#### СНАРТЕК

# 26

## F&B spatial design and functionality

Marta Hoi Yan Lam

Institute for Tourism Studies, Macao (IFTM): Colina de Mong-Há Macao, China

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#### 26.1 Introduction

Food and beverage industry is not just about eating and drinking. It is a matter of how we can deliver "an experience" to the customers. This experience is perceived through customers' five senses: seeing, smelling, feeling, hearing, and tasting (Spence and Piqueras-Fiszman, 2014). Tasting, by all means, depends on the food which is to be served on the table. The other senses are somehow also related to customers' encounter through the servicescape<sup>1</sup> in and around the restaurant.

<sup>1</sup>Servicescape is the environment where service takes place, which if designed successfully will change people's behavior to enhance the overall experience.

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One of the key elements of servicescape within foodservice outlets is spatial arrangements. A logical progression from one space to another; from exterior to entrance to dining room; and from kitchen to dining room are all part of the deal to create an aesthetic yet functional environment to staff and customers. Developing a restaurant design and floor plan involves knowing every anthropometric detail of human, equipment, and movement path, that is, the space required for standing, sitting, and working to make the optimum space utilization together with the requirements of the restaurant operations. Ideally, 60% area in a floor plan must go to the dining area and the other 40% to the kitchen, storage, freezer, etc. (The Restaurant Times, 2017). This proportion of front of house serving area versus the back of house kitchen area varies differently among different concepts of foodservice outlets. But the ultimate emphasis on creating an amenity design lies on correct positioning within the market with functional use of space, yet with energy efficiency achieved in all equipment installations. With every nation in quest on new technology to create a carbon neutral operation, foodservice designs are also heading toward this sustainability mission.

### 26.2 Foodservice design factors: front and back of house—location and site characteristics

Choosing the best location to start up a foodservice business is the first key to success. But not all locations suit the owner's expectations, or sometimes the site itself is technically unfit for the establishment. Some newly developed sites lack the extensive coverage on building services (electricity, water, or gas supply), which results in inadequate support for equipment installations and might cause restrictions in future operations. Thorough checking on local regulations and utility provisions at the desired location is important before putting a finalized decision to run the business at the location.

The size and shape of the foodservice space, of course, depends on the original characteristics of the site. However, designing the space with higher ceilings or lower ceilings greatly affect the perception of people (Love and Grimley, 2007). Higher ceiling creates an airy space for diners and will also diminish the apparent width of the space (Ching and Binggeli, 2004), which engages people into the dramatic atmosphere. While a low ceiling space visualizes a huge area into a small enclosure, it helps to create a cozy and warm feeling in a restaurant (Baraban and Durocher, 2010). Shape of the dining space always has psychological impact. Most people are attracted to curvature forms, but curve walls and lines are difficult to layout table settings, losing the flexibility to combine tables for larger groups.

The geographical location also affects the back of house kitchen design. For instance, food can be purchased daily in urban restaurants; however, in more remote places, larger storage facilities within the restaurant are needed to accommodate for longer period before procurement and delivery can arrive (Walker, 2014). Thus, extra storage space must be planned in the design according to the logistics of food delivery.

If renovations are required to fit to an existing structure in a desired location, it is always necessary to seek design solutions to embrace the current elements of the existing structure in the design rather than cover them up (Baraban and Durocher, 2010). Taking an example of traditional Chinese architecture, legislation of keeping the shop front icon may not be a total fit to the concept and theme of a western cuisine foodservice. But with cross-over themes now

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coming into trend, a cultural and historical view at the outlook entrance can sometimes be an attractive gimmick to arise people's attention.

Visibility is the extent to which the restaurant can be seen for a reasonable amount of time, whether the potential guest is walking or driving by. The signs, parking area, landscaping, design and color of the building, windows, view of the inside, and lighting will all be closely scrutinized to maintain a visible sight to people. It is best to have the restaurant to be visible from both sides of the street, as far away as 400 feet (Katsigris and Thomas, 2009). This also means that checking local signage regulations is important so as to make sure you can or cannot put up your restaurant logo and signage up without affecting the neighborhood. Some worst-case scenarios, the size and height of the restaurant name badge might have restrictions in urban areas, making sure it complies with the local law and appropriate brightness level would definitely help in selecting the best foodservice location.

#### 26.3 Spatial allocation with types of service

The restaurant design and layout will very much depend on whether the staff would serve the food or if it is a self-service restaurant. This refers to the "type of service" or concept in foodservice sector and is the start of the journey in developing a new restaurant. Examples of types of service include fine dining, casual dining, fast food, cafes, pubs and bars, buffets, etc. (Birchfield, 2008). Fine dining restaurants can be categorized with generous space in seating and in-service aisles. The ample space in fine dining will not only provide an upscale atmosphere to the customers but also allow tableside tools to move around the space, where casual dining and fast food services would not provide tableside service. Cafes, on the other hand, will need extra space on display refrigeration units for high visual impact to the customers to trigger their desire on cakes, sandwiches, and confectionary. Each and every type of service would have their own requirements on space allocation to equipment, staff, and customers.

According to the North American Association of Food Equipment Manufacturers (NAFEM), the following chart lists the average allotted square feet per customer by service type (Table 26.1).

Type of operation	Space allocation—per seat (Sq. Feet)
School lunchroom/cafeteria	9–12
Banquet room	10-11
Table service (minimum)	11-14
College or business and industry cafeteria	12-15
Table service at a hotel, club, or restaurant	15-18
Commercial cafeteria	16-18
Counter service restaurant	18-20

 TABLE 26.1
 Space allocation for different type of foodservice operations.

Source: Marta Lam.

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#### 26.4 The space layout

Design focuses on the overall space planning and includes defining size, shape, style, and decoration of a space. Layout, on the other hand, is the detailed arrangement of the equipment, floor space, and counter space (Gregoire, 2016).

#### 26.4.1 Front of house

As mentioned in the beginning of the chapter, dining out is hardly just about the food. The scenes, artwork, decoration, and socializing with the servers are equally important. When these are done right, these design elements will alleviate the whole dining experience. A simple meal would seem to be much more scrumptious when paired with fascinating furniture, alluring lighting, and stunning artifacts.

From the moment when one enters the restaurant, all designers are hoping to acclimatize the customers through human's senses. First impression is the key to cognitive thought which will induce to the next behavioral response (Fitzsimmons, 2014). Gentle music, soft lighting, and a welcoming host are all part of the deal to facilitate the foodservice delivery starting point. When customers are adapted to this first acclimatization, the journey to lure into the design and theme commences.

Aside from the decoration, the seating layout is probably the next most concerning issue to customers' affection. Booth seating against the wall is, by all means, mostly favored by customers. This is because of the cozy and private sensation that one can get when sitting in booths. However, anchored booth seating has a restriction in movement, and the construction space needed is higher than typical rectangular and square tables. Where upscale restaurants contain more area to accommodate different types of table settings, the furniture used in upscale restaurants is normally larger and bulkier, thereby also forbidding the flexibility to accommodate changes. Round tables on the other hand are preferable for group dining because of easier socialization. Chinese cuisine restaurants, for instance, are designed with lots of round tables for the ability to share dishes in the Chinese food culture. But again, round tables also lack the flexibility to combine tables and pushing toward corner areas.

All types of foodservice space would require the provision of restrooms—no matter if it is a counter service, sit in service, or even a takeaway service. Careful consideration on where the restrooms are to be located depends on, majority, where the building services like plumbing, drainage, and water supply pipes are laid. If a total new makeover of the restaurant is to be done, new pipelines can be installed and can give alternative positioning of where the restrooms can locate within the dining space. The best to place the restrooms is far away from immediate dining seating area, although of course in some instances this cannot be avoided. In case of this, partitions should be installed in between the dining space and the restroom entrance to make sure a visual separation is maintained.

#### 26.4.2 Back of house

The back of house area of a foodservice space is the kitchen, which should be welldesigned to a happy, sanitized, and efficient working area for food preparation. It links to

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#### 26.4 The space layout

the importance of workflow, equipment positioning, and accommodating the required staff number to facilitate a smooth operation. It is always better that fewer steps are required to complete a task. Careful and well-considered kitchen design will save money and time during the construction phase and increase the profitability over the lifetime of the kitchen.

Kitchen design begins with an analysis of the individual task that must be performed in each area. The menu will govern the quantity of food and supply items required in the preparation and cooking processes. Correlating to the number of seating and turnover rate in the front dining space, the amount of storage space, size and type of production equipment needed at concurrent time can be evaluated. Below (Fig. 26.1) are a few steps to consider when performing kitchen space planning.

The last item listed in Fig. 26.1 refers to the "workflow," which is the movement of people in an operation. There are normally two types of flow in foodservice designs, namely product flow and traffic flow (Gregoire, 2016).

According to Gregoire (2016), product flow is the movement of food and ingredients from receiving through production to the customer and then through trash removal. On the other hand, traffic flow is the movement of staff through the operation from start to completion of their work. The best scenario is to a have a straight line flow from kitchen to serving space, or even best from receiving food delivery through warewashing (i.e., receiving  $\rightarrow$  storage  $\rightarrow$  preparation  $\rightarrow$  serving  $\rightarrow$  cleaning), which minimizes backtracking and cross-over movement of food and people. However, this rarely happens because the kitchen space shape is never a long rectangular dimensional space. According to Birchfield (2008), the flow of a foodservice design could ideally be demonstrated in Fig. 26.2.

In Payne-Palacio and Theis (2016), the typical diagram showing desirable work area relationships and progression of work from receiving goods to serving without backtracking and with little cross traffic is shown in Fig. 26.3.

Almanza et al. (2000) suggested the understanding of work centers in kitchen area to implement a smooth design fitting into the kitchen plan shape. Work centers are areas where a group of closely related tasks are done by an individual or individuals. According to Almanza et al. (2000), a work center is all about maximum reach and normal reach distance to obtain tools and materials for quick, convenient operation. Each work center should be



FIGURE 26.1 Simple steps in defining the space planning in kitchens. Source: Marta Lam.



FIGURE 26.2 An example of foodservice design flow by Birchfield (2008). Adapted from Marta Lam.



FIGURE 26.3 An example of foodservice design flow by Payne-Palacio and Theis (2016). Adapted from Marta Lam.

located at different points in the kitchen space so that staff and chef will not need to outreach places while performing their tasks. Thus, efficiency will be achieved. Each individual's work center will be combined together to form the total work flow inside the kitchen. These work centers do not need to be ideally in a straight line dimension, but they can be fitted according to the shape and size of the kitchen space. The aim is to eliminate unnecessary travel and energy consuming crisscrossing and backtracking and to obtain the smoothest flow line within the restricted kitchen plan shape.

Birchfield (2008) stated that flow is an important consideration in efficient design throughout a foodservice facility and listed out some flow considerations, quoted as below:

- The movement of employees from one section of the kitchen to another
- The flow of dishes through dishwashing system and back to the service area
- The flow of raw food ingredients through the main traffic aisles of the kitchen to the preparation area

In the design process, it will be very useful for the designer to diagram the flow patterns on the preliminary floor plan, showing the movement of chefs, servers, customers, food, dishes, and trashing rubbish. Color coding the flow lines of each party and equipment makes the patterns easier to distinguish and assists the designer in arriving at a design solution that accommodates the proper flow of materials and personnel. Rough sketches called "bubble diagrams" are used by designers to help in the preliminary design process. A bubble diagram quickly shows the spatial relationships among major areas of a restaurant. An example of a bubble diagram is shown in Fig. 26.4. Sometimes, these bubble diagrams can be expanded in details, thereby showing every equipment placement so it can be shared with different employees.



FIGURE 26.4 An example of a bubble diagram to show the schematic relationships between the various working areas (Mion, 2017). Adapted from Marta Lam.

#### 26.5 Features of a comfortable restaurant design

Foodservice interior design is not only about how exquisite the decorations are or on the success purely laid on how exciting the menu is. People asked for comfort. According to the United States Environmental Protection Agency (EPA), an average American spent 90% of his time indoors. This posed a great challenge to architects, designers, and engineers to come up with eye-catching and comfortable and financially viable designs to implement in the current days. Hence, if your restaurant interior design is comfortable and if it gives the customers a sense of comfort, then there are high chances that your restaurant will top your customers' favorite list.

According to the Chartered Institution of Building Services Engineers (CIBSE), "the indoor environment should be designed and controlled so that occupants' comfort and health are assured." The overall layout of space and the accompanying environmental conditions of climate influence how people feel in a space.

#### 26.6 Thermal

When the word thermal comes up, temperature is always considered as the relationship with it. Actually, thermally comfort is not just about the right temperature. It is all linked together with the relative humidity, the ambient temperature, and also the activity of oneself. Sometimes with the same ambient temperature at different humidity levels, humans experience comfort discrepancy. Removing excess moisture to lower the relative humidity (but at the same temperature) can, in some circumstances, achieve a thermally comfortable environment.

Indoor comfort can be achieved through air conditioning, which is either through heating or cooling. Outdoor comfort is about shelter and about external air modification through localized equipment. With alfresco dining becoming more and more common and with unbearable hotter summers, a lot of outdoor dining space has installed mechanical fans, localized cooling units, or even evaporative cooling fans by spraying jets of water to cool down customers outdoor.

The internal heat gains in kitchens are extremely high because of cooking, lighting, electrical equipment, and the number personnel, whereas in the front dining space it is much cooler to the customers because of steady activity, such as sitting down and enjoying the meal. Thus, the thermal requirements in each part of the restaurant could be totally different. Adjusting each zone into the required standard of thermally comfort level to occupants is essential for engineers to implement at the design stage.

#### 26.7 Ventilation

Ventilation in foodservice designs is all about capturing and exhausting odors, grease, and heat from the kitchen and keeping them from entering the dining area. Controlling all these are never an easy task. Cooking equipment generates moisture and heat, and food preparation generates smoke and grease to the air. Mechanical ventilation must be installed in the kitchen area to force supply air into the space; and if the air properties are changed (cooler or hotter) before entering the kitchen, it will be known as air-conditioned.

Extract fans and exhaust hoods in the kitchen will remove smoke and grease to the exterior, which the airflow will induce changes of pressure in the space. At the same time, makeup air is added to the kitchen, the overall design promotes a negative pressure that prevents kitchen air pollution from reaching dining area, whereas in the dining area a positive pressure is to be maintained through mechanical ventilation systems such that outdoor dust and kitchen smell will not flow over to the dining space (Baraban and Durocher, 2010). In case there is a smoking bar next to the dining area, further considerations are needed so that the cigarette smell can be maintained and expelled out, while at the same time not affecting diners next to them.

Positioning the ventilation grilles (air outlets) can sometimes be a very hard job for the designers and engineers. Locating grilles far away from the dining tables may not be able to provide the required thermal comfort level. On the other hand, placing these air outlets near to dining seats can result in discomfort with high wind turbulence onto the diners. Thus, an efficient ventilation system in a restaurant should make all the above merits happen, within the space allocation of the ventilation equipment installation.

#### 26.8 Lighting and color

Lighting is, of course, one of the major factors in designing restaurant as it enables visibility and also spontaneously affects the mood of the customers. Hence, choosing the proper lighting level and the lighting color is based on the restaurant theme, concept, and target market. In case of targeting young people like teenagers, then choosing funky lights could be appropriate. A quick service restaurant, for example, should be brightly lit so as to let patrons move through ordering and the pick-up process. The most important issue in this case is to prevent lingering to promote the turnover. On the other hand, if planning to target families or couples, using lights that create an intimate environment would be more suitable. Lighting must not be too bright or too dim in the dining area. A proper lighting level can enhance the decoration and increase the appeal to customers.

Large-sized windows capturing natural daylight could help in lighting up the space, giving a sense of well-being to customers. Another advantage of harnessing natural daylighting is to lower the energy bills. Brightly lit up restaurants typically spend from 12% to 15% of the annual budget on lighting (Katsigris and Thomas, 2009). However, dining tables located adjacent to the solar bearing windows receive a lot of heat gains, which brings to the dilemma of enjoying sunlight or becoming too hot for the discomfort diners. A well-balanced window area, with effective shading devices and heat reflective glasses, is somehow a key way to get a view and maintain comfort to the customers. The challenge while designing lighting is to understand under what circumstances certain visual conditions might be better than others and to use that knowledge to design lighting systems that improve the overall performance and human comfort (The Restaurant Times, 2017).

Color has a great psychological impact on guests. Different colors stimulate different emotions and can heavily impact feelings of hunger, thirst, and even space in customers

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(The Restaurant Times, 2016). Tacky colors or the ones that hurt the eyes will not be much appreciated by humans. On the contrary, using proper color can help making the restaurant look spacious; similarly, a wrong choice of color can shrink the space. Colors are known to affect the eating habits of the customers; for instance, quick service restaurants more commonly choose bright colors such as red and yellow (such as McDonald's), as it inspires a feeling of excitement and makes customers order and eat quickly. Using warmer colors at the entrance of a restaurant makes the customers feel that the temperature is a few degrees higher than normal, providing a comfy atmosphere. In contrast, cooler shades send a psychological stimulus that makes people feel that the temperature is actually cooler (The Restaurant Times, 2016).

#### 26.9 Acoustics

Acoustics is the design of sound within a space. In foodservice designs, control of the auditory environment is both important in dining space and in the kitchen. One of the greatest challenges is to safeguard perceptible conversations at the dining seats without being overpowered by the background noise and music. Thus, installing ceiling speakers or wallmounted televisions or any music producing equipment must be carefully considered to each of the dining seats.

According to Baraban and Durocher (2010), the average noise level of a typical restaurant during a dining rush is around 80 dB (some could reach up to 110 dB). Within the dining space alone, an unsuccessful acoustics environment can also induce shouting and hearing problems. Most likely it is because the sound generated within the space is not absorbed within the decoration materials, causing echo and noisy atmosphere. Without the need to change the space layout, some acoustics solutions are, for example, to treat the dining ceilings with sound baffles; to treat the floors with carpet; to replace with soft furnishing and upholstered chairs; to use table cloths (reducing utensils noises on dining tables); and to hanging up curtains, which all can provide sound absorbing qualities to reduce the echo and noise reverberation problems.

Kitchens are obviously noisy spaces made louder by communication between chefs and service staff. Sound level above 65 dB will force chefs and servers to shout so that they can be heard over background noises (Baraban and Durocher, 2010). With remote printers in kitchens now linked with point of sale system, the need for conversation between production and service staff is significantly reduced. In case of designs with display kitchens, the carrying over of cooking and utensil noises must be minimized because of the proximity to the dining areas. These kinds of concerns are also vital in ensuring an appropriate acoustics environment in any foodservice space.

#### 26.9.1 The trend in foodservice design

Foodservice sector is facing the same challenge to all industries in the nation, which is sustainability (Smith, 2001). It is not only about how delicious the food tastes nowadays, but also customers and owners are becoming more concerned about environment they are situating.

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They would question about where the ingredients are from and if they locally sourced or grown from sustainable agriculture. Some people are more concerned with how food waste is being treated or whether there is a recycling facility available within the foodservice sector. Some customers will even query about the type of wood used in decoration and what preservatives have been used on the wood. Owners may request designers to use a mix use of natural lighting and artificial lighting in the dining space and urge the replacement of energy efficient luminaries irrespective of higher installation costs. All these issues are happening all around us as people are now leading a more environmental conscious lifestyle. The designs in all types of infrastructure, including those of foodservice spaces, are not only needed to fulfill the functional and esthetic qualities but also to aim for higher standards of sustainable designs to endure the future.

Accreditation points have been developed for energy conservation in foodservice designs. The most known system is the LEED certification process (Leadership in Energy and Environmental Design). It is a standard that architects and construction firms competing to market their buildings as green (Payne-Palacio and Theis, 2016). The LEED rating systems include groups of requirements for projects that want to achieve LEED certification. Projects satisfy different areas to earn points within the LEED credit categories so as to satisfy the green building requirements. Designs which gained 40 points will be LEED certified—50 points will be certified as silver level; 60 points as gold level; and 80 points as platinum level. The areas of scaling will include design and construction; site location; water efficiency; energy and atmosphere; material and resources; indoor quality; and innovation in design.

Another design trend in the foodservice sector is to become more universal design capable. The American Disability Act (ADA) was enforced to ensure that the environments to be designed nowadays are catered for everyone without much extra effort for people to use, termed as "Universal Design." Restaurant designs must comply with the ADA requirements, in particular to ingress and egress, size allocations, and perceptible sensory facilities. These are applied not only to patrons but also to each and every employee working inside the foodservice outlet, for example, providing slope access, handrail support, effective communication tools for people with hearing, vision, or speech disabilities and removing barriers, etc. This movement toward Universal Design will continue to strengthen as worldwide population continues to age. Architects and designers are in need to design and refurbish more environments to accommodate our aging community, providing easier access and alleviating use to all types of people.

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