

***School Lunch Supply Process From The Perspective of Service Design:  
In The Case of Primary School in Yunlin County***

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**Abstract**

School lunch program in Taiwan has been developed since 1954, in recent years, related studies and reports demonstrate that the trend of Taiwanese student wasting their school lunch is climbing. Every year, the number of wasted lunch is as high as several thousand tons and the wasting up to 1.9 Billion NT in cost. Those wasted food and cost may have an impact on Taiwan's economy, which may be a problem in society that shouldn't be neglect. However, there are rarely studies that focus on school lunch and its process. Furthermore, Service Design could discover current process and recognize the situation and solve the problem. Therefore this study will focus on using a service design approach to analysis the school lunch process. The researcher used method such as observation and in-depth interview to understand the relationship between school and group meal industry in the Process. Due to the time and resource limitation, the scope of the study is the case of primary school in Yunlin county .Then, by using the user journey map to analysis the information. The result of this study is the development of service design diagram from group meal industry to school lunch table .The result could be served as a reference on future study regarding lunch wastage .This study hope future studies could focus on reduce the school lunch waste.

Keywords: school lunch, supply process, service design

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## 1: Introduction

### 1.1 General Background Information

Taiwan school lunch, from the 43 years of the Republic of China since 40 years, the school lunch purposes in the diet "concept" to convey the correct and correct bad habits "Eclipse" system development has been mature enough, more developed five lunch system, long operation to lay a foundation of health; modern society is facing excess food the problem of food box Association statistics, 100 schools in Taipei city every 70 thousand outward contracting lunch, 2 years to produce 2040 tons of food waste, conversion in 3 million 400 thousand to 1 meals lunch; an average of 55 yuan, 1 billion 807 million yuan (about 1 years of waste Si Ping Wu et al., 2016). The tendency for Taiwan students to waste lunch is increasing year by year, and students are faced with the problems of picky eaters and over spending, which may have unpredictable effects on Taiwan's economy for a long time.

### 1.2 Research motives

Taiwan today in a school lunch waste, but there are few studies to explore, in foreign countries have similar problems, but are corresponding to different culture solutions to improve the design process for a service can do a detailed analysis as the reference range of influence. This study will reduce the waste lunch process is divided into two stages. The first stage: to find the group meal feeding process, clear operation and gap system, analyze the possible causes of waste from the interview results, put forward the most effective suggestions for the waste. The second stage: the use of the above research data, the use of service design proposed effective waste reduction service process. Therefore, it is still in the first stage of this experiment, leading research, providing reference for future research, and reducing the waste of nutritional lunch.

### 1.3 Research objectives

#### I. provides school lunch meal in the process

The researchers will use the service design tools in the context of exploration, participant observation method to close to the lunch process, from the kitchen to the dining process of the school, the actual visit and observe, list today lunch procedures to enhance future continued study.

#### II. Analyzes waste gaps in the nutrition lunch supply process

The actual observation system process after lunch will interview staff inquire from the interview staff on flow experience and views, we can find the process of pain and opportunity to point out possible waste gap analysis.

### 1.4 Scope and limitations

Time and money, the field limits on the research at present will be locked in the range of primary school, Yunlin county not only from the study area near Touliu City, there are nine primary school, for this study, therefore, in this study, three primary school Touliu city as the main research field. The nutrition lunch supply process also has five different forms, and this study chooses the public and private model as the research target.

## **2: Literature Review**

The two part of this chapter to explain the school lunch and service design, the first part explains the origin of Taiwan school lunch, lunch in Taiwan to understand the history, understand the purpose of nutritious lunch with different types of operation; the second part explains the definition of service design and service design, the core principle of thinking, and this study is the use of what kind of service design method in the process, why.

### **2.1 Taiwan school lunch**

The primary purpose of school lunches is to address the problem of malnutrition among schoolchildren in remote areas and to improve the nutritional status of schoolchildren. Now different space-time background, school lunch in anti-populated metropolitan areas, in addition to industrial society, parents can solve the difficult to prepare lunch for school children, also hope that through the school lunch supply, so that students can get enough nutrients and teach children balanced diet ideas and cultivate students correct eating habits (government the Department of education, 2014).

The purpose of lunch is good, but also solve the problem of children nutrition, but also in the long-term development to become the parents at ease, but the kinds of data show that the rich resources now has caused a lot of waste, the development of a balanced diet system, but ignored the correct eating habits, so check the gap and lunch process to explore the lunch process waste, is the focus of this study.

#### **2.1.1 School lunch supply model**

In order to cope with the different needs of the development of school, school lunch five types, mainly government subsidized public schools \_ mode, cooperation mode and private \_ outsourcing vendor's \_ private mode. Different types of services will have different processes, according to previous research literature shows that in the central part of Taiwan is the most public mode, so this study will also be classified as a public model. The following study summed up the relevant nutrition lunch business types, as shown in table 1.

Table 1 types of school lunch management

Public operated public	A government funded secondary school to build kitchen, purchase elevator, boiler, conditioning equipment, the establishment by the school faculty organization lunch Working Committee, in accordance with relevant laws to handle the business school lunch, lunch supply.
Public private	The government funded the construction of the school kitchen, elevator, boiler procurement and all the necessary conditioning equipment, and then from the school to select qualified registered private contractors, free use of the kitchen facilities and equipment, according to the implementation of the supply school lunch.
Joint public service	A central school with a kitchen, a school with a nearby lunch free kitchen, will work together on a nutritious lunch, cooked in the central kitchen, and sent to the nearby joint schools.
Joint private	Please center with kitchen of the school is responsible for leading the number of free lunch, combined with adjacent kitchen department, jointly select qualified registered private contractors, by private operators stationed in the school kitchen cooking, sent to the school lunch kitchen, lunch.
Private run	Refers to the school due to school restrictions and other factors have not set the kitchen, to register qualified manufacturers order cooked food to supply students lunch, supply way cent, meal bucket and lunch two kinds.

(Source: Yang Wei, 2007)

There are five different patterns of school lunch. Different supply patterns result in different lunch procedures, and according to the literature, the school lunch model in central Taiwan is: Public operated public sector (52.9%); Private run private (29.1%); Public private (12.3%); Joint public (5.7%); Joint private (0%).

The central Taiwan is located in the middle of Taiwan, including Taichung City, Changhua County, Yunlin County, Nantou County four counties.  
(Data sources : Mr. Yang , 2007)

This study selected the field, is a public mode, so you can understand the public is the most common in the middle small business model, so it can be concluded that the study covers a wide range , will be relatively objective.

## 2.2 Service design

UK Design Council (2010) said: "the service design is about an output available and effective, efficient and is expected to service the whole process of Birgit Manger (2009): service design is to ensure that our customer service is effective and efficient is unique. Live, work (2010) argues that "services to design innovative and practical way to improve existing services, and create a new service industry, finishing above expert opinion, therefore, find the problem from life to solve the problem, is the core of service design.

The information industry innovation institute introduction of R & D methods of design and development of innovative services \_ from 95 years, creating suitable for service enterprises to use the theory research method of Taiwan Guide - "service experience engineering methodology (S.E.E. method) to assist the enterprises to carry out new service development in a systematic program, find out the development direction of the development of service innovation, service innovation products. Improve the success rate of enterprise service development. In view of the characteristics of S.E.E method in R & D, inquire about service innovation, so the research tools into the S.E.E method in assisting the investigation and integration of information system, is to utilize the services designed to help the research, using five principles of service design of finishing as the reference, the following table 2.

Table 2 service design thinking of the five principles

1.User-centred	The service must be centered on user experience and feelings.
2.Co-creative	In the design of services, all the stakeholders, such as service providers, service supporters, service receivers, and even non personnel, should be included in the design process as much as possible.
3.Sequencing	The service consists of a series of sequential actions, and the service process is clear and clear.
4.Evidencing	The intangible services and feelings are presented through entities and visualizations.
5.Holistic	In addition to include users and enterprise of the whole environment shown in consideration.

Data sources : Stickdorn and Schneider (2011)

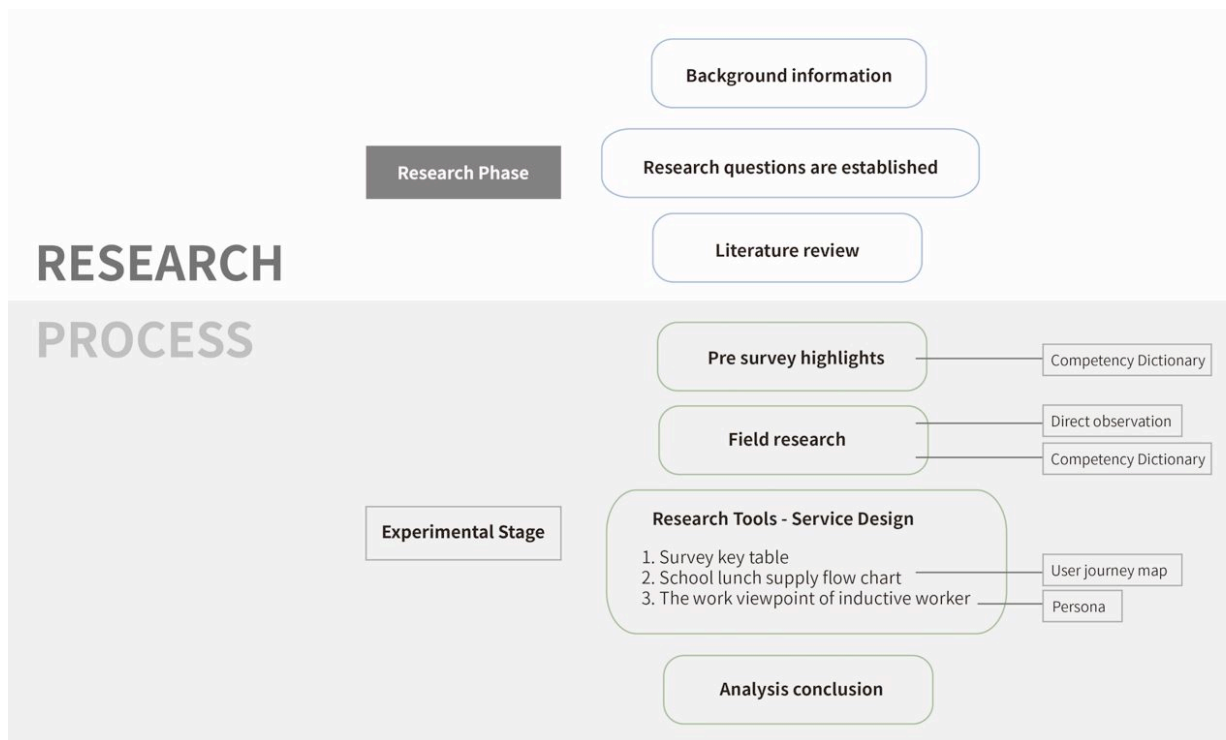
Service design can help to study the complete context, using the principles of service design research to ensure users (using service) as the center, while the principle of commonality, order execution and visualization is used in data service, help service result derives the information clear chart and sequence.

### 3: Research Method

At present, the research process is divided into two parts \_ research and experimental stage. In the research phase, research background and thesis as the research base, including public data, research papers, documents, and Internet content in the literature, the past research data, today's lunch research background into the research problems and research purposes. At the experimental stage, we use the previous research background, go to the field, do fieldwork, and use service design tools to analyze the data, and draw conclusions.

#### 3.1 Research process

Study before the first to identify the problems and background, find related to lunch because the field of literature, strange and closed, so in the investigation before the first interview with the relevant industry, capture the focus from interviews, analysis of the seven key, after the interview with seven key to classification of the respondents. To observe the results, put forward the complete nutrition lunch process, and to summarize the supply staff with figures.



### 3.2 Research methods \_S.E.E method

The interview method and S.E.E method are used to study the characters and customer service journey. Service design is an overall process (UK, Design, Council, 2010) that yields useful, usable, effective, effective, and desirable services. This study argues that the concept and tools of service design are in line with the social problems that this study intends to solve. Therefore, service design is used as a research approach (Xiao Shuling et al., 2009).

### 3.3 Research tools

#### 3.3.1 Direct observation method

Direct observation refers to the observation or recording of what happened or the behavior of a person. The investigators were passive during the observation, that is, the investigators did not control or interfere with the observed events or actions. Direct observation can be divided into two methods: public observation and hidden observation. Public observation is the disclosure of the investigators at the site of the investigation, where the investigators realize that someone is observing what they have said and done. Covert observation refers to the fact that the investigated person is unaware that his actions have been observed and recorded. In most cases, the two methods are the direct collection of first-hand data by means of survey methods (MBA, lib, 2014).

#### 3.3.2 Competency Interview

The term "functional interview" was put forward by Hermann, with the aim of distinguishing functional interviews from general interviews. The interviewee is limited to the staff or supervisor in charge of the analysis. In addition to the limitation

of the object, functional interview is structured interview, which is more systematic, and is mainly based on the function of a specific position. The interviewee's questions were asked to give specific examples in specific circumstances, and then the interviewee further asked the interviewee to give a detailed account of these specific instances (Hermann, 1989).

### 3.3.3 Persona

In order to design the product according to the user's needs, the character image is constructed by using the role description method to construct the target user's appearance and details. That is to say, the plot is a user centered design approach that reverses the way in which the product was developed and the design was created before thinking about the possible target market (mission life team, 2017).

### 3.3.4 User journey

Customer service users in the journey is used to show the process of achieving goals, experience a series of contact points, the relationship between the user and the service description through different points of contact, at different contact points describing the experience process, for the new customer service experience to provide a vivid and structured visual presentation (service design to follow, 2016).

## **4: Research Content**

In the stage of research, through the literature that the school lunch program has five different forms, that the central region is the largest public public model, so that the choice of a public mode of study will be covering the highest; and the service is beneficial to inquire about the characteristics of the design and development of new service demand, is also very suitable for use in the study on the use of services, five design principles and framework of the research makes the whole process more clearly, it helps the research results output.

The main results of this study are as follows

1. Make the research interview record in key categories
  - Chart all the highlights of the interview and quickly catch the heart of the problem
2. The public catering process is made up of linear charts and identifies the limitations and gaps in the process
  - A linear chart can clearly indicate the timing of the service gap at what time and what events occur
3. Figure out the work point of view of the supply personnel
  - Characters have the characteristics of integrating character information and finding out respondents' values
4. After the results of the study, the reasons for food waste in nutrition lunch were put forward
  - You can see the slightest and the most serious waste by comparing the degree of waste in a strip arrangement

#### 4.1 visits before focusing on

Lunch is complex, and hard to reach level, to make the interview and field investigation more efficiently, researchers in the pre survey, an interview with a minimum of 4 years' experience in the lunch system of kitchen workers, and from the interview, analysis of the observation direction needed in the study and the emphasis of interview, respondents the key is summarized as follows in table 3.

Table 3 summarizes key before the visit

Respondent information:	53 year old male, School lunch chef and golf instructor
Work experience:	10 years restaurant chef, For 4 years, a small lunch Chef (now) serves as a breakfast Chef
Interview keywords:	<ol style="list-style-type: none"> <li>1. Health is of prime importance!</li> <li>2. School cooks are not like chefs, more like workers, because the cooking methods and weight are limited, just follow the instructions.</li> <li>3. Lunch will be given a lot, because manufacturers have signed a contract with the school, must let each student eat full, in order not to be violation.</li> <li>4. Most of the cooking is done with a steam pan, so it doesn't taste very good</li> </ol>
Analysis interview points:	Environmental sanitation, meal prices, cooking methods, nutrition and taste, food quantity, type and quantity of kitchen waste, waste suggestion

#### 4.2 Field visits

Observation interview School: (1) Touliau city Yunlin County town west elementary (2) Yunlin elementary school (3) Gongcheng elementary

Time of visit: am9:00 - pm13:00

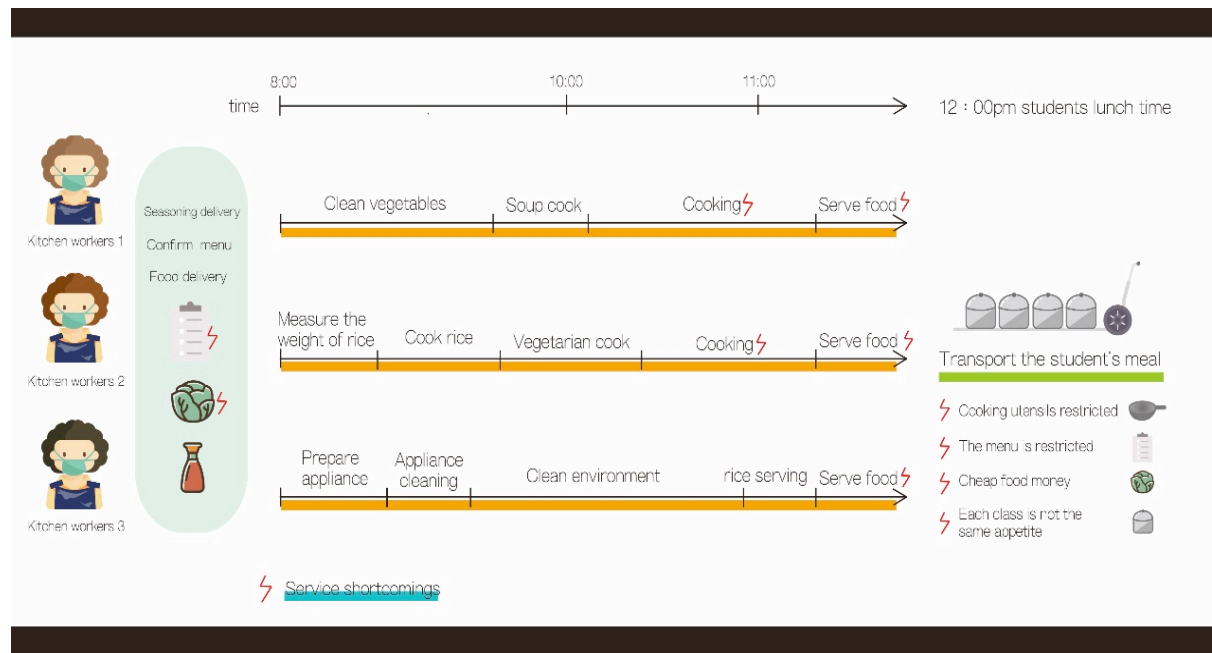
Number and type of interview: 6, cook, nutritionist, lunch Secretary

Table 4 Observation and interview results

<b>Environmental Sanitation</b>	In interviews with three chefs and nutritionists, they were asked "what is the most important thing in the process"? The unified answer is "hygiene".
<b>Meal Prices</b>	Lunch costs 600 yuan a month, about 15 yuan a meal, all the dishes come from the local, lunch costs are very cheap, but the quality of vegetables is very common.
<b>Cooking Methods</b>	Because the cooking time is limited, the kitchen cooking utensils are limited, in order to avoid food burning, almost steam cooker cooking, so that cooking is not very good.
<b>Nutrition Taste</b>	In terms of taste, as the seasoning and menu are controlled, the flavor is lighter, and the researcher feels good after trying actually, but it is difficult to get used to the heavy food and heavy taste.
<b>Food Quantity</b>	The campus and the vendor contract, provisions must let students eat, otherwise illegal, so the food will give 15%, while low grade students eat less than high grade, kitchen workers will be in accordance with the amount of food for different classes.
<b>Type Quantity Of Waste</b>	Visit three primary schools, a day about 15-10 kilograms of kitchen residue (dehydration), and the northern statistical difference, but the remaining almost all vegetables, and meat is the most popular, almost no leftovers.
<b>Waste Suggestion</b>	Asked the interviewee, "according to your experience, are there any ways to change the waste?" The answer is _ education. Food nutrition education is a better solution, says a nutritionist interviewed by us. "Creating a good home environment and campus environment will be the best way to solve the situation of kitchen waste."



### 4.3 Lunch supply flow chart



### 4.4 Summarized of supply staffs point of view

## Persona

**Name :** Mrs.Li  
**Age :** 53  
**Gender :** Woman  
**Status :** Work for 9 years  
**Locaton :** Yunlin County  
**Occupation :** School Lunch Workers

**Motivations :**  
 Decision : ● ● ● ● ● ● ● ●  
 Influence : ● ● ● ● ● ● ● ●  
 Directness : ● ● ● ● ● ● ● ●  
 Difficulty : ● ● ● ● ● ● ● ●

**Personality :**  
 Professional knowledge  
 ● Cooking skills  
 ● The execution of the menu

**Goals :**  
 To ensure the environment is healthy, and children eat good and happily .

**Frustrations :**  
 Only cook according to the planned menu, the seasoning is also limited

**Work faith :** Let the children eat healthy and good.

Responsents refused to take pictures

Summarized of supply staffs' point of view

## Persona

Name : Mrs.Cha  
Age : 43  
Gender : Man  
Status : Work for 10 years  
Locaton : Yunlin County  
Occupation : Dietitians

**Motivations :**  
Decision : ● ● ● ● ● ● ● ●  
Influence : ● ● ● ● ● ● ● ●  
Directness : ● ● ● ● ● ● ● ●  
Difficulty : ● ● ● ● ● ● ● ●

**Goals :**  
Lets nutrition which the child eats balanced very important. but also wants them to like having the lunch to be able the true health growth.

**Frustrations :**  
Nutrition balanced very important, but not very tasty lunch ,the student does not like , amd go out to buy the food to eat instead the more unhealthy

**Personality :**  
Professional knowledge  
Nutrition ● ● ● ● ● ● ● ●  
Monitoring lunch step ● ● ● ● ● ● ● ●  
Decision menu ● ● ● ● ● ● ● ●

power ● ● ● ● ● ● ● ●  
endurance ● ● ● ● ● ● ● ●  
operating hours ● ● ● ● ● ● ● ●  
responsibility ● ● ● ● ● ● ● ●  
degree of labor ● ● ● ● ● ● ● ●  
Knowledge level ● ● ● ● ● ● ● ●

Respondents refused to take pictures

**Work faith :** Let the children eat nutrition balance and not picky eaters

Summarized of supply staff's point of view

### 4.5 Summary

In this study, found that the school lunch program does have a lot of waste gap, listed below by the severity of waste, from mild to severe, from top to bottom to arrange.

1. School lunch is cheaper, resulting in meat and vegetable quality is generally low.
2. Dishes are generally repeated, but also by the nutritionist limited menu.
3. Cooking utensils are limited, not like the general kitchen cooking, delicious discount.
4. For each kind of different intake, the kitchen worker does not assign different weight to the system.
5. Children generally eat only meat and food, fried vegetables, vegetables and fruits do not often eat.

School lunch in the process there are a lot of waste and the research conclusion gap, the largest gap is a waste, the children and the children themselves don't waste food, after the concept of culture, the family may also indulge the child or neglect of diet education, cause the children no longer cherish food and waste; therefore concludes that the main reason for lunch waste for students, picky eaters, the solution includes family education, the problems with their own education, so after study, should strengthen the import of food education school lunch process, school lunch waste in order to effectively improve the problem.

### 5: Conclusions

The purpose of this study can be divided into the record of school lunch process, analysis of school lunch waste gap, the results of the study showed that the school lunch kitchen process to the image of the record, also marked process leads to a waste of the gap, used for future research to improve the basis, also by direct visit and interviews to collect data, analyze the causes of waste. Research to find out the biggest waste of students in the gap is fussy, follow-up study on the gap to make improvements.

The researchers will continue to focus on reducing waste in the school lunch, at present the study to find the largest gap in the waste in children, the follow-up may focus on improving children and children family education, food education will go to research all over the world, and think about how to import food education Taiwan education, construct the complete process.

Study on the value of this study in the main reason to find the school lunch waste, hoping to further research and help other researchers, and this research is currently only in the middle of the Taiwan primary school, and most schools in the city of waste of North and South high, hope there are different areas of study.

This research has encountered some difficulties, because the school lunch process is the manufacturers of school, is a closed process, it is often refused to visit and interview, 6 primary school in only 3 of respondents are willing to, and interviewed the kitchen workers because of busy, ever met but refused to accept the observation interview. And the attitude and tone are not very friendly, to complete the analysis process and the gap is hard, hope to follow-up researchers engaged in related research, to find the closest pipeline or agency for help, can help the research process more smoothly, and have more reference sample.

## References

1. Nutrition lunch Education Network  
[Http://library.taiwanschoolnet.org/cyberfair2014/lunch202/a/a1.html](http://library.taiwanschoolnet.org/cyberfair2014/lunch202/a/a1.html)
2. Taiwan service innovation system approach - service experience engineering method SEE (on)  
[http://www.find.org.tw/market\\_info.aspx?n\\_ID=6849#](http://www.find.org.tw/market_info.aspx?n_ID=6849#)
3. MyMKC management knowledge center  
[Http://mymkc.com/article/content/21446](http://mymkc.com/article/content/21446) MY.MKC
4. Study on nutrition lunch patterns in different primary schools in Central China  
[Http://ntcuir.ntcu.edu.tw/bitstream/987654321/7551/1/095NTCTC576057-001.pdf](http://ntcuir.ntcu.edu.tw/bitstream/987654321/7551/1/095NTCTC576057-001.pdf)
5. A study on the organizational model of nutrition lunch in Taichung County elementary school  
[Http://handle.ncl.edu.tw/11296/ndltd/52229541873098538962](http://handle.ncl.edu.tw/11296/ndltd/52229541873098538962)
6. Forest Sikkim 2013 service blueprint (Service Blueprint)  
[Http://mymkc.com/article/content/21446](http://mymkc.com/article/content/21446)
7. New Taipei City school food hygiene safety management manual  
[Http://nutrition.ntpc.edu.tw/upload/20141202150019\\_-%E6%B5%AE%E6%B0%B4%E5%8D%B0001-014-12\\_merged.pdf](http://nutrition.ntpc.edu.tw/upload/20141202150019_-%E6%B5%AE%E6%B0%B4%E5%8D%B0001-014-12_merged.pdf)
8. Which Occupational Analysis Technique: Critical Incident, DACUM, and/or Information Search? (December , 1989)  
[Http://www.tandfonline.com/doi/pdf/10.1080/10408347308003391](http://www.tandfonline.com/doi/pdf/10.1080/10408347308003391)
9. MBA lib number library (Lin Qiaoling et al., 2017)  
[Http://wiki.mbalib.com/zh-tw/%E7%9B%B4%E6%8E%A5%E8%A7%82%E5%AF%9F%E6%B3%95](http://wiki.mbalib.com/zh-tw/%E7%9B%B4%E6%8E%A5%E8%A7%82%E5%AF%9F%E6%B3%95)