conduct other operation.

### **4.3 Interface design**

The design of interface size should be based on the platform of mobile phone terminal. On the APP interface, visual elements are used to guide the viewer's reading order or focus realization interactive behavior. The methods of font design and color use are applied; focus on key elements, effective organize and sort information, and clearly deliver important information to the user, so that the user can easily understand and obtain information. The carrier for similar information uses frame of the same thickness or undersurface of the same color to ensure consistent format and intervals in every direction. In interface design, the overall color is blue grey. Use the same color for the same function, maintenance uniform color functions, prevent creating any trouble to the user's recognition, and reduce the reading difficulty. The words should be as clear as possible to guide the user to select required service, ensure the systematic and smooth performance of user interactive interface, and ensure easy withdrawal by user when there is any false operation. By combining the operation flow chart of APP, visualize its text information, and form the visual design scheme for APP interface.

## 5. Conclusion

The mobile phone-base lifestyle will definitely result in revolution in other lifestyles. The intelligent life style begins to take shape, which has provided the soil to cultivate various design concepts. The 5G era has become the basis for smooth communication of information, which will definitely promote the interconnection between all things. In the big data era with everything connected, it is possible to explore new approach that can solve the laundry problem that has troubled the college students for so long. In the design of service system for public self-service laundry point based on college dormitory, the service blueprint can be drawn by comprehensively organizing various modules such as contact, user, foreground and background, which can solve the laundry problem of college student group in their dormitory life described in this paper from the perspectives of strategy and management. Build a laundry model based on intelligent lifestyle, so that the laundry process in college can become reasonable, healthy and orderly. As a result, it can improve the living environment of college dormitory, and prevent various problems caused by putting a laundry machine in each dormitory, such as chaotic placement of objects, occupation of space, interfering with other people's time for rest, waste of water and power resources, hidden safety problem, increased maintenance cost, recycling of laundry machine after graduation, etc. The original intention to design the public self-service laundry model is to deliver the concept of green lifestyle to the student group: in the environment of group life, after the lifestyle has become classified, efforts should be made to save resource, live orderly, pay attention to other people, live and survive together, and co-build the living environment with sustainable ecology. Driven by this idea, the design, concept and scheme may still have certain aspects that need to be improved, but we wish it can provide certain reference to the concept design of similar software service system.

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