A study on the external space of Japanese public libraries: As public open space in the city

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Abstract: *Public facilities and public open space (POS) in cities are facing new challenges in the post-pandemic era. Use of Japan's public libraries has been declining for years due to aging facilities and the impact of e-readers. After the pandemic, offline services are once again in crisis, and the external spaces of libraries are being utilized particularly poorly. These spaces are mainly used as parking lots with no connection to the library services themselves, which has not brought better POS to Japan's cities. Therefore, this study explores the possibility of using external library spaces from a wide-area perspective. The external space and external environment of existing libraries are then interpreted through case studies and correlation analysis. Finally, possible directions for the development of external library spaces are derived. We found that if external library spaces are developed appropriately, the POS system can be improved. This can bring libraries and cities closer together, increase intergenerational communication to better serve the aging society, and provide more economic and operational spaces for development. Ultimately, the resilience and sustainability of libraries and cities will be enhanced.*

Keywords: public libraries; open public space; sustainable urban development; Japan

1. Introduction

The crisis caused by the COVID-19 pandemic is testing the resilience of cities. The United Nations Sustainable Development Goals (SDGs) are becoming more difficult to achieve because of the new social distance and travel patterns brought about by the pandemic. The risk of population concentration has risen because of the need to avoid intensifying the disease spread, so there has been a renewed dispersal away from cities [1]. Before COVID-19, more than half of people traveled only to places that were accessible within fifteen minutes, both inside and outside spaces [2]. In contrast, Yuasa showed that people's utilization of outdoor spaces and their purpose of use changed after the pandemic [3]. People began to think more about the population density of a place and its distance from home. Therefore, use of spaces closer to home that had not previously been activity spaces increased. A study by Funabiki and Katayama also proved that people's staying behavior and distribution in public open space (POS) increased slightly and more evenly after the COVID-19 outbreak [4]. The study by Gubić and Wolff also suggests that small-scale public green space (PGS) will significantly address the need for PGS activities around residences [5].

Public library buildings in Japan are aging, with 892 libraries built before the new seismic standards of 1982 [6]. All of these libraries are over forty years old, and, according to the Japanese Library Association (JLA) [7], the total number of public libraries in Japan is only 3,316. Therefore, in terms of age and decay alone, more than a quarter of these libraries will need to be renovated or rebuilt in the near future. Given the current trend of public libraries in Japan, it is clear that this percentage will gradually increase. However, if libraries can be distributed in such a way as to fill the gap in urban public spaces, it may be possible to use library renovation to reorganize the relationship between the inside and outside of these buildings to meet the new needs. The current utilization rate of public libraries in Japan is declining year by year [7]. Therefore, the opportunity for renovation is also an opportunity to develop the stock of public libraries and to stimulate the vitality of city libraries. Agboola's study confirms that markets have the potential to serve as public spaces [8]. While public libraries have been considered as buildings, whether external spaces also have such potential has not been discussed.

The purpose of this study is to examine POS and public libraries to determine whether and how

external public library spaces can be used as POS. Previous studies on public libraries have not focused on their external space, and few studies on POS have looked at the use of external library space. This, this study can complement a systematic organization of external space around public libraries, and it can suggest efficient uses of urban space. The uniqueness and value of this study lies in the win–win effect achieved by using public libraries as POS. Moreover, if the study can be extended, there may be potential to utilize the exterior space of many types of public buildings.

2. Literature Review

The current discussion on the external space of public libraries is based on a wider area than just the space within the site. Nakamura and Kurihara first proposed the theory of the ovoid sphere of a library's service area [9]. Later, Nakai proposed the concept of a two-level sphere [10]. Both theories are related to the service circle of the library. Generally speaking, people are more concerned about the distance of a library from their home than the size of the library. However, the distance is no longer so important because of the popularity of vehicles. Therefore, people's range is larger than before, and the proportion of people choosing libraries because of distance is decreasing [11]. Thus, libraries with small proximities will likely see a further decrease in utilization. This is clearly contrary to the demand for POS after the pandemic.

During the pandemic, road spaces began to be used for live activities in Europe and the United States, and in Japan, there are also examples of parking lots on both sides of a road being used for small events [12]. These are all examples of using POS for different activities depending on the time of day. And the integration of the two types of activities, regular use and event use, needs to be considered [13]. So, if we are going to use the external space of the library, we should also consider the daily use of the library. Indoor and outdoor spaces can have negative effects if they interact with each other, but they may have a strong activating effect if they can mutually benefit one another [14].

3. External Space of Japanese Public Libraries

Before discussing new uses, it is important to understand the current situation. We have compiled a quantitative and qualitative study of 45 award-winning public library selected by the JLA as case studies to understand the current status of external library space use. This will help us identify what to learn from and avoid. The distribution of the 45 libraries (Figure 1) spans all regions of Japan, including both high- and low-density areas. At the same time, they are selected by JLA as the best libraries of their time, so this collection is both universal and representative.

Figure 1: Distribution of 45 public library cases in Japan.

3.1 Current Status of Public Libraries in Japan

Before conducting the case study, it is first necessary to understand the architectural and activity characteristics of Japanese public libraries to gain a better sense of the external space of libraries.

As mentioned earlier, Japanese public library buildings are decaying. In addition to safety issues, the decay of facilities has also led to a deterioration in people's perception of library spaces. People's impressions of libraries tend to be negative, such as dull, serious, and old [6], and people's impressions of libraries largely influence whether they will use them [15]. For this reason, Japanese library researchers introduced the concept of library of place, and this theory has led to a unique Japanese methodological system [16]. However, small-scale libraries can face the problem of limited space. Hasegawa has proposed a theory of coexistence between two library models [15]. One is an information and service-oriented library, which provides a quiet and serious environment and professional services. The other is a library that provides a "place"; a place for communication and a relaxed and nice environment. Together, they form a group of libraries that meet the needs of various users.

3.2 Relationship between internal space and external space

The relationship between the external space of a library and the library building can be divided into four categories in terms of spatial layout (Table 1). Enclosed spaces make up the majority. There are nine libraries with external spaces on only one side, seven of which are entrance spaces. Shared spaces, in contrast, are found in libraries that are co-located with other venues. Shared spaces are mostly found on the entrance side.

Table 1: Position of the external space relative to the street

	Entrance space	One-sided space	Wraparound space	Shared space
Number/Total	7/45	2/45	30/45	6/45

Table 2 shows the statistics of specific elements in the external space and external environment. First is the parking lot. The vast majority of libraries have parking spaces, and those that do not have parking spaces will at least have space for bicycle parking. The second most common external space in libraries is a landscaped space, which includes natural greenery and designed public spaces. Most of these are meant to provide views and trees to isolate the external environment, while a few provide artificial landscapes that can be accessed, such as open spaces. The third most common exterior space is the entrance plaza, and more than half of the libraries have entrance spaces. Most of the entrance plazas are pass-through spaces, and a few provide seating spaces for resting or semi-outdoor spaces under galleries. The remaining elements do not have obvious universality.

Table 2: External space elements

External space	
Parking	39
Landscape	31
Entrance square	25
Wasteland or lawn	6
Cultural facilities	6
Restaurant or café	6
Bicycle parking	6
Government facilities	5
Roof space	5
Cultural heritage	3
Restaurant or cafe	2
Green infrastructure	2

3.3 External Space of Japanese Public Libraries

With the analysis of the external space, we hope to draw two conclusions: to understand the existing relationships and to explore the potential. To obtain deep relationships that are not accessible by direct observation, we performed a binary correlation analysis of Table 1 using R language[17].   In this way, we can see whether there is a more explicit relationship between the external space itself. (Table 3)

The first negative correlation is that parking lots and wastelands do not generally occur at the same time. Because the spatial form of the two is similar, both are uncovered flat areas. Therefore, if the demand for parking is high, there is no room for wasteland, and conversely, the demand for parking is generally low in places where wasteland is available. There is a high substitutability between these two.

The other two negative correlations are that libraries with cultural facilities and restaurants nearby will have fewer entrance plazas. This is a bit strange when you look at the data alone, but if you combine these with the positive correlations, they are well understood.

There is a clear positive correlation between cultural facilities, government facilities, and restaurants. These three are all typical of libraries with parallel facilities. Additionally, as we have observed, libraries that are built in parallel with other facilities often share entrance spaces, so the entrance space is no longer a public space within the library site, but a shared space. Why then do the government facilities not show a significant negative correlation with exit spaces? The answer is that libraries sometimes have learning centers and information centers attached to them. These are government facilities, but they are within the libraries themselves rather than separate buildings. Therefore, the entrance space is the entrance space of the library.

In addition to the relationships we observed, there are some unobserved relationships that are telling. In other words, there is potential for improvement. For example, currently the surrounding schools and cultural facilities have a weak negative correlation, but in reality, the relationship between cultural facilities and schools should be positive. Issues such as these will be discussed in the next section, which discusses possibilities for future development.

Table 3: Binary self-correlation analysis of external space

External space	Car parking	Wasteland or lawn	Entrance square	Landscape	Cultural heritage	Cultural facilities	Government facilities	Restaurant or cafe	Roof space	Green infrastructure
Car. Parking	1.00	-0.46	0.31	-0.04	-0.05	-0.06	0.17	-0.06	0.04	-0.07
Wasteland or lawn	-0.46	1.00	-0.38	-0.33	0.07	0.17	-0.07	0.16	0.01	0.14
Entrance square	0.31	-0.38	1.00	0.12	0.11	-0.46	-0.27	-0.45	0.00	0.25
Landscape	-0.04	-0.33	0.12	1.00	-0.37	-0.01	-0.03	0.21	-0.20	0.13
Cultural heritage	-0.05	0.07	0.11	-0.37	1.00	0.31	0.33	0.00	0.10	0.29
Cultural facilities	-0.06	0.17	-0.46	-0.01	0.31	1.00	0.57	0.59	-0.01	0.09
Government facilities	0.17	-0.07	-0.27	-0.03	0.33	0.57	1.00	0.58	0.21	0.09
Restaurant or café	-0.06	0.16	-0.45	0.21	0.00	0.59	0.58	1.00	0.22	0.10
Roof space	0.04	0.01	0.00	-0.20	0.10	-0.01	0.21	0.22	1.00	0.16
Green infrastructure	-0.07	0.14	0.25	0.13	0.29	0.09	0.09	0.10	0.16	1.00

4. External Space of Japanese Public Libraries

4.1 As a Supplement to POSs

The previous discussion has demonstrated from a broad perspective that public libraries can fill the gap of public space, so this will be a direction of improvement. However, external library space is not a complete substitute for POS because it has its own special characteristics.

4.1.1 External Space of Japanese Public Libraries

As a Supplement to POSs the most important difference between the external space of a library itself and a mere POS is that it is an external space of a building, and the influence of architecture cannot be ignored. Library buildings have changed over the years from their original serious image. Moreover, public libraries are not just spaces that provide precious books or a quiet place; they are spaces that provide a diverse range of information and a place for communication. The semi-externalization of the interior space has increased. It is shown to the city while consciously living in the city [18]. Combining the characteristics of these buildings to provide better quality public spaces not only fit the needs of today's libraries, but they also serve cities better.

4.1.2 Environmental sustainability and health

This sense of everydayness is similar to the attributes of a library [19]. Thus, if more green elements can be incorporated into the exterior space of a library, perhaps it could significantly improve the sense of community life. This becomes more important in the post-pandemic era. Currently, small- and

medium-sized libraries are mostly accessible by car [11]. It may be possible to increase the number of people who choose to walk by improving the exterior space, because far more people choose to walk to outdoor spaces than indoor ones [2]. This is coupled with the fact that people are still more aware of the surrounding exterior spaces of buildings [3].

Therefore, if the external space of a library is not considered as a parking lot but instead as an extension of the library space, there is a possibility that people will choose to walk to the library. The availability of sitting space is also a major consideration when people choose to walk [2]. In this way, the utilization of a library and the efficiency of the library as a public space will increase, and it will also increase the odds that people in the area will walk. Reducing carbon emissions while increasing the opportunity to exercise may have a good effect on improving the health of the region.

4.1.3 Communication and placemaking

The role of outdoor space as a place of communication is obvious [3]. However, there are several conditions for public spaces to fulfill their function as places of communication, and different types of public spaces have different properties and different available resources around them [20]. Therefore, it is important to have a clear understanding of spatial properties when using them. In Section 4, we explained the relationship between external library space and the external environment, including the available resources around the library. In practice, we need to introduce a participatory process to verify the results. The participatory process is the first step in the five points of placemaking proposed by Sonoda [21]. The final step is to develop a chain of actions with the surroundings and to find a niche in the higher plan. This is the next topic to be discussed.

4.1.4 Communication and placemaking

Different facilities have different needs for distance. Therefore, the co-location of a library and civic hall is appropriate in terms of service radius. In recent years, new libraries such as Yachiyo Central Library have started to co-locate with art museums and organize cultural activities together. If the external space of the library can also join in, it would not only improve the efficiency and diversity of the use of the individual spaces, but it would also create an opportunity to form a system. Concentrating on low-use spaces on a small scale and creating synergy with the surrounding area can produce better results and provide a better understanding of the chain of public space development [22]. The external space of cultural facilities is similar to low-use land and is a public space different from a park. Together, they form a system of public spaces that can better export culture into the city.

4.1.5 Communication and placemaking

Nowadays, there is not much difference in the function of libraries themselves, but only in the size and distribution of the libraries due to differences in population density. Weekends or weekdays have a significant impact on library use and do not differ significantly depending on whether the library is located in an urban or rural area [23]. However, there are some environmental factors that affect library use. For example, weather factors have a greater impact on urban areas [23]. This is mainly related to the mode of transportation and lifestyle and has little to do with the library function itself. However, if outdoor space is to be utilized, then weather is one of the factors that must be considered. From our survey, it is also true that there are differences in the situation when the surrounding area is agricultural or wasteland because the availability of land and the visual habits of the residents are different. Therefore, although the design of a library building does not reflect obvious urban–rural differences, the exterior space needs to be carefully considered.

4.2 Libraries That Intervene in the City

The visualization of communicative activities in public spaces is an important part of being a place of communication [20]. A major difference between libraries and bookstores nowadays also lies in this. It is not that the facade of a library is closed, but that the curtains are mostly closed in the course of use, whether for privacy and quiet or for the protection of books. However, is bookstore open and the reading behavior inside the store can be visualized. This is closed nature is improved in the new large libraries, where the transparency and visibility of behavior is much higher. However, it still does not penetrate to the outside. This is one of the potentials of using the external space of the library. If we can put the act of reading and communicating outdoors so that people in the city can visualize the activities of the library, we can attract more people to the venue and thus increase library utilization. The relationship with the street must be considered when designing the site and organizing an event as it affects the extent to which the event can be presented.

4.3 Support for an Aging and Childless Society

It is important for families to use libraries [11]. Therefore, it is important to guide children to use libraries. However, children also needs sufficient outdoor space at all times [3]. The need for multifunctional and intensive children's spaces is even more important in today's world of fewer children. The combination of these two is particularly important. However, most of these activities take place in the school space and are limited to classrooms and other environments. If the library has an outdoor space that can be used, there may be more possibilities for activities in combination with the library's internal functions.

Older people and students occupy the libraries on weekdays, while young people mostly go on weekends because the libraries are closed on weekday evenings. This cuts off the possibility of intergenerational communication. if libraries have external spaces related to library functions that are open to the public for extended hours. It is possible to promote communication for both the elderly and children, and even for families. As families and friends gather more, cities will also benefit from the bonds of social capital created by this kind of OPS. It can also improve the efficiency of library use.

4.4 As Part of the Economic Cycle

Another serious problem that libraries face today is a decline in funding year after year. If libraries are to be sustainable, they also need to be economically sustainable. If possible, support should also be provided to the surrounding businesses to complete the economic cycle. The PFI and PPP systems of recent years have improved the financial problems and applied more flexible operating models, but they have not changed the trend of declining library utilization. What about bookstores, which are closely related to libraries? While the proportion of individuals who visit libraries is not low, the proportion of those who visit bookstores is higher, the highest of all public spaces [24]. However, the commercialization of libraries has been successful but controversial [25]. The most typical example is the Takeo city library in which the company behind the Tutsaya bookstore is involved. Thus, the business model of the bookstore obviously cannot be directly substituted into the library.

Unlike libraries, neighborhood residents still mostly approve of commercial activity in public spaces, and they believe that it can improve the safety of the area and make the community livelier [26]. This difference makes the external space of the library more valuable. Is it possible to develop an acceptable business model if we move the commercialization of libraries from the inside to the outside space? Further, if the external space of cultural facilities forms a new business model, it could be beneficial to the overall economy. Kiosks have an important role to play in the activation of neighborhoods if they are to change from the unipolar and local-decline model of Tokyo to a multipoint network [27].

5. Summary and Prospects

Mumford proposed the concept of social cities—a sparse, polycentric development structure [28]. Public libraries in Japan can not only increase utilization but also have a more sustainable development structure and build resilience if they increase the diversity and number of activities offered through external space. This is also important in the post-pandemic era as it is essential to maintain a sense of life in the city when both the economy and lives of residents have been greatly affected and limited. Libraries facilitate the unification of administrative and civic functions [29], which can be further enhanced by having a stronger connection to the city through external their spaces. In local metropolitan areas, where there is a possibility of rapid population decline because of the highly mobile youth cohort, a phased improvement of the environment in compact cities could make it less likely that this cohort will move away as they reach middle age [30]. This is the direction of improvement that can be expected. Even in areas with more agricultural land in the surrounding area, it is possible to provide agricultural support or even a productive green space where agriculture and urban symbiosis can be realized on site [31].

There are still some limitations in this study. The correlation analysis is reasonable but contains some speculation, so the next step is to increase the amount of data and conduct interviews to verify the findings. The specific surroundings and external spaces to be used also need further specific understanding. In Japan, cultural facilities such as libraries play a role in disaster prevention, and small- and medium-sized libraries serve as temporary shelters for residents in the surrounding area, and then are taken over by large-scale facilities. Therefore, the use of external space must also be considered in such a way that it does not affect the existing disaster prevention function. The feasibility of the use of external space also

needs to be further confirmed. Similar to what Sorensen showed [32], it takes a tremendous amount of government power to push through. Understanding this difficulty is the basis for achieving such a strategy in Japan as well as in other regions of the world.

In general, however, it can be confirmed that utilizing exterior library space can bring many benefits, possibilities, and opportunities for sustainability if the space is used appropriately, allowing libraries to break through the huge traditional constraints. Libraries preserve and provide a special kind of space in the city [33]. They provide a sense of place that is difficult to replace with other public facilities and have the potential to strengthen the bonds of social capital. This bonding is important for the satisfaction of the residents [34]. In this post-pandemic era, we must find some way to preserve and make better use of public libraries, and the exterior space is a new breakthrough toward achieving this goal.

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