Rest Facilities at Commercial Plazas through User Behavior Perspective

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Abstract

This study attempts to understand how users use rest facilities and, through observation and surveys conducted in three plazas, tries to identify their demand on the rest facilities. The results showed activities in the plaza bringing in large crowds. Half of all users used the supplementary rest facilities such as green decks, railings, and stairs. As a result of ongoing user activities, the rest and other facilities were observed to be closely related. Additionally, children comprised more than 10% of users in the three plazas and tended to use the rest facilities in a dangerous manner. The survey results demonstrated that cleanliness and communication were crucial issues for users. Thus, suggestions include having a plaza design that is based on activities to be held there, that take into account the needs of children, and that consider the environment, users' comfort, and the need to facilitate communication.

Keywords: rest facilities; environment behavior; commercial plaza

1. Introduction

Plaza, a Spanish term, derived from a word that means "field," describes an open public space in an urban area, such as a city square[1]. Plazas originated in the Hellenistic world in 800 BC. They were initially places for conducting business transactions, but at around 700 AD, they gradually began to be used for celebrations and judicial trials. From there, they evolved into an urban symbol. Today, plazas remain a popular place within cities. Recently, a new trend has emerged-plazas started to combine[2]. Most shopping malls and department stores in Taiwan are surrounded by plazas. These commercial plazas provide customers with a place to rest and also give shops and other businesses a place to hold publicity activities. Commercial plazas usually provide street furniture[3] to enable customers to rest. Providing appropriate street furniture, including chairs and benches, is a key issue for commercial plazas[4]. This study investigates what types of rest facilities satisfy shoppers at commercial plazas.

Although people generally see a rest facility as simply comprising chairs or benches, they have used other facilities to rest in the real environment. Gehl stressed that rest facilities can be divided into two categories: a) basic seats, the purpose of which is to allow people to sit down and rest, these include chairs and benches; and b) supplementary seats, installed for the landscape or for movement, such as green decks and stairs. When there are enough seats in the area, the basic seats with a good view are preferred. However, in areas without sufficient seats, assisting seats are also used[5]. Gehl made two significant observations: a) both basic and assisting seats can be used to rest; and b) seats with a good view are important to users. Albert also indicated that seats without a good view were rarely used[6]. This study considered both basic seats and assisting seats.

Additionally, this study focused on the influence of view on the use of rest facilities. This study attempts to understand how users use rest facilities, as well as determine the demand they place on the rest facilities through observations and surveys. Finally, this study makes design recommendations for rest facilities in commercial plazas.

2. Method

2.1 Observations

This study selected three plazas in Taiwan for the non-participant observation: Tiger City, Mitsukoshi...
and Sogo. The observation done at Tiger City Plaza involved 639 users, whereas Mitsukoshi Plaza involved 621 users. Sogo Plaza had 401 subjects. Before the observation, each plaza was divided into five regions according to rest facilities; the other facilities in each region were recorded. Observations were conducted in November for more than 2 days in each plaza (included a week day and a weekend). The observations were made 30 minutes before the start of business and 30 minutes after the close of business (1130-2130). The observers used a camera and a record sheet (Table 1.). User behavior was recorded at 2 hour intervals. The data recorded were users' gender, age group, partners, activity being engaged in, location, manner in which rest facility was being used, posture, and current activity (if any) in the plaza. After the investigation, the following items were analyzed: 1) user location, utilization ratio of rest facilities, and user posture; 2) relationship between utilization ratio and environment situation, including time (day or night) and whether an activity was being held in the plaza; and 3) relationship between utilization ratio and individual differences, including user gender, age group, partner, and activity being engaged in.

2.2 Survey
A total of 334 survey questionnaires were returned. The survey was done 3 months after the facility observation. Respondents were given the definition of rest facilities (those that can reduce physical tiredness) and were asked two major questions: 1) where do they think the rest facilities should be placed; and 2) what rest facility do users require. A pre-survey was used to validate these questions. The respondents were allowed to give multiple answers.

3. Results of Observations
3.1 Tiger City Plaza
There were 639 users at the Tiger City Plaza: weekday: 128, weekends: 511; male: 339, female: 300; children: 72, adults: 562, elderly: 5.

Based on Jan's classification of seats, the basic seats in Tiger City Plaza comprised nine wooden chairs. Meanwhile, the supplementary seats comprised five green decks, railings, stairs, and platforms. As to usage, 53.1% of users sat on the wooden chairs, 34.7% used the green decks, and 10.8% used handrails. Roughly speaking then, half of the users used the basic facilities, while the other half chose the supplementary rest facilities. Fig.1. shows the location of individual users within the plaza. It indicates that, the utilization ratio of users in region C was lower than that in region A (13.6%< 39.4%, p<.05). In region A, the utilization ratio of wooden chairs facing the plaza was higher than of those facing the building (73.8%>26.2%, p<.01). Despite being in the same category of rest facilities, wooden chairs facing the plaza were strongly preferred by users.

From the results of coefficient analysis (Table 2.), a significant relationship emerged between whether activities are held in the plaza and customer usage of different categories of the rest facility. To clarify this relationship, it is necessary to understand plaza characteristics when activities are held. Fig.2. shows that regardless of whether it is a weekday or a weekend, a large number of users appear when there are activities in the plaza. This was especially obvious on weekend. The number of users increased from 41 to 114 during an activity, and then was reduced to 54 after the activity. Number of users fluctuated, depending on the occurrence of the activities. Number of users significantly influences selected by those users. Fig.3. indicates that, when activities are held, the wooden chair users decreased to 39.3% from 66.9% and the platforms users increased to 45.2% from 24.2%.

Also worth noting is the proportion of users who used the railings (13%) while watching the activities. The basic seats were always preferred but, during activities, users became willing to settle for less optimal facilities.

Restated, the assisting rest facilities at the plaza allowed users to rest when the number of basic rest facilities was insufficient. Additionally, Table 2. reveals

| Table 1. The Recording Sheets of Observation |
|---------------------------------------------|
| **Observational content**                  |
| **Record items**                            |
| User location                               |
| Region                                      |
| Category                                    |
| Usage of rest facilities                    |
| User postures                               |
| Environmental condition                     |
| Time                                        |
| Day, night                                  |
| Activities                                  |
| whether there is an activity being held     |
| Individual characteristics                 |
| Gender                                      |
| male, female                                |
| Age group                                   |
| children, adults, elderly                   |
| Companions                                  |
| number of users                             |
| Ongoing user activity                       |
| resting, conversing, eating, drinking, smoking, etc. |


a significant relationship between activities held in the plaza and user location. When there were no activities the plaza, 55% of the users chose region A. This result confirms the edge effect of the general field [7]; people generally select seats located against the wall, which provides a feeling of security. On the other hand, users facing an open space can experience the fun of watching people. However, because of the desire to secure a good view, the ratio of users selecting rest facilities near the stage (region B) increased to 45.3% from 19.1%. Moreover, Fig. 3 shows a large number of users selecting the green decks facing the stage. The same thing was noted with respect to posture. When activities were held, the ratio of users standing increased to 26.7% from 5.2%. Additionally, more proactive viewers used the rest facilities unconventionally to obtain a better view, and the ratio of users standing on the seats increased to 5% from 1.1%. In short, users became more selective in terms of location and posture during activities.

From the relationship between individual differences and rest facility usage listed in Table 2., age and gender were found to be important factors.
posture were found to be significantly related. Table 3 shows that most adults sat with their feet on the ground. Meanwhile, the data showed 41.7% of the children sitting with both feet dangling in the air, 18.1% with both legs bent on the seats, and 25% simply standing on the seats. This figure demonstrates that seat height was not suitable for children. The elderly invariably sat with both feet on the ground.

As to individual differences, the data most worthy of attention involved the relation between utilization ratio and ongoing user activity listed in Table 2. The activities engaged in by plaza users were as follows: watching the performance, 35.7%; having a conversation, 24.7%; resting, 22.8%; looking at the electronic billboards, 5.3%; playing, 4.1%; smoking, 3.3%; talking on the phone, 1.9%; reading, 0.3%; writing, 0.5%; and ordering bags, 1.3%. The number of watchers’ utilizing the facilities has already been discussed, and that discussion revealed that users selected rest facility location based on its distance from the stage, and the same situation was noted with the other facilities. For example, Fig.4 reveals that electronic billboard watchers concentrated themselves in regions A and B, which are most suitable for viewing because of the unobstructed view and comfortable viewing distance. Moreover, most eaters, drinkers, and smokers concentrated in regions A and C, close to the trash cans and ashtrays. People frequently selected rest facilities in specific regions, depending on the activities which they plan to engage in. The observation results revealed a close correlation between environmental facility location and rest facility location.

3.2 Mitsukoshi Plaza

Observed in Mitsukoshi Plaza were 621 subjects. The sample was broken down as follows: week days, 159, weekend, 462; male, 297, female, 324; children, 86, adults, 521, and elderly, 14.

The basic seats in Mitsukoshi Plaza comprised six wooden benches and 13 metal benches. The supplementary seats comprised high green decks, low green decks scattered, stairs, columns, and low green decks around the garden. Seat usage was as follows: 34.3% of the subjects used the metal benches, 18.2% used the wooden benches, 35.4% used the high green decks, 12.5% used the low green decks, 5.6% used the stairs, 3.1% used the columns, and 2.9% used the low green decks around the garden. Although half of all the users used supplementary facilities, much like that at Tiger City, the reason for this selection had nothing to do with activities that had been organized. Unlike at Tiger City, the number of users of rest facilities during activities did not increase; most people stood to watch the activities on the stage. This observation
result was expected. The rest facilities in regions A and B of Mitsukoshi Plaza are not facing the stage, while those in region D did not offer a good view as people gather in front of the stage while, others enter or leave a department store, and finally most of the seats in region E have their view of the stage obscured by the building itself. Because of the insufficient rest facilities with a view of the stage, the facilities that do exist are little utilized during activities. Thus, activities did not strongly influence utilization ratio. In other words, neither basic nor supplementary facilities at this plaza helped users to rest while watching activities.

Fig.6. reveals that the utilization of the wooden benches in region E was high (47.8%). When sitting on the wooden benches in region E, users can watch previews of movies on the television wall. But while sitting on wooden benches in regions B and C, the view of the television wall is obscured or part by big coconut trees. The quality of visions thus may affect utilization ratio. Moreover, the wooden benches in region E are positioned between two green decks and have a significantly higher utilization ratio than the green decks. This result supports the position of Jan Gehl—that when different rest facilities share the same view, people prefer the basic rest facilities.

Table 4. reveals a significant relationship between user posture and age: 59.3% of the children sat with both feet dangling in the air, 21% sat with their feet touching the ground, 6.7% had both legs bent on the seat, and 4% stood on the seats. Although the percentage of children sitting with their feet not touching the ground was similar to those in Tiger City, at this plaza, 21% of children did sit with their feet touching the ground. These children were using the low green decks. These supplementary rest facilities allowed the children to sit with their feet touching the ground.

Additionally, Table 4. also reveals a significant relationship between utilization ratio and ongoing activity. The activities engaged in by users of this plaza were as follows: resting, 50.1%; having a conversation, 23.2%; eating and drinking, 11.4%; talking on the phone, 4%; playing, 3.2%; watching the performance, 2.4%; smoking, 2%; watching the fountain, 1.2%; watching television wall, 0.9; reading, 0.2%; and ordering bags, 1.2%. Fig.7. shows that eating, drinking, and smoking users favored the rest facilities with close proximity to trash cans. Notably the main activities engaged in by users were resting and chatting. Despite the presence of electronic billboards, fountain, and a stage in Mitsukoshi Plaza, these rest facilities were little used. It indicates that this plaza did not have a good match between environmental facilities and rest facility locations.

3.3 Sogo Plaza

The observation at Sogo Plaza involved 401 subjects. The subjects were broken down as follows-weekdays: 70, weekend: 331; male: 154, female: 247; and children: 65, adults: 313, elderly: 23. The basic seats in Sogo Plaza comprised 36 white wooden benches. The supplementary seats included barriers, columns, and walls. The utilization ratio of the wooden benches was 93.3%, while that of the walls was 3.5%. The arrangement of rest facilities at Sogo Plaza differed from the other two plazas. There are few supplementary rest facilities in Sogo Plaza, but there are a large number of moveable wooden benches. Fig.8. shows that 19 of these benches are placed along the walls, allowing users to lean against the wall while sitting, and 11 are placed in front of the stage. In this plaza, the arrangement of the wooden benches serves a clear purpose. The benches placed along the walls can meet the edge effect, and users seated on those benches can view the whole plaza. The benches placed in front of the stage allow users to watch activities on stage. Although this arrangement was helpful for users wishing to watch activities, it was unsuitable when no activities were in progress. Fig.10. reveals that in the event of activities occurring, utilization ratio of users in region D was 61%, while if there were no activities, it was only 12.5%. Although region D contains more benches than do other regions, the benches there had the lowest utilization ratio, indicating that these benches were generally inefficient.

Additionally, Table 5. reveals a significant relationship between age and posture: 76.9% of the children sat on the rest facilities with both feet dangling in the air, 5% with both legs bent on the seats,
and 8.7% stood on the seats. The wooden benches in the plaza are clearly too high for children to use safely.

The breakdown of activities engaged in by plaza goers is as follows: resting, 41.6%; watching the performance, 32.4%; having a conversation, 11.2%; eating and drinking, 6%; smoking, 4.5%; talking on the telephone, 2.2%; reading, 0.5%; and ordering bags, 1.5%. Besides, the performances were the only things that affected plaza usage. The range of activities engaged in by users was reduced when fewer environmental facilities were available.

4. Survey Results

A total of 334 survey questionnaires were returned. Respondent age was divided into four categories: under 20 years old: 21%, 20-40 years old: 68%, 40-60 years old: 8%, and more than 60 years old: 1%.

This is understandable as a person staying in the plaza may be engaged in two or more activities simultaneously, some of which can be observed (e.g., eating and drinking, talking on the phone, or watching the performance), while others cannot (e.g., waiting, thinking, and so on). The survey thus helped gather more information about the type of activities engaged in by plaza users. Table 6. shows that the largest single group of plaza users were those waiting for the partners. Additionally, 31.7% of users were people watchers, and the popularity of this activity helped explain the high utilization ratio of the seats facing the plaza.

Table 5. Results of Pearson Product Moment Correlation Coefficient Analysis in Sogo Plaza

| Environmental condition | Intersection of plaza | Time | Activity in plaza | Gender | Companion | Ongoing activity |
|-------------------------|-----------------------|------|-------------------|--------|-----------|------------------|
| Forms                   | 0.29**                | 0.32** | 0.13              | 0.19   | 0.12      | 0.46**           |
| Location                | 0.32**                | 0.50** | 0.12              | 0.26** | 0.28**    | 0.66**           |
| Posture                 | 0.35**                | 0.34** | 0.14              | 0.58** | 0.25*     | 0.58**           |

(*p<0.05, and rectangle **p<0.01)

Fig. 8. Layout of the Location of each User in Sogo Plaza

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a strong preference for shady locations. Additionally, people were interested in watching the electronic billboards and activities held in the plaza and results from Tiger City and Sogo plazas showed that the utilization ratio of rest facilities facing the plaza or near the stage increased considerably during activities. These indicate a close relationship between rest and other facilities.

Table 8. shows that 80.5% of plaza users attached enormous importance to cleanliness of rest facilities. This is understandable as, cleanliness level indeed affects user willingness to use the facilities. Next to cleanliness was comfort, including aspects such as materials, provision of backrest, usage posture, and ergonomic considerations, and then by communication and personal space requirement. Meanwhile, customers cared relatively little about beauty, style, and color. There were a few age-related differences in the views of respondents, with 100% of respondents over 60 years old thinking a back-leaning design was necessary, though this view was also shared by more than 60% of respondents of all ages. Overall, the results indicated that, besides comfort, communication was also an important consideration.

5. Conclusions
This investigation discusses the similarities and differences in usage of the rest facilities in three commercial plazas. A survey is done to investigate people's requirements with regard to rest facilities. Finally, the observation and survey results are integrated, and the following points are presented as recommendations for the design of rest facilities in commercial plazas:
1. Designs must be made suitable for activities that will be held in the plaza.
2. Designs must be capable of dealing with a large numbers of users but
which do not become a barrier the space becomes empty. Such supplementary rest facilities are less comfortable than benches, but are more flexible as they can be used in a variety of ways. Movable rest facilities also deserve consideration, such as the wooden benches in Sogo Plaza, which can be moved around the plaza to cater to activities being held, increasing the efficiency of space usage when no activities are held.

2. Child-friendly designs are required.

Observations indicate that children comprised more than 10% of the users in the plazas, but child users had limited access to rest facilities. They are able to use only the lower facilities, or are forced to adopt a dangerous posture when using the higher ones. Therefore, the plaza should ensure ample facilities with low seats, as well as facilities suitable for shared use by parents and children.

3. Designs must consider the facilities existing in the immediate area.

Some facilities in a plaza may increase its attractiveness (e.g., electronic billboards, fountains, and so on) whereas others support human activities (e.g., lighting equipment, trash cans and others), providing users with increased feelings of convenience and comfort.

The observation results reveal that environmental and rest facilities are closely related, with the relationship being based primarily on distance. Distance will differs among individual users, but generally users have effective vision up to 500 m, effective hearing up to 35 m, effective sense of smell up to 3 m, and prefer a distance of between 30 and 35 m between themselves and the stage. Therefore, we can consider the service type provided by the environmental facilities to determine the optimal distance between them. Furthermore, it is necessary to consider whether vision is blocked. Proper consideration of nearby environmental facilities can improve the utilization ratio of rest facilities and can also support activities held in the plaza, thus boosting the effectiveness of the plaza facilities.

4. Design for comfort will be required.

Comfort is a fundamental consideration for rest facilities. One notable result of the survey is the importance users place on cleanliness; therefore, besides improving management, it is important that the rest facilities are easy to clean. Regarding materials, comfortable foam materials are unsuitable for outdoor use. However, material heat levels deserve consideration. For example, wood temperatures vary little between winter and summer, while metals become cold in winter and very hot in summer. Moreover, observations indicate that the elderly tend to select rest facilities that provide back support, while the survey results indicate that both elderly and younger adults demand the same back support. Therefore, designs that provide back support should be considered.

Additionally, consideration should be given to locating facilities in shaded areas in the plazas, where users will be more comfortable.

5. Designs that enhance communication are required.

Plazas are intended to facilitate communication between urban dwellers. Besides providing a space for business transaction, the need for communication between users and partners also deserves attention. The survey results also indicate that communication is an important issue for customers in selecting a rest facility. Recently, S-shaped designs have been extremely popular, allowing users to face inward and communicate with each other or sit with their backs to the center and avoid the gazes of others. Such designs are highly promising for both individual and group users.

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