A Study on the Utilization of Public Open Space in Consideration of its Building Attributes in Fukuoka, Japan

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Abstract
This study is aimed to suggest an instrument for useful Public Open Space design. For this purpose, all of 156 POS in Fukuoka, Japan, are investigated by the type to clarify the relation between POS and use of buildings and its circumstance. This shows that (i) Pedestrian Road type should be designed in relation to existing public sidewalk conditions; (ii) General Open Space type should be designed in relation to the location in the lot; (iii) major problems on both PR type and GOS type are occurred in office buildings of which lot area is 1000-1500m2; (iv) ideal design are often in office building; and (v) barricades are placed often in the case of housings. With these results, a flow of consultation, design considerations checklist and amendment of Fukuoka regulations including design guidelines are proposed.

Keywords: public open space; pedestrian road; plaza; use of buildings; lot area1.

Introduction
1.1. Background and objectives
Public Open Space (POS) Regulation is a bulk incentive program, through which Floor Area Ratios (FAR) and height regulations designated as Basic may be increased according to POS area provided. Since its establishment in 1971, a good number of POS have been provided for public utilization. However, some POS are not used by citizen because of its design problems, a kind of obstacles. This may be from the absent of design guidelines for POS by type although POS can be designed various types. Therfore, it is necessary to clarify what are the factors affecting the utilization of POS by type, in consideration of the circumstance around a building.

The previous studies on POS are (i) studies on the application of POS regulations focused on the procedure and the provisions(Akasaki, 1992; Fujii, 2003; Katauke, 1995); and (ii) study on the sequential formation of pedestrian space(Akasaki, 1994). However, those studies did not consider the relation between a building and its attributes such as building use or lot area. With this background, this study is focusing on two main objectives: One is to clarify the relation between the characteristics of POS and building attributes, and the other is to present the findings in a format that will assist local government to encourage conforming POS design.

1.2. Methodology and Scope
The objects of this study are 156 POS which are completed as of June 2003 in Fukuoka. Firstly, each POS is classified into 4 types of POS, and the characteristic of POS is analyzed in view of its utilization(chapter 3). Secondly, this result is analyzed again in view of building attributes including use of buildings, lot area, zoning districts (chapter 4). Lastly, these results were interviewed with official in charge of POS to make a proposal for application of POS such as amendment of POS regulations, design considerations checklist, design guidelines (chapter 5).

2. Definition of types of POS
According to The Fukuoka Public Open Space Regulation (Fukuoka City, 1998), POS are classified into two types. One is Pedestrian Road (PR) type including sidewalk (SW) type and passage type; SW type is divided into 2 sub-types according to the Public SW (PSW) existence. The other type is General Open Space (GOS), which means all except PR type, including plaza type and landscape type. These types are placed with each other as shown figure 1. Table 1 shows the number of samples.

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3. Characteristics of POS by the type

3.1. Pedestrian Road type

Table 2 shows that this type has 3 main considerations; lot conditions, architecture elements, and edge elements, which are considered to have relation to the utilization of PR.

(i) Lot conditions mean facing street condition (width and length), and whether the lot is surrounded by buildings or not. PR not facing ESW is facing a 6.9m wide street, where the traffic is usually low, can bring illegal parked bicycles and cars. Furthermore, when a lot is surrounded by adjacent buildings, the POS becomes losing visual access from street as shown in photo 1.
(ii) Architecture elements consider whether stairs, columns, and parking entrance hinder the access to PR.

(iii) Edge elements mean what are placed between PR type and street (or PSW). There are removable or irremovable. Removable elements, easy to be cleaned up, are from 2 origins: illegally parked bicycles and cars from users; planters, signs, and selling counters from building occupants. Irremovable ones, installed to the lot, are barricades to prevent illegal parking, or tree planting to provide greenery so that as long as they are placed at the end of SW, they protect pedestrian from traffic and improve the urban greenery (photo 4). However, if they are placed between PR and PSW, they control pedestrian access to PR (photo 5 and photo 6), so it is recommended to place near buildings. This is one of major findings of this study telling that SW type should be treated in relation to whether the lot is facing public SW or not.

1) SW type not facing PSW: There are 36 samples. The average width of SW is 3.2m, and that of facing street is 6.9m, usually an access road. The main problems of this type are (i) A dented SW: 22.2% are located at a lot surrounded by neighboring lot lacking of visual access (photo 1); (ii) Parking entrance: 58.3% are disconnected by an access to off-street parking facility (photo 2); (iii) Illegally parked bicycles and cars: many bicycles and cars are illegally parked in front of this type. One of the reasons is that the facing street is usually an access road of low traffic (Photo 3).

2) SW type facing PSW: There are 73 samples. The average width of PR provided is 3.6m, becoming the total width of SW to 7.8m, usually an access road of low traffic. The main problems of this type are (i) Parking entrance: 34.2% are disconnected by an access to off-street parking facility; (ii) Barricades and tree planting: 41% are equipped with barricades and 31.5% are with tree planting; (iii) Planters: 13.7% are equipped with planters between PSW and PR such as photo 7. Especially, (ii) and (iii) divide the PSW and PR meaninglessly (photo 5 and photo 6). On the other hand, 23.3% of SW type facing PSW are designed without obstacles, with trees planted at the side of building not to intervene SW as shown in photo 8.

3) Passage type: The samples are only 10. The average width is 4.1m. The biggest problem is illegally parked bicycles as shown in photo 9.

3.2. General Open Space type

Table 3 shows the results of investigation on 4 items; lot conditions, architecture elements, GOS design elements, and obstacles, which are considered to have relation to the utilization of GOS.

(i) Lot conditions consider the relation with building entrance, whether a lot is surrounded by adjacent buildings or not, and the width of facing street. (ii) Architecture elements consider whether stairs, columns or pilotis hinder the utilization of GOS. (iii) GOS design elements consider what are designed for users or for improving landscape. (iv) Obstacles consider what are placed on the GOS space.

By the way, it is difficult to make a difference between plaza type and landscape type. 95.2% of plaza type is designed with planting to meet the planting requirement. Especially, there are lots of plaza one cannot figure out how to utilize or what is the purpose of those plaza. This may be from the absence of design concept of GOS because most GOS are produced only for FAR incentive without thorough investigation of anticipated activities and users.

This confusing point also makes it difficult to set up the viewpoint of investigation on GOS. So, this investigation focuses on the character of GOS to establish the design concept of GOS by the location of, mainly plaza: front, rear, side, and inside.

1) Front Plaza: 13 samples of 29(44.8%) plaza type are located in front of building (BD), and the average width of facing street is 26.4m, usually a main street. A front plaza tends to be overlooked directly or indirectly from inside of a building or from street as shown in photo 10, so that it is difficult for one to utilize the space for private use such as taking a rest. Therefore, it is recommended that a front plaza be designed to improve the view of the building itself as well as urban landscape rather than provide a space to citizen by providing wide-open space, in particular, in the case of a lot which is surrounded by adjacent buildings because those are lack of accessibility.

2) Rear Plaza: 10 samples of 29(34.5%) plaza type are located at the rear of BD, and the average width of facing street is 7.53m, usually an access road. 4 samples are extended along the full length of the rear lot line between the side lot lines, so that people can pass through. All of them are designed with planting and benches, making a separate space. However, when the plaza is not large enough or is surrounded with
neighboring buildings, there is an illegal parking problem as shown in photo 11, but when it is large enough and equipped with elements for user to utilize it, it plays a role as a pocket park.

3) Side Plaza: 4 samples are located at the side of a building. This location seems to the best to make it independent enough to utilize. Sensitive designed plaza can turn a plaza into a play area, providing amenity for residents and the neighbors alike as shown in photo 12.

4) Inside Plaza: 2 samples are located through of a building to allow passing. Although level changes and columns define the separation between street and inside plaza as shown in photo 13, it provides visual access.

5) Landscape type: There are only 8 samples of landscape type. Photo 14 shows an example where there is PSW enough wide and the pedestrian traffic is not so heavy. Furthermore, photo 15 shows that the adequate maintenance ensures that the view of POS is attractive; otherwise, it could harm the urban landscape.

4. Relations the characteristic of POS and use of buildings and site attributes

Table 4 shows the results of analysis on the relations between the characteristics of POS and use of buildings and site attributes (lot area, zoning districts). In case of landscape type, the number of samples is just counted because the samples are not enough.

4.1. By use of buildings

Use of buildings is divided into 3 groups: office, housing, and the others. Office group has 25 samples, housing group 16 samples, and the others 8 samples (3 hotels, 2 mixed-use buildings, 1 store, 1 department store, and 1 hospital).

Figure 2 shows that SW type prevails at all groups, passage type are seen in only office group. Housing group has high proportion of “SW not facing PSW” and plaza type. Because they are usually located outside of city where the Basic Building Area Ratio is low, compared to lot area.

1) SW not facing PSW: Figure 3 shows that parking entrance problem occurs in all groups at a similar rate. Illegally parked bicycles and cars are seen at a low frequency in housing group.

2) SW facing PSW: Figure 4 shows that barricades are most frequently placed in housing group, tree planting in office group. In the case of office group and the others, the frequency of nothing between PSW and PR is high, however, that of planters is high also.

3) Passage: Passages are seen only in office group. It is considered that housings keep from passing through the building for privacy and security.

4) Plaza: Figure 5 shows that frequency of front plaza is extremely high in office group, probably to improve the view of buildings. On the other hand, in housing group, plaza is often located at the rear or side of BD as a separate space from the housing buildings.

5) Landscape: This type is more in office group.

4.2. By lot area

Lot area is divided into four groups: 500m²-1000m², 1000m²-1500m², 1500m²-5000m², more than 5000m² in consideration of Fukuoka Regulation. It is natural the plaza is often planned in a large lot. In addition, another two factors are affecting; use of buildings and the low standards of basic FAR.

1) SW not facing PSW: The frequency of all problems is highest in 1000-1500m² group.

2) SW facing PSW: Barricades are often placed in 500m²-1000m² group, where the proportion of housing
<table>
<thead>
<tr>
<th>Items</th>
<th>By use of buildings</th>
<th>By lot area (m²)</th>
<th>By zoning districts</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Offices</td>
<td>Housing</td>
<td>The others</td>
</tr>
<tr>
<td>Number of total samples</td>
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<td>46</td>
<td>25</td>
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<tr>
<td>Number of samples</td>
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<td>F 0.61</td>
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<tr>
<td>Illegally parked</td>
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<td>Sidewalk</td>
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<td></td>
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<td>Side plaza</td>
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<td></td>
<td>F -</td>
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<td>Inside plaza</td>
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<tr>
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<td>F -</td>
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</tr>
<tr>
<td></td>
<td>%</td>
<td>52.5%</td>
<td>12.5%</td>
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</table>

Note) *F: frequency of case

![Fig.2. Type of POS by use of buildings](image)

![Fig.3. SW not facing PSW by use of buildings](image)

![Fig.4. SW facing PSW by use of buildings](image)

![Fig.5. Location of plaza by use of buildings](image)
is high. Compared 1000m²-1500m² group and 1500 m²-5000m² group, where all offices are located, obstacles are more frequent in 1000m²-1500m² group, on the other hand, ideal design is often in 1500 m²-5000m² group.

3) Passage: Passage’s main problem appears only in 1000m²-1500m² group.

4) Plaza: Front plaza are popular in less than 5000m². In more than 5000m², the plaza has incline to be placed in the rear or inside of building.

5) Landscape: This type is easy to be seen in 1000m²-1500m² group.

4.3. By zoning districts and FAR

Zoning districts are divided into four groups: commercial and non-commercial, and commercial district is subdivided into three according to Basic FAR: less than 0.4, 0.5-0.6, and 0.7-0.8. The average of Basic FAR on non-commercial district is 0.2.

There is close relation with use of buildings and FAR. Houssings are located only in the area of FAR less than 0.4 and non-commercial area. This influences the trend of POS problems as well.

1) SW not facing PSW: Frequency of illegal parking problem becomes higher as the FAR goes higher, where the center of Fukuoka.

2) SW facing PSW: planting is more frequent in FAR 0.5-0.6. On the other hand, as the FAR goes higher, there is nothing between PR type and PSW.

3) Passage: Passage’s main problem appears only in FAR 0.5-0.6 group.

4) Plaza: Front plaza is frequent in commercial FAR 0.4, 0.5, 0.6, where offices are located.

5) Landscape: This type is easy to be seen in FAR 0.5-0.6 group.

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5) Landscape: This type is easy to be seen in FAR 0.5-0.6 group.

5. Proposal for improvement of POS regulation

Table 5 is summary of the analysis on characteristics of POS in relation to building attributes. Based on this results, a set of proposals are suggested including flow of consultation, design consideration checklist, amendment of Fukuoka regulation.

5.1. Flow of consultation

In the stage of the prior consultation, the concrete concept of POS should be settled through site analysis. As referred before, the full understanding its site circumstance ensure that the POS is designed for anticipated activities and future users. In particular, following points should be clear: (i) what kind of POS is needed, (ii) what kind of design is compatible with this kind of POS in relation to its surroundings, and (iii) whether it is possible to maintain this design of POS.

In the stage of design consultation, whether the design of POS is compatible the concept of POS is checked. In particular, the main problems which were discussed in chapter 4 should be checked with high attention. Furthermore, design considerations checklist and image sketches are helpful.

5.2. Design considerations checklist

This checklist helps planner to design POS compatible with the concept of POS and take into account major factors to escape problems may occur when it completed. In particular, this checklist emphasizes the site analysis including the street condition and the location of POS, to meet the site circumstance. Table 6 shows an example of design considerations checklist filled out.
5.3. Amendment of Fukuoka Regulation
The amendment of Fukuoka Regulation, mainly on the design of POS, is suggested based on the results of chapter 3. This includes provisions for prohibiting barricades or tree plantings which are obstacles between PSW and PR, and an image drawing as a document in consultation process to figure out the image of open space when completed. Besides, open space design guidelines are presented by the type to encourage design of POS compatible with its purpose as shown in table 7.

6. Conclusion
This study aims to clarify the characteristics of POS...
Major factors affecting the characteristics of POS differ according to the type of POS: In PR type, whether a POS is facing the public sidewalk or not is important, on the other hand, in GOS type, the location of POS is important. Most main problems which prevent users from utilizing the each POS are occurred in the case of office buildings of which lot area is 500-1500m² and FAR is 0.5 or 0.6. Those problems are illegally parked bicycles and cars, barricades, and the location of tree planting in the case of PR type, and illegally parked bicycles and cars, and not-maintained POS in the case of GOS type. Furthermore, the PR type in housing group is designed with barricades prohibiting from passing the SW. On the other hand, office group offers an ideal design of PR type without obstacles in the case of lot area 1500-5000m² and FAR is 0.7 or 0.8. To provide a conforming POS, setting up concrete concept of POS design is essential in consideration of the necessary of POS type, anticipated activities and users. This should be based on the full understanding by site analysis. To help this process, design considerations checklist and amendment of Fukuoka regulation are presented including the POS design guidelines.

Acknowledgment

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References


4) Fukuoka City (1998) Regulation on the Public Open Space Design Rule
