

Article

Rethinking the External Space of Japanese Public Libraries from the Perspective of Urban Sustainability in a Post-Pandemic Era

Tongguang Zang ^{*}, Jun Jiang, Konomi Ikebe and Takeshi Kinoshita

Department of Landscape Architecture Field of Landscape Design, Graduate School of Horticulture, Chiba University, Chiba 271-8510, Japan

^{*} Correspondence: cama5982@chiba-u.jp

Abstract: In the post-pandemic era, cities are facing new demands and challenges. Both telecommuting and dense development require communities to provide more public space to meet people's psychological and physical needs. The insufficient space currently left in the city calls for stock development. The Japanese public libraries affected by COVID-19 are part of this stock. We aimed to determine and propose strategies for using the external space of libraries to enhance the sustainability of cities. Ultimately, we expect to achieve a synergy between public libraries and cities in terms of sustainability. We found that the most dominant element in the exterior space of Japanese public libraries is parking lots, which have the potential to be flexibly utilized in the post-pandemic era. We also summarized the current patterns of external space for public libraries in Japan. Finally, we proposed six strategies to enhance the sustainability of libraries and cities. These strategies can simultaneously enhance the sustainability of cities and public libraries from multiple perspectives, especially in the post-pandemic era. Our proposal will not only help to build or renew public libraries in the future, but also fills a gap in the urban perspective of Japanese public libraries and their external spaces.

Keywords: public libraries; post-pandemic; sustainability; external space; public space

Citation: Zang, T.; Jiang, J.; Ikebe, K.; Kinoshita, T. Rethinking the External Space of Japanese Public Libraries from the Perspective of Urban Sustainability in a Post-Pandemic Era. *Sustainability* **2023**, *15*, 7796. <https://doi.org/10.3390/su15107796>

Academic Editors: Magnus Moglia and Stephen Glackin

Received: 11 April 2023

Revised: 8 May 2023

Accepted: 8 May 2023

Published: 10 May 2023



Copyright: © 2023 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

1.1. Background

The needs of cities changed after COVID-19 affected all parts of the world. Moglia et al., in 2021, proposed seven needs for the post-COVID-19 world, and three levels of scenarios corresponding to them [1]. One of these changes in transportation patterns has a strong correlation with the need for urban green and public spaces. Home-based offices may act as catalysts for urban reconfiguration, and thus urban sustainability [2]. The aftermath of the pandemic has provided opportunities for pedestrian and bicycle spaces, especially on a community scale. This is not only for ecological reasons but also for the health aspect of sustainability [3]. Japan's situation validates this conclusion. Kawaguchi's study also illustrated that working from home in Japan can alleviate the concentration of residents around workplaces in metropolitan centers, where land prices are high [4]. It creates a greater tendency for the population to disperse [5]. Ota and Minai's study also demonstrated that people went to parks and socialized with people in the neighborhood more than any other activity during the pandemic [6]. This should have a positive effect on the development of community scale and walkable spaces. Various means of improving walkability, such as increasing urban diversity, have been proposed in Japan and are consistent with the need for intensive development in Japan today [7].

However, in reality, home office and community development are interactive processes. If community sustainability is not promoted, working at home may lead to more problems. When there are children at home or when both members of couples have jobs, it

can be difficult to secure space for work, such as meetings [8]. Reduced opportunities to work and travel affect mental and physical health [9]. Without adequate pedestrian accessibility and infrastructure, more private car travel may occur [10]. Public transportation systems are also greatly affected [11]. People's uneasiness regarding facilities and transportation could also lead to a further decline in urban vitality [12]. Therefore, advancing the progress of community spaces is a necessity. In response to the reduced demand for public transportation systems in the post-pandemic era and to considerations of economic sustainability, public transportation needs to be adapted to the situation [13]. People also need appropriately scaled public spaces to replace the private or intensive activities of the past [14].

Given the current situation in Japan, before COVID-19, more than half of the population went to places they could reach within 15 min, whether inside or outside [15]. In contrast, Yuasa et al. showed that the ways and reasons people used outdoor spaces changed after the pandemic [16]. People have become more concerned with the density of a place and its proximity to their homes. As a result, there was an increase in the use of spaces closer to previously inactive homes. Funabiki and Katayama also showed that the staying behavior and distribution of people in public open space (POS) increased slightly and became more homogeneous after the COVID-19 pandemic [17]. Gubić and Wolff showed that public green space (PGS) largely meets the need for PGS activities in residential areas [5]. The reconfiguration of PGS should ensure physical proximity and increased urban accessibility and inclusiveness. Takahashi and Fukuda suggested that the available range of "service areas" in parks is similar to that of libraries [6]. Therefore, the external space of public libraries may have the potential to replace or complement urban public space.

At the same time, Japanese public libraries are facing challenges posed by COVID-19. Reading needs and habits have changed since Japan became a highly computerized society. Research on the transformation of public library services to accommodate this change is currently underway. Library services have gradually shifted from lending services to program support services, and now to regional information bases. Although large central and academic libraries have certain functions, the service needs of regional public libraries are changing with the social environment, the role of libraries in cities is changing, and the relationship between libraries and cities must be reconsidered [18]. It is important to consider not only the functional connection but also the physical relationship in the information age [4]. Museums have been shown to contribute to urban sustainability in three ways: through education, historical heritage, and fostering a sense of trust in the community. As an equally important public cultural facility in the city, is it possible for a library to contribute to the sustainability of the city through external space, as architectural space is not easily adaptable, as the needs of the city change? If so, how can the external space contribute to the sustainability of both the public library and the city during the process of building a new or renewing a public library? This is the research question of this study.

1.2. Purpose and Significance

The objective of this study was to find strategies for the new construction or regeneration of public libraries that make better use of external spaces through theoretical discussions and analysis of the current situation. We expect more quality public spaces to be provided using the external space of public libraries in the post-pandemic era, in order to respond to the needs of the new era and the sustainable development of the city.

The discussion in this study provides a new perspective that is beneficial to both libraries as public buildings and cities, and both may have synergistic effects. In turn, the typological study of the external space of Japanese public libraries has reference value for subsequent practice. This will be valuable for other countries pursuing sustainable development in the post-pandemic era, and for the use of exterior spaces in other types of public facilities. This will provide a more flexible use of space in urban landscapes

worldwide to respond to the new demands of the post-pandemic era. At the same time, this research is an interdisciplinary research that includes public libraries, public space, and urban sustainable development. In this way, we can provide a new research angle and fill the research gap on the external space and environment of libraries.

1.3. Literature Review

Globally, libraries as social and cultural facilities are inherently relevant to the sustainability of cities, but they are more often discussed from the perspective of library information science (LIS) [19]. However, few libraries have researched their spatial identity and construction connotations [20]. In Japan, research on the relationship between libraries and cities has focused on determining the scope and locations of these services. Nakamura and Kurihara first proposed the ovoid sphere theory of the scope of library services [21]. This theory demonstrates that the scope of services is not the same in different directions of the library. Subsequently, Nakai proposed the concept of a two-level sphere [22], differentiating library distance-independent utilization from distance-based utilization. Nakamura's and Nakai's theories both explore the nature and scope of the library's function in the city from the library's perspective.

Libraries in various countries have introduced online services during the information era, and although many libraries have now reverted to in-library use, remote services are likely to persist [23]. In Japan, due to COVID-19, public libraries offered a range of offline services from March 2020 to October 2021. These included starting or expanding mail delivery services, temporary windows, mobile libraries, providing book collection services for social distancing, adding service points at nearby stations, expanding electronic and online services, providing sanitized or manual-free services, and the emergence of decentralized library service programs for the post-pandemic era [24]. Alajmi and Albu-daiwi also showed that sustained library services provided a rare sense of normalcy for communities during a pandemic [25]. However, at the same time, different views have emerged. Yazaki and Kurita proposed a reduction in the number of public libraries, arguing that libraries in partially depopulated areas should be eliminated and their collections distributed proportionally to other libraries in the area [26]. This argument was mainly based on economic considerations, which are one of the main problems that Japanese public libraries are currently experiencing. This is not the first time that scholars have proposed this idea. As early as 2004, Igari, Nakade, and Higuchi showed that library utilization in inaccessible suburban areas was affected by traffic, suggesting the development of linked facilities and centralized management [27]. Kim's study also proved that the attractiveness of libraries comes not only from materials or information, but also from spatial conditions, such as the relationship with the surrounding environment and accessibility [28]. Therefore, although libraries are necessary in cities, the sustainable operation of public libraries and their spatial relationship with the city is an issue that needs to be considered.

Several operational changes were implemented in Japan. In addition to the popular public-private partnership (PPP) and private finance initiative (PFI) systems [29], commercial public libraries have been created, such as those operated by Tsutaya, Inc. However, the introduction of commercial models as public goods into libraries is controversial. The introduction of market principles has achieved good results, but the resulting lasting adaptability and social risks cannot be ignored [30]. A neighborhood mostly accepts the commercial use of POS to increase the safety and vitality of the area [31]. Therefore, commercialization of libraries may be more acceptable if commercial activities are conducted in an external space, rather than in the library itself. However, there has been no discussion of this possibility. The discussion of the multi-functionalization of libraries in Japan is still limited to the interior of libraries.

Izumiyama et al. conducted a survey on the on-site use of public spaces in Japan [32]. They found that the number of activities occurring in plaza-type spaces was much higher than in access-type spaces. If indoor and outdoor spaces are considered, the total number of outdoor and semi-outdoor spaces would exceed 70%. Toki and Kaijima studied the use

of parking spaces in plaza-type parking lots at train stations, and found that parking spaces were used for various purposes [33]. Today, patrons of general libraries and individual libraries located near train stations prefer to travel by car rather than by public transportation [34]. Therefore, parking and access are required during business hours. However, as mentioned earlier, telecommuting offers opportunities in future urban development to promote walking and reduce private car trips. Gehl defined the types of outdoor spaces by classifying their use as necessary, operable, and social activities [35]. If public transportation or walking can be promoted, parking will no longer be a necessary activity for the library's exterior space, and there will be more opportunities to provide green or social spaces. This also requires the functional adaptation of the library itself. Indoor and outdoor spaces may have negative effects if they interact with each other, but if they benefit from each other, they may have a powerful activation effect [36]. Users who utilize functions within the building are potentially able to utilize external spaces, and vice versa.

Overall, this study introduces an urban sustainability perspective based on previous research. However, it is focused on exploring the potential of the external space of public libraries for urban sustainability. In this study, we re-examine the role that public libraries can play in cities not only from the library perspective, but also from the city perspective. This allowed us to break away from the limitations of the traditional public library service scope and discuss new possibilities. How traditional public facilities can meet the new needs of cities is particularly important in the post-pandemic era.

2. Materials and Methods

2.1. Methods and Definitions

In order to determine whether the external space of public libraries has the potential to contribute to the sustainable development of the city, and to find strategies for new construction or renewal, we conducted this research in three phases.

1. Collect and explore literature from various fields to discuss the potential and feasibility of using the external space of public libraries in Japan from a theoretical perspective, and the role this could play in the sustainability of the city.
2. To understand the current state of external space through case studies.
3. To discuss feasible strategies for regenerating the external space of libraries in relation to the theoretical and current situation.

The case studies selected for this study were from excellent libraries selected by the Japan Library Association every year since 1985. All 47 public libraries were designed to meet the needs of their era, which helped us find temporal information and was more representative.

However, the definition of external spaces mentioned in this study remains to be determined. Regarding the method of analysis of the cases, Kawanami and Oi's study defined two types of continuity: continuity of internal and external spaces, and continuity of external spaces and the external environment [37]. We followed the definition of external space and external environment used by Kawanami and Oi. That is, the internal space refers to the interior of the building. The external space refers to the space between the building and the boundary of the site. The external environment refers to the urban space outside the site [37].

2.2. Case Selection and Distribution

Since 1985, the Japan Library Association has been awarding architectural prizes annually. The scope of coverage includes all public libraries in Japan. This includes 47 city, town, and village libraries on a city scale. These 47 libraries span 39 years, from 1980 to 2019. As stated in Section 2, these libraries represent the excellent architecture of their era; therefore, the architecture and space of these cases are representative from a timeline perspective. Basic information for this case is presented in Table 1.

Table 1. Basic information on the library cases.

Year of Completion	Library Name	Building Foot Print (m ²)	Site Area (m ²)	Building/Site	Capacity of Book Storage
1980	Hino City Takahata Library	583	1086	54%	60,000
1982	Joso City Public Library	1231	4066	30%	80,000
1983	Urayasu City Central Library	2953	5296	56%	200,000
1983	Okayama City Central Library	2952	9143	32%	800,000
1983	Kura City Central Library	1400	14,819	9%	400,000
1983	Tendo City Library	1873	4292	44%	180,000
1984	Izumo City Central Library	2017	4812	42%	170,000
1984	Higashitamato City Central Library	1440	23,042	6%	188,000
1985	Urasoe city library	1782	4252	42%	300,000
1985	Yokaichi Public Library	1363	7596	18%	150,000
1986	Fujisawa City General Public Library	2471	4726	52%	350,000
1986	Komagane City Library	991	9836	10%	100,000
1987	Musashino City Kichijoji Library	603	864	70%	75,000
1987	Urayasu City Central Library	1741	6582	26%	150,000
1989	Fujinomiya City Central Library	2006	4723	42%	376,000
1989	Isehara city library	2921	3889	75%	220,000
1990	Tottori Prefectural Library	3035	29,681	10%	1,141,000
1990	Sanda City Library	2082	5630	37%	180,000
1990	Ishigaki City Library	2264	6329	36%	250,000
1992	Eniwa Public Library	2610	9520	27%	292,000
1993	Hekinan City Library	5425	10,927	50%	400,000
1993	Nakatsu City Obata Memorial Library	2385	5644	42%	110,000
1994	Ichikawa City Central Library	6164	11,012	56%	1,094,000
1994	Odawara City gull library	3627	9112	40%	170,000
1995	Imari Public Library	4054	7692	53%	300,000
1998	Chikusei Public Library	3558	7835	45%	316,000
1999	Usa Public Library	2580	7156	36%	210,000
2000	Ishikari City Library	3466	9000	39%	300,000
2001	Chiba City Central Library	3975	12,775	31%	1,125,000
2003	Izumo City Hikawa Library	2781	10,393	27%	168,000
2005	Hakodate City Central Library	5143	11,707	44%	730,000
2005	Akiruno City Eastern Library L	920	1721	53%	101,000
2006	Itako Public Library	2585	11,771	22%	186,000
2007	Nigata City Central Library (Hoponto)	4556	9914	46%	458,000
2007	Umi Town Library	4065	13,093	31%	140,000
2008	Kita City Library	2699	5725	47%	414,000
2009	Obuse Library Machitoshō Terrasow	998	10,511	9%	49,000
2011	Kanazawa Umimirai Library	2112	11,763	18%	400,000
2014	Seiro Township Library	2606	15,448.00	17%	200,000
2015	Yachiyo City Central Library & Public Gallery	3500	12,073	29%	460,000
2016	Fumi-no-Mori MOTEGI Library	2977	6414	46%	125,000
2017	Taketa Municipal Library	1239	2800	44%	137,000
2017	Anjo City Library	2403	6914	35%	450,000
2018	Yusuhara Community Library	1170.5	3088	38%	90,000
2018	Otepia Kochi Library	4216.26	6606	64%	2,050,000
2019	Tette Sukagawa Civil Exchange Center	4877	7724	63%	237,000
2019	Nagahama City Public Library	2728.7	7377	37%	300,000

As shown in Figure 1, the distribution of public libraries in Japan is consistent with the distribution of Japan's high-density population. This further illustrates the need to activate the external space in libraries. The distribution of award-winning public libraries is more consistent with the distribution of public libraries in Japan. These libraries encompass a variety of situations, with variability in operations, size of space, and volume of books in stock. This helped us to discuss more general issues. Therefore, these 47 libraries were used as case studies.

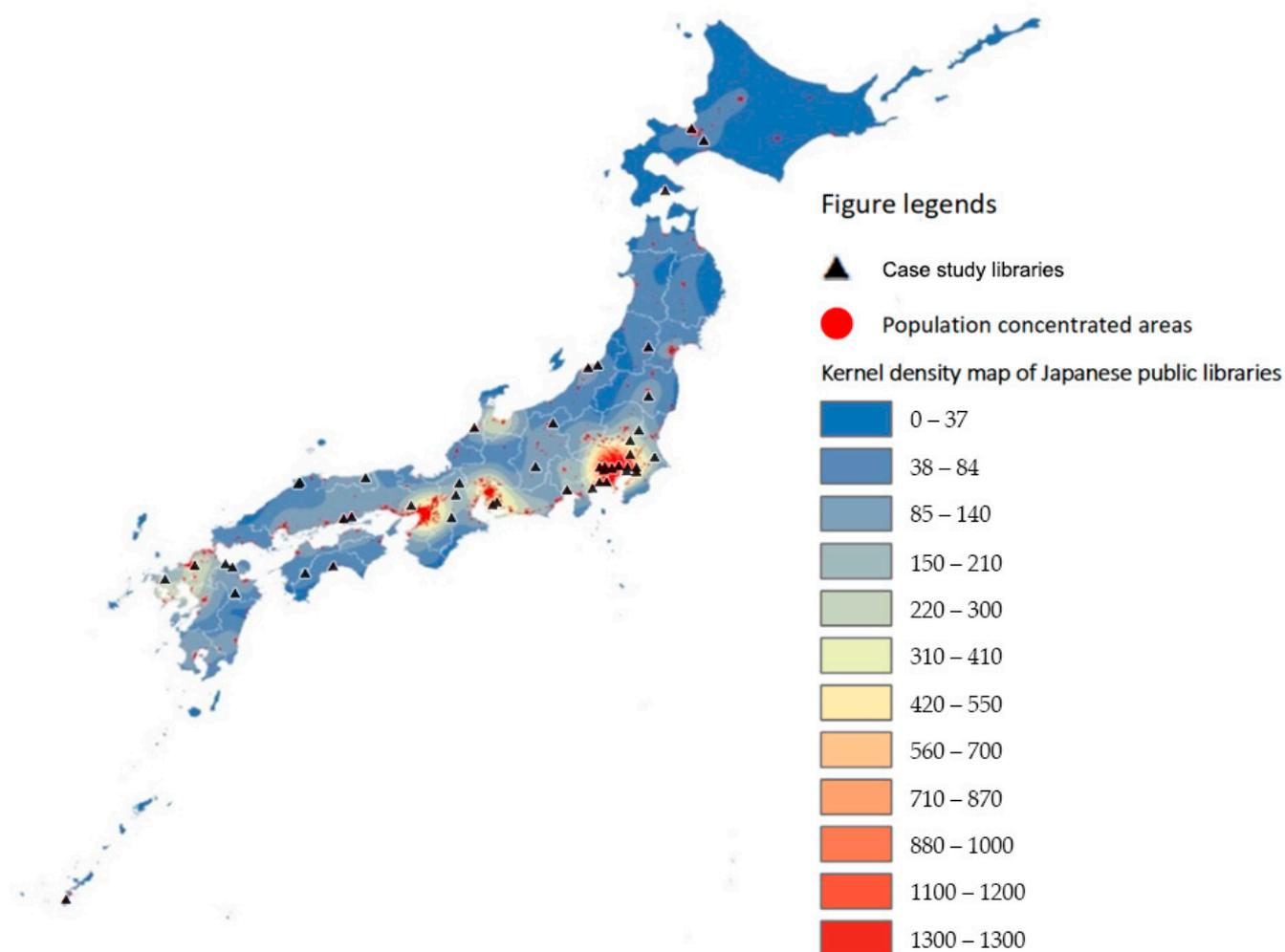


Figure 1. Kernel density map of Japanese public libraries, showing population concentration with the case study libraries in Japan (produced by authors).

2.3. Data Collection Process

The data collection in this study consisted of three main components (Figure 2).

1. Information collection for the case building was divided into two periods. Information from 1980 to 2006 was well documented in a collection of works published by the Japan Library Association (JLA) [38]. Basic information for 2007–2022 needed to be collected through multiple channels, such as the official websites of the libraries or the official websites of the design firms.
2. The survey of the external space and environment of Japanese public libraries was jointly completed through Google Earth, the map of the National Geological Institute of Japan, and Google Street View. Accuracy was ensured through multiple verifications.
3. The investigation of the external space elements of the library was mainly completed through Google Earth and Google Street View. We reached out to the libraries where we could not see the external spaces using Google Maps or Google Street View, and the librarians provided photos of the space but did not authorize for these to be made public. If no librarians responded, we conducted fieldwork in person.

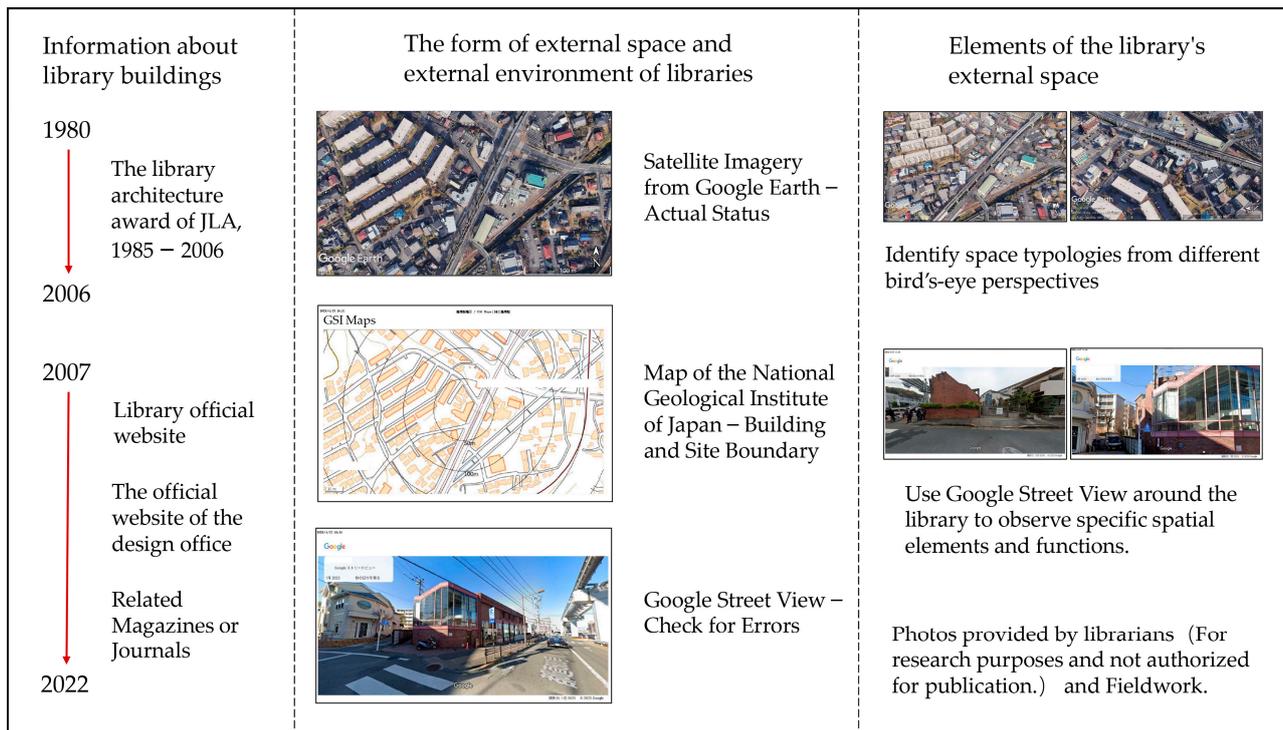


Figure 2. Data collection process (produced by authors).

3. Results

This section is divided into two parts. The first part discusses the potential of the external spaces of Japanese public libraries in urban sustainability, and the second part is a spatial analysis of the external spaces of the libraries.

3.1. Potential of External Space for Urban Sustainability

The external spaces of libraries as urban landscapes or public spaces are not the same as traditional public spaces, such as single-function parks or squares. Because these spaces still belong to the library, they are still library spaces rather than completely open spaces in the traditional sense, both in terms of spatial properties and management. Therefore, the possibility and feasibility of the library's external space are largely influenced by the characteristics of the library itself. The relationship between libraries and cities needs to be discussed. In other words, this part of the discussion also explored the problems that could be solved for the city when the external space of the library exists as a medium between the library and the city, or as an urban landscape or public space.

Different facilities have different needs for distance. Once the distance from the library exceeds 4 km, the satisfaction rate drops to less than 80 percent, similar to museums and civic halls [39]. Clearly, in this case, the external space of the library was not sufficiently densely distributed in the neighborhood park. Therefore, even if it is possible to join a park system, it is necessary to identify the unique characteristics of the library.

In recent years, new libraries such as the Yachiyo Central Library have begun to co-locate with art museums and organize cultural activities together. Art museums are already trying to connect with surrounding society in external spaces [40]. If the external space of the library can also be joined to this, it would not only improve the efficiency and diversity of the use of the individual spaces, but 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 [41]. The external space of cultural facilities is similar to that of low-use land, and is a public space that is different from a park. Together, they form a system of public spaces that can better export culture to the city.

Library buildings have changed over the years from their original serious images. Moreover, public libraries are not just spaces that provide books or a quiet place; they are also spaces that provide a diverse range of information and a place for communication. Their essence lies in education and the exchange of information [18]. Changes in libraries are also reflected in the changes in these buildings, which often now have a highly transparent skin, such as the Kanazawa Umimirai Library or the Yusuhara Community Library's unique wooden form, which reflect the meaning of shared space. The operation model may even now be a relaxed space that incorporates a commercial model, such as in the Takeda City Library. Therefore, there is no need for a square exterior space to support the 'seriousness' of libraries. The semi-externalization of interior spaces has also increased and is shown to the city [42]. Combining the characteristics of these buildings to provide better quality public spaces not only fits the needs of today's libraries, but also serves cities better. One of the simplest ways to achieve this is to add seating to the exterior space. Tooya et al. demonstrated that the presence or absence of seating has a significant impact on crowd retention in different seasons [43]. With the increase in reading styles and media, outdoor seating spaces can stimulate more diverse activities.

Seta et al. illustrated that exterior architectural spaces and plants in residential areas can increase the perception of a sense of life [44]. Public libraries are also an important part of the sense of normalcy in the city [25]. Thus, if more green elements can be incorporated into the exterior space of a library, this could significantly improve the sense of community life. The sense of normalcy has become increasingly important in the post-pandemic era. The current distribution of public libraries in Japan, especially local community libraries, may provide more opportunities for movement. Currently, small- and medium-sized libraries are mostly accessible by car [45]. 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 to indoor spaces. It is also likely to be possible to further improve the utilization if a space for sitting is added to the external space. The availability of sitting space is also a major consideration when people choose to walk [15]. In this way, the utilization of a library and its efficiency as a public space could increase, and it could also increase the odds that people in the area will walk. Reducing carbon emissions while increasing the opportunity to exercise may improve the health of the region.

Another critical factor when discussing urban issues is the advanced age and young child populations. Family use of libraries is important [45]. Therefore, it is important to guide children towards using libraries. However, children require sufficient outdoor space [16]. The need for multifunctional and intensive children's spaces is even more important in today's world, which has fewer children. The combination of these two factors is particularly important. Many of the innovations in library activities today are also made in conjunction with the surrounding schools. However, most of these activities occur in school spaces, and are limited to classrooms and other environments. If a library has an outdoor space that can be used, there may be more possibilities for activities in combination with its internal functions. This could also be a complementary educational space at certain times, such as during pandemics.

The current usage pattern of libraries is that all age groups tend to use them alone, except for parents and children who go together. The ability to access transportation determines whether the elderly and students use libraries in the community [46]. Surveys have shown that older people and students use libraries on weekdays, while young people mostly go on weekends, because libraries are typically closed on weekday evenings [46]. This reduces the possibility of intergenerational communication. The public places most frequently used by families or friends are now restaurants, and the percentage of families who use the library is the smallest of multiple public places [47]. A higher percentage of households use restaurants because there is a high degree of overlap in how and when restaurants are used in all age groups [47]. However, the opposite is true for libraries. There are two ways to solve this problem: increase the variety of functions or extend opening hours.

In terms of variety, complex libraries are utilized more often of the libraries with similarly sized collections [48]. Thus, diversity can increase library utilization. The three main reasons why people do not use libraries are buying their own books, distance, and limited opening hours [45]. Many library activities cannot be fully implemented because the act of reading or studying itself still requires a relatively quiet space, so although new libraries have more space for communication, there is still a degree of limitation. Space constraints are more prevalent in small and medium-sized public libraries [49]. In Kitamura's study, more than three-quarters of seniors felt it was necessary to have a place to stay outside their own homes [50]. Less than one in ten of these seniors chose a public facility. Elderly people need to go out at times, but they do not tend to choose public facilities, which shows that the need for communication spaces for the elderly has not been met. Hino and Ishii's study also demonstrated that proximity to a place that is walkable is the highest priority when choosing a place to live, and that libraries, while popular with the elderly, do not offer social attributes [51]. Therefore, the problem of lack of public activity or communication spaces for the elderly can be solved by providing sufficient space for communication outside of this space.

In addition, quality outdoor spaces do not have the time constraints of libraries. Inside spaces often have closing times that overlap with work hours for security reasons, as well as the limitations of librarians' work hours. However, spaces outside the library need not be closed or managed. Increased opening hours increase the possibility of a crossover between populations, which, in turn, promotes intergenerational exchange. In summary, libraries with external spaces related to library functions can be open to the public for extended hours. It is possible to promote communication for both the elderly and their children, and even for families. This can also improve the efficiency of library use.

The influence of the library cannot be ignored, as it is the external space of the building. The role of outdoor spaces as places of communication is obvious [16]. Visualization of communicative activities in public spaces is an important part of creating a place of communication [52]. A major difference between libraries and bookstores nowadays also lies in this. It is not that the façade of a library is closed, but that the curtains are mostly closed during the course of use, whether for privacy and quiet, or for the protection of the books. However, a bookstore is open, and the reading behavior in the store can be visualized. This closed nature has been improved in new, large libraries, where the transparency and visibility of behavior are much higher. However, it does not penetrate outside. Showing activities to the city is one of the potential uses of a library's external space. Reading and communicating outdoors, so that people in the city can visualize the activities of the library, could attract more people to the venue, thereby increasing library utilization. The relationship with the street must be considered when designing the site and organizing an event, as this affects the extent to which the event can be presented.

In summary, it is hoped that today's opportunities will simultaneously enhance the sustainability and resilience of libraries and cities from multiple perspectives. However, when it comes to how exactly to implement this spatially, it requires a macro understanding of the external space of the library.

3.2. *Spatial Analysis of External Space*

3.2.1. External Space Elements Composition

The exterior spaces of Japanese public libraries are not complicated in terms of spatial composition. All the cases contained 11 elements (Figure 3). According to the results of the survey, all libraries had bicycle parking, and most of them had car parking. Parking, landscaping, and entrance plazas are the three most frequently occurring elements. Grasslands and wastelands were not included in the landscape category because of their different degrees of freedom of reuse. The term landscape here refers to designed natural or man-made landscapes. It also includes parts of the landscape within the roof space. Therefore, we concluded that the exterior space of the current Japanese public library is

still mainly used as a parking lot, although the landscape is considered, and some space is reserved at the entrance.

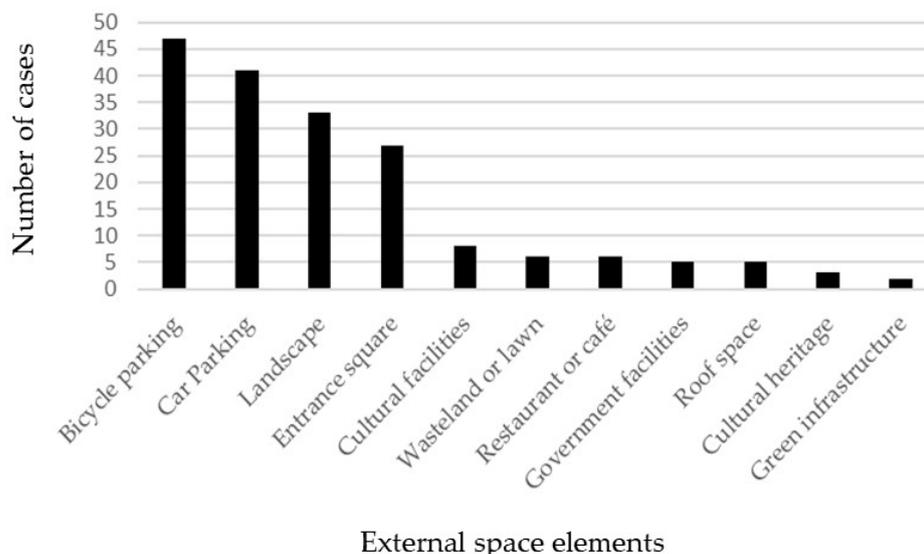


Figure 3. Library external space composition (produced by authors).

Do libraries have enough external space for us to use? From the statistics, it was found that in 37 out of 47 cases, the building of the library accounted for less than 50 percent of the total area of the site (Figure 4). Fourteen libraries had less than 30 percent building area. This showed that the majority of libraries have external spaces of sufficient size that could be used. The next step was to determine whether the current type of space can be utilized for diverse applications.

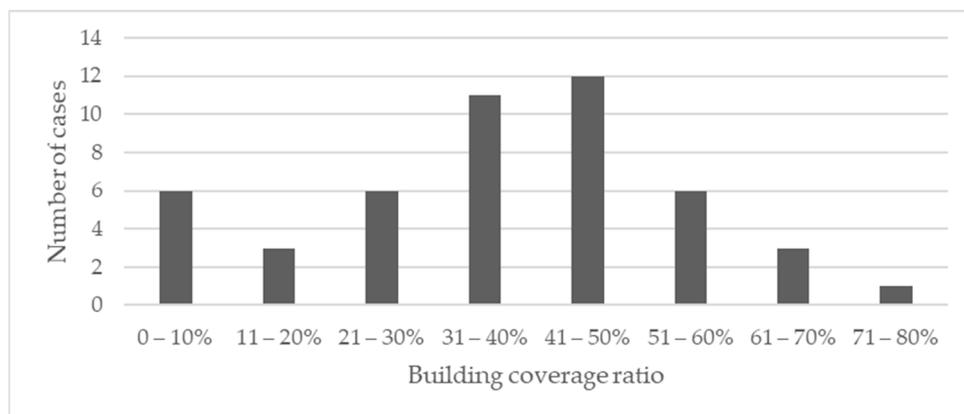


Figure 4. Building coverage ratio (produced by authors).

3.2.2. External Space Form

We conducted a figure-ground analysis of the external spatial form and site surroundings of the 47 case libraries (Figure 5). The purpose of the figure-ground analysis was twofold.

1. To determine the spatial relationship between the external space of the public library and the building.
2. To determine the spatial continuity between the external and external spaces.

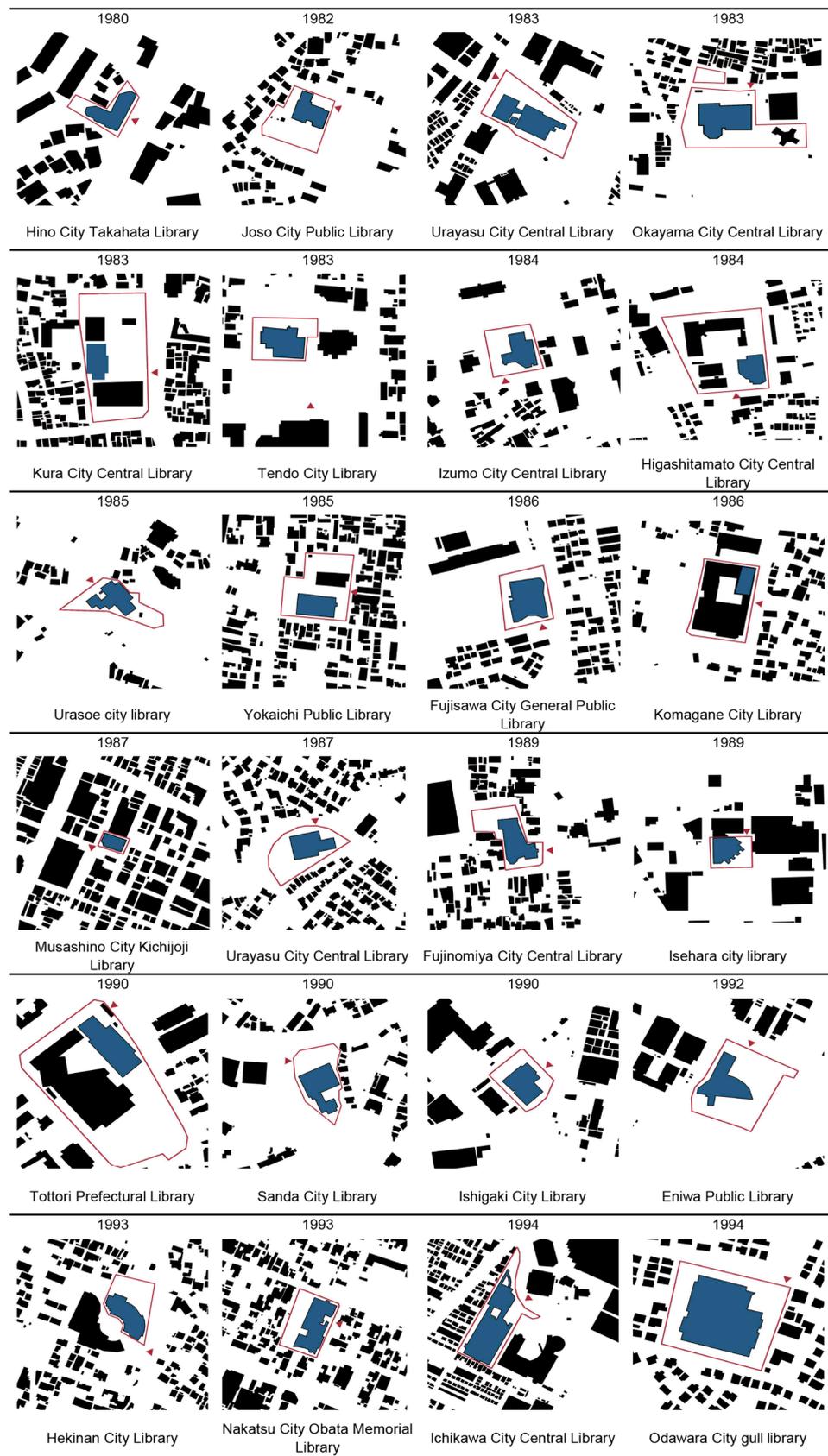


Figure 5. Cont.

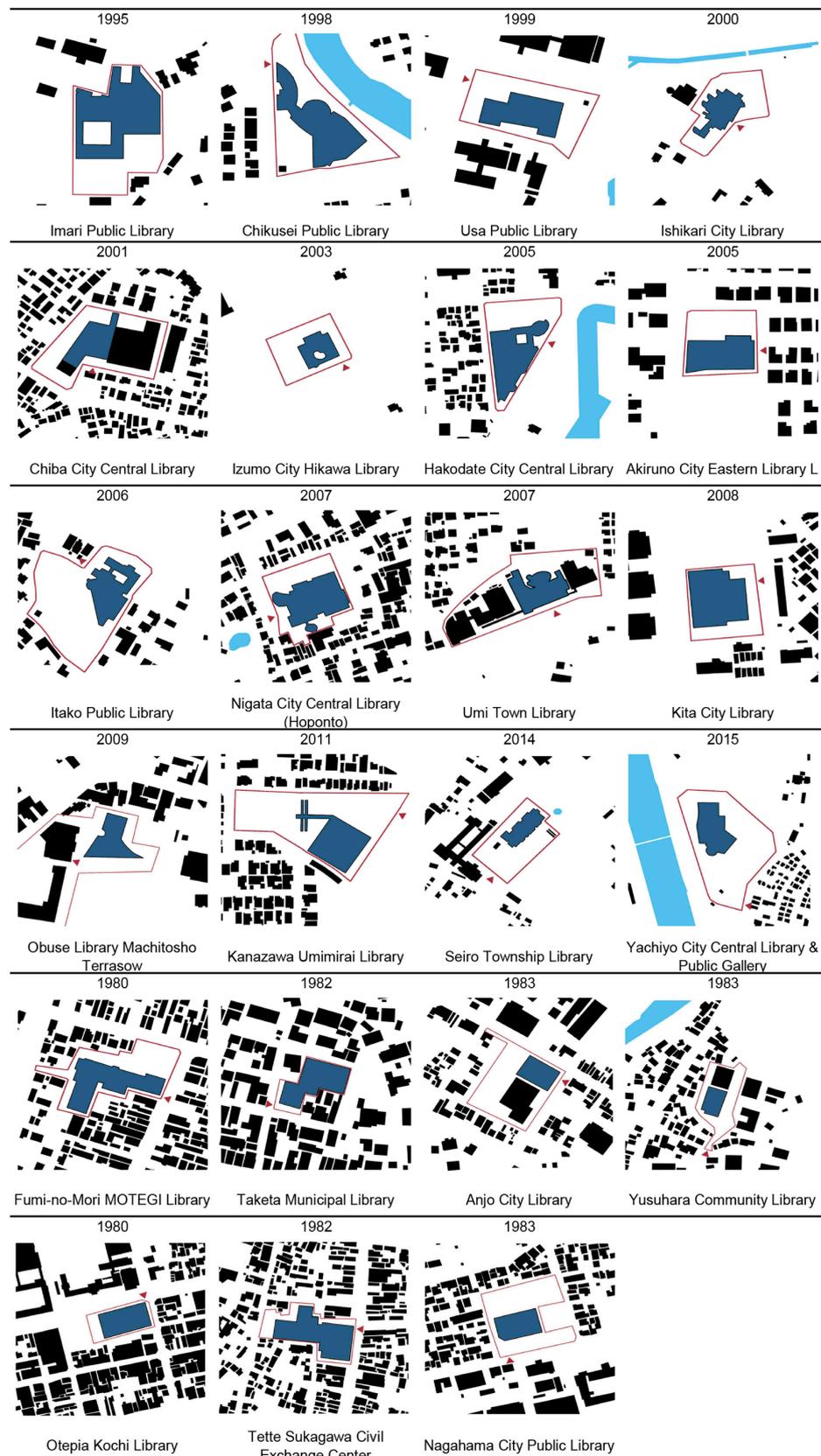


Figure 5. Figure-ground analysis (produced by authors).

After a typological analysis of the library’s external space, the following patterns were found. Among these, enclosed spaces were the most numerous, and the majority of libraries had external spaces in multiple directions. Twenty percent of libraries had public spaces on only one side, most of which were on the library’s main entrance side. Twenty-four percent of exterior spaces were more complex, including atrial or single-sided spaces on opposite sides. Only one case has external space in the atrium only and no external space around it.

After considering the continuity with the external environment, several typical types of external spaces were identified (Figure 6). Thus, we can see that the degree of openness in the external environment influenced the installation of external spaces. For example, when there was no blocking around a library, there was often sufficient space around the library. When the surrounding area was completely blocked, the library also had some space around it, but more often there was sufficient public space on the main entrance side. The total absence of external space was observed only when the surrounding environment was completely or mostly blocked.

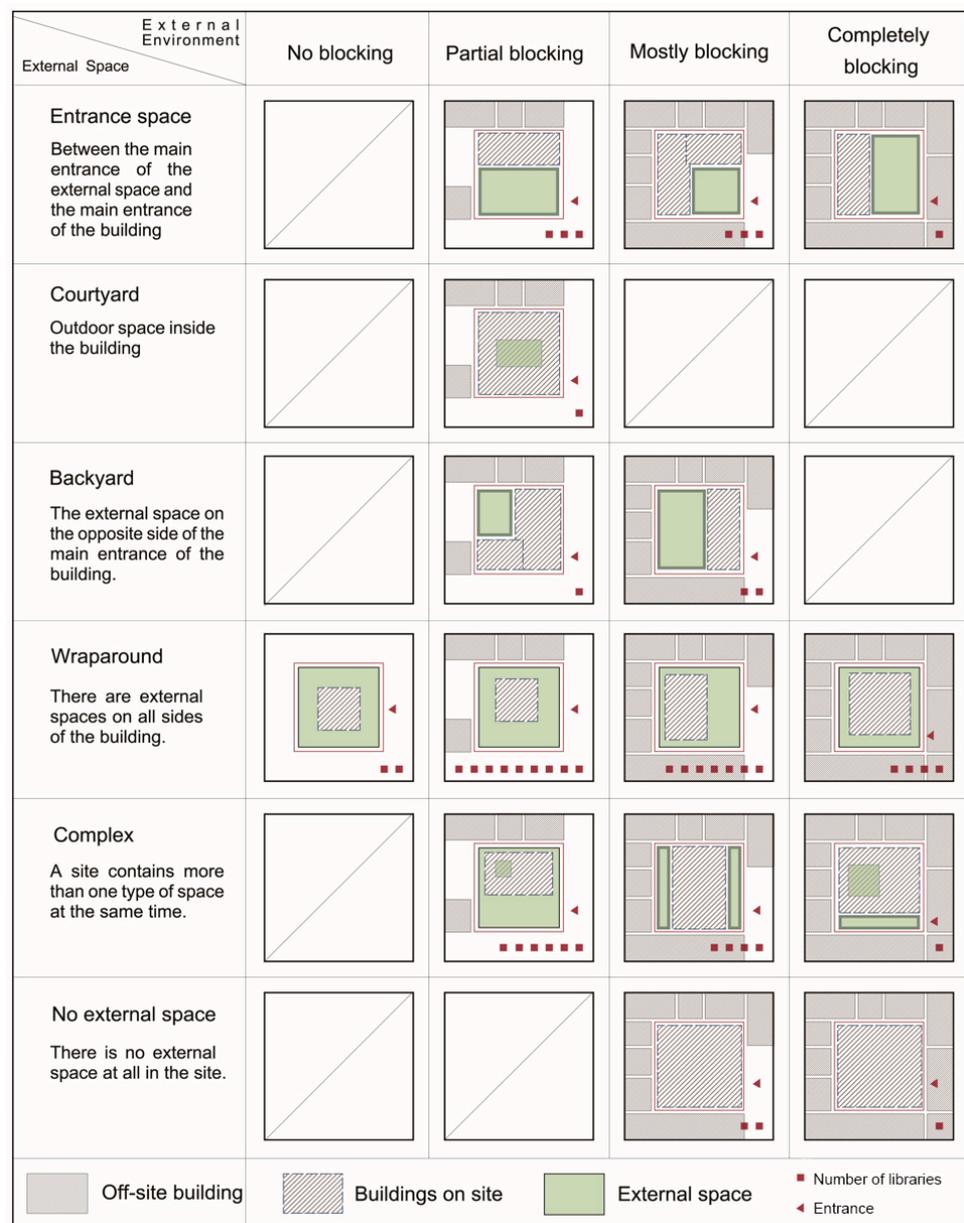


Figure 6. Types of external space in public libraries (produced by authors).

The percentage of the “Mostly blocking” type and “Partial blocking” type was the highest among all the cases. The most common space types in both cases are wraparound spaces and complex spaces. The size of the wraparound space also varied in different directions, usually with more on the entrance side. The complex type consisted of three modes. One was the combination of a single-sided space with an atrium, another was the combination of a wraparound space with an atrium space, and the last was a non-interoperable space on each side of the library building (Figure 7).

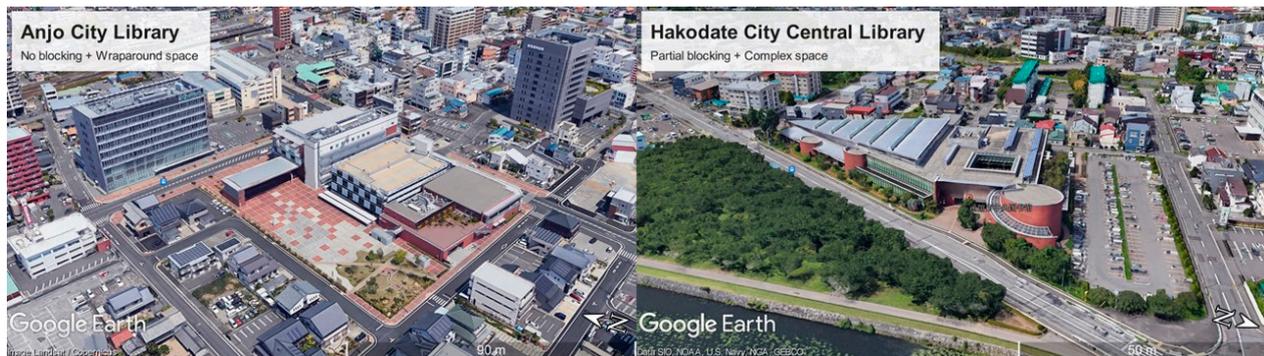


Figure 7. Representative cases of wraparound type and complex type.

However, in high-density urban areas, even three sides facing the street may not allow enough area for external space. In low-density areas, there may be plenty of exterior space, even with only one side facing the street (Figure 8).



Figure 8. Representative cases of libraries at different urban densities.

Therefore, libraries in some high-density areas use roofs to achieve greening. However, this does not mean that green roofs only appear in high-density areas. The roof also serves as a semi-outdoor space to gather people in some libraries (Figure 9).

When a library is part of a complex, it often has external spaces that are shared with other facilities that are generally not small in size. However, there are also some libraries that are co-built with other facilities, but the external space is completely separated from that of the other facilities (Figure 10).

In addition, although some libraries have little external space, they make good use of the external environment. For example, they may use the surrounding landscape as a viewing point or use the surrounding park or culture landscape as an extension of the library. Some libraries also set up ornamental landscapes in sites when there is sufficient external space (Figure 11).

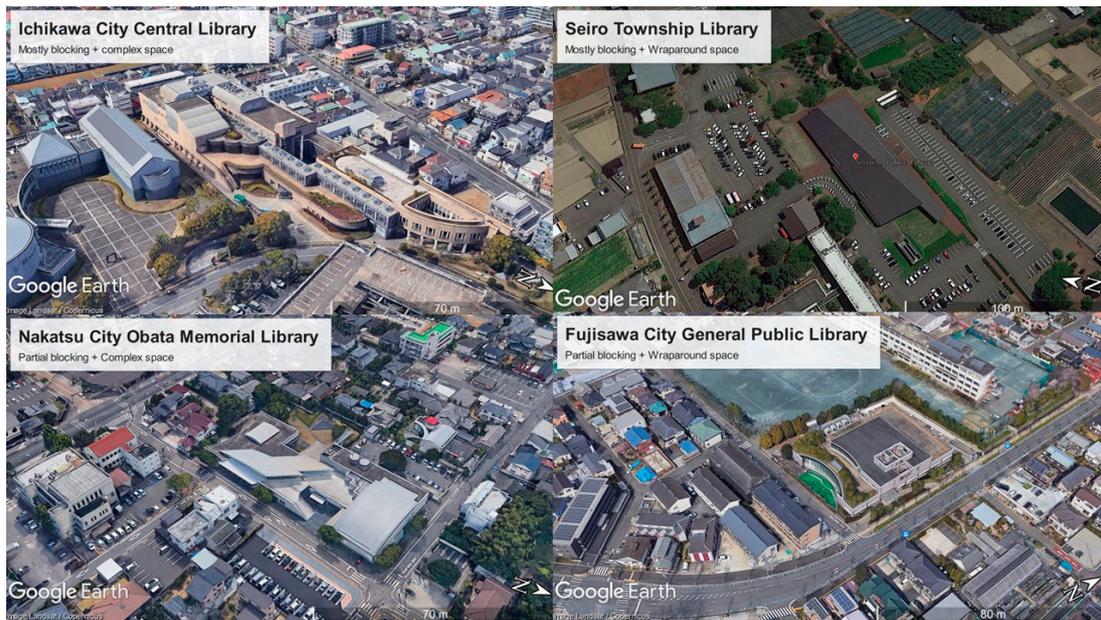


Figure 9. Representative cases of different roofs.



Figure 10. Representative examples of libraries in different complexes.



Figure 11. Representative cases of libraries with landscaping.

4. Discussion

From the results in Section 3, we can see that, although the external space of Japanese public libraries is relatively adequate, it is currently underutilized. One reason for this is because of parking restrictions; most of the space is currently used only as parking lots. The service radius of public libraries in Japan can accommodate public transportation and walking, but the popularity of cars and the different sizes and ages of venues affect people's choices [45]. Therefore, the external space of the library could increase the participation of walkers and integrate this into the neighborhood, as described previously, reducing the use of vehicles. We would like to promote the idea of choosing to utilize the two-layer circle proposed by Nakai [22], wherein a virtuous circle is created. An increasing amount of space can therefore be used to provide activities rather than parking.

Another serious problem that libraries face today is declining funding [53]. If libraries are to be sustainable, they must also be economically sustainable. If possible, support should also be provided to the surrounding businesses to complete the economic cycle. The PFI and PPP systems in recent years have improved financial problems and applied more flexible operating models [29], but they have not changed the trend of declining library utilization [53]. While the proportion of individuals who visit libraries is not low, the proportion of those who visit bookstores is the highest among all public spaces in Japan [47]. The commercialization of libraries has been successful, but controversial [30]. Thus, the bookstore business model cannot be substituted directly into libraries.

For example, food and beverage functions, which are believed to affect traditional library functions, can be performed in an outdoor or semi-outdoor space so that the noise, smell, and possibility of dirtying books can be avoided. As mentioned earlier, small and medium-sized public libraries lack available internal space for such ventures [49]. However, they may have available external space. As shown in Figure 4, there is still a lot of space left outside the libraries, and there is a relatively large possibility of using it.

The specific business model for the use of external space refers to the industry–government–academia linkage approach that is often mentioned in Japan today. By gradually developing activities—initially holding tentative activities and adapting to the environment—and by using social resources such as research funds [52], it is possible to slowly build activities in the library and develop user habits.

In summary, libraries' external spaces can be considered as a new cityscape or public space. If the external space of libraries can be used effectively, it could solve some of the problems of vitality and sustainability of urban spaces in Japan or other countries with a certain level of library coverage. The use of external spaces can also have a positive effect on the use of libraries. This is even more valuable for countries that do not have sufficient libraries. By designing the external space as part of the city when building a new library, the space can be used more efficiently and be better integrated with the city.

Finally, we proposed six strategies for the renewal of the library's external spaces (Figure 12). These six strategies include proposals for new construction, renewal, and management of libraries and external spaces. We aim to promote both the sustainability and resilience of Japanese public libraries and cities. The six strategies are only guidelines for new constructions and renewals, rather than detailed design solutions. Each of these strategies corresponds to a different space and needs to be adapted to each situation. New libraries can be designed freely, but renovation needs to be based on the existing spaces. The following is an explanation of our proposed strategies.

1. Enhancing the library's interaction with the city by increasing the transparency of the facade. The ability to see the activities inside the library enhances the sense of normality and increases the vitality of the city. This could attract more users to the library.
2. Use external spaces as urban public spaces. External public spaces in libraries can help increase the possibility of intergenerational communication and provide social space for work-at-home residents. For the library, public spaces provide the possibility of business opportunities. In the post-pandemic period, Japan changed from a model of

unipolarity and local decline in Tokyo to a model of multi-point networks [54]. There are more opportunities for piecemeal businesses in communities now. Semi-outdoor space close to the entrance is often suitable for hosting social activities.

3. Provide seating in the exterior space. Outdoor seating adds resilience to the city while extending the service hours of public libraries. Seating can be installed in all directions of the library and can support different types of activities depending on the location.
4. Provide outside spaces to support work, meetings, and education. The post-pandemic era has led to public libraries performing new functions as information exchange centers. Libraries must be prepared for the era of online work and learning. Because work and meetings require a certain level of privacy, they are better suited to atrium, backyard, or rooftop spaces. Off-line activities can also help the library [55].
5. Events in exterior spaces are an extension of public libraries' activities and can be used as a medium to better communicate the library's impact on the city. Events in public spaces could be useful for attracting potential users and activating cities. Display activities are more appropriate at the interface with the city, particularly in the entrance spaces.
6. Including more green spaces in external spaces. Intensive cities require additional functional public facilities. At the same time, in the post-pandemic era, there is also a need to provide more green spaces at the community scale to meet residents' health needs. In addition to improving the reading environment, green spaces can also inject more vitality into the library from crowds attracted by the landscape. If there is insufficient space for landscaping at the site, the surrounding green resources can be maximized.

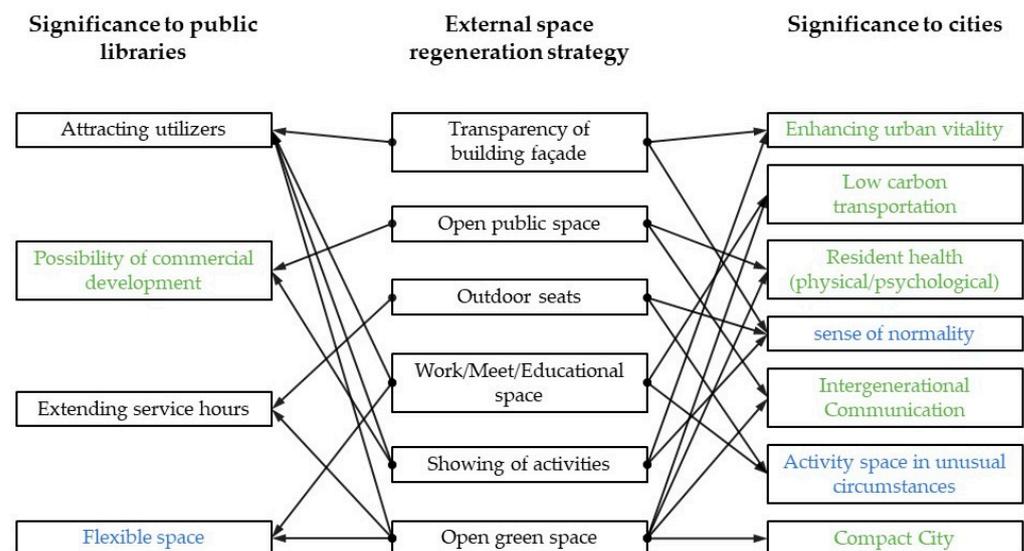


Figure 12. Regeneration strategies and significance.

Mumford introduced the concept of a social city as a sparse, polycentric development structure [56]. Japanese public libraries that increase the diversity and number of activities through external spaces can not only increase utilization, but also have a more sustainable development structure and build resilience. This is important in the post-pandemic era, as it is important to maintain a sense of urban life in a context where both the economy and the lives of residents have been greatly affected and constrained. Libraries promote the unification of administrative and civic functions, which can be further enhanced by having stronger connections to the city through these external spaces.

5. Conclusions

This study examined how the external spaces of public libraries in Japan can contribute to the sustainability of cities in the post-pandemic era. First, through cross-sectional

discussions, we determined that public libraries' external spaces have the potential to enhance urban sustainability. If the external spaces of libraries can be used effectively, they may be able to solve some of the problems related to the vitality and sustainability of urban spaces in Japan or other countries with a certain level of library coverage. These include the diversified services of the famous Oodi Library in Finland, and other libraries in Finland have also committed to undertaking more activities for residents [57]. Our survey of the exterior spaces of 47 representative public library cases in Japan verified that parking lots occupy a large portion of the current exterior spaces of public libraries, and that parking lots could be more flexibly used in the post-pandemic era. In fact, there is already precedence for the use of parking lots as public space [58]. Subsequently, we summarized several patterns based on the external spaces and environment of Japanese public libraries. Finally, we proposed six strategies and their suitable external space types based on the previous discussion and the case study results. Libraries preserve and provide a special space in the city that is irreplaceable [59]. These strategies could be used to improve the sustainability of cities while also promoting the sustainable development of public libraries. Ultimately, a synergy between public libraries and cities can be achieved.

These models and strategies fill a gap in the study of external space patterns of public libraries in Japan and provide a reference for future new construction or renovation projects. However, this study has some limitations. The urban–rural divide is also an important influencing factor [60]. New technologies in cities bring new management possibilities such as drones, which can capture the utilization of parking lots and adjust them in real time [61]. These considerations will be addressed in the next phase of our work.

Author Contributions: Conceptualization, T.Z.; methodology, T.Z.; software, T.Z. and J.J.; validation, K.I. and T.K.; formal analysis, T.Z.; investigation, T.Z.; resources, T.Z.; data curation, T.Z.; writing—original draft preparation, T.Z.; writing—review and editing, K.I. and T.K.; visualization, T.Z. and J.J.; supervision, K.I. and T.K. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Moglia, M.; Frantzeskaki, N.; Newton, P.; Pineda-Pinto, M.; Witheridge, J.; Cook, S.; Glackin, S. Accelerating a green recovery of cities: Lessons from a scoping review and a proposal for mission-oriented recovery towards post-pandemic urban resilience. *Dev. Built Environ.* **2021**, *7*, 100052. [[CrossRef](#)]
2. Glackin, S.; Moglia, M.; Newton, P. Working from home as a catalyst for urban regeneration. *Sustainability* **2022**, *14*, 12584. [[CrossRef](#)]
3. Barbarossa, L. The post pandemic city: Challenges and opportunities for a non-motorized urban environment. An overview of Italian cases. *Sustainability* **2020**, *12*, 7172. [[CrossRef](#)]
4. Kawaguchi, T. The Development of telework in Japan and its geographical implications. *Sundai Hist. Rev.* **2020**, *170*, 105–139.
5. Konagaya, K. Urban structure and urban industries in the age after/with COVID-19: The third way policy. *Urban Manag. Res.* **2021**, *1*, 47–72.
6. Ota, C.; Minai, N. Changes in community bus usage and living environment during the COVID-19 pandemic. *Rep. City Plan. Inst. Jpn.* **2022**, *21*, 71–74. [[CrossRef](#)]
7. Ichinose, T. From walking for health to building sustainable cities. *IATSS Rev.* **2022**, *47*, 22–32.
8. Miyahara, M.; Tsukuda, H. A study on workspaces environment during teleworking from home. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2021**, *86*, 2541–2548. [[CrossRef](#)]
9. Kondo, N.; Tanaka, K. Impact of spatial realignment of community streets on traffic calming and promotion of physical activity. *J. City Plan. Inst. Jpn.* **2022**, *57*, 1295–1300. [[CrossRef](#)]
10. Campisi, T.; Basbas, S.; Skoufas, A.; Akgün, N.; Ticali, D.; Tesoriere, G. The impact of COVID-19 pandemic on the resilience of sustainable mobility in Sicily. *Sustainability* **2020**, *12*, 8829. [[CrossRef](#)]

11. Hasegawa, D.; Eom, S.; Nishihori, Y. Change in public transportation accessibility and relationship with floating population change pattern. *J. City Plan. Inst. Jpn.* **2022**, *57*, 1281–1287. [[CrossRef](#)]
12. Suzuki, Y.; Yamazaki, M.; Mimura, Y. The Study on the relationship between going-out activities and stress/a sense of purpose in life in the COVID-19. *J. City Plan. Inst. Jpn.* **2022**, *57*, 1164–1171. [[CrossRef](#)]
13. Sugama, A.; Okumura, M. Sustainable network redesign of transit service in urban outskirts. *J. City Plan. Inst. Jpn.* **2021**, *56*, 865–872. [[CrossRef](#)]
14. Fang, Y.; Yoshimura, Y. Case studies of temporary urban intervention in public spaces during COVID-19: Strategy for freedom and control. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2023**, *88*, 180–190. [[CrossRef](#)]
15. Mori, R.; Hashimoto, K. Research on the characteristics of choosing a place to stay in public space. *Man-Environ. Res. Assoc. J.* **2018**, *21*, 37.
16. Yuasa, K.; Song, J.; Izumiyama, R.; Miura, S.; Murakami, S. Trends in outdoor space usage under the influence of COVID-19 infection. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2021**, *86*, 2677–2688. [[CrossRef](#)]
17. Funabiki, E.; Katayama, I. Impact of “new lifestyle” on the stop/stay action of users of public spaces: JR Osaka Station Atrium Square as the subject. *AIJ J. Technol. Des.* **2021**, *27*, 1379–1383. [[CrossRef](#)]
18. Zang, T.; Zhou, T.; He, X.; Yang, X.; Ikebe, K. Rethinking Japanese public libraries from the perspective of time. *Sustain. Cities Soc.* **2022**, *87*, 104222. [[CrossRef](#)]
19. Kamińska, A.M.; Opaliński, Ł.; Wyciślik, Ł. The landscapes of sustainability in the library and information science: Systematic literature review. *Sustainability* **2022**, *14*, 441. [[CrossRef](#)]
20. Jiang, Y.; Chen, Y.; Wu, Y.; Yang, X.; Yu, W. Are librarians ready for space transformation? A systematic review of spatial literacy for librarians. *Sustainability* **2023**, *15*, 3244. [[CrossRef](#)]
21. Nakamura, K.; Kurihara, K. The models of catchment area of community library according to scale: Fundamental investigation for the planning of library system to community area (10). *Trans. AIJ J. Archit. Plan. Environ. Eng.* **1997**, *62*, 97–104.
22. Nakai, T. *Research on Library Planning in Sparsely Populated Areas Based on the Dual Structure of Usage Areas*; Mie University: Tsu, Japan, 2000.
23. Nagatsuka, T. Makerspace in Public Libraries during the COVID-19 Outbreak. *Present and future possibilities of remote service introduced recently. Prepr. Inf. Prof. Symp.* **2021**, *2021*, 55–60.
24. Nakayama, M. Japanese public libraries’ approach to COVID-19: Perspectives from Library Outreach Services. Otsuma Women’s University annual report. *Humanit. Soc. Sci.* **2022**, *54*, 110–122.
25. Alajmi, B.M.; Albudaiwi, D. Response to COVID-19 pandemic: Where do public libraries stand? *Public Libr. Q.* **2021**, *40*, 540–556. [[CrossRef](#)]
26. Yazaki, Y.; Kurita, O. Analysis of public library location focusing on library desert. *J. City Plan. Inst. Jpn.* **2019**, *54*, 1504–1511. [[CrossRef](#)]
27. Igari, S.; Nakade, B.; Higuchi, S. A study on the location and utilization of libraries in the local cities. *J. City Plan. Inst. Jpn.* **2004**, *39*, 559–564. [[CrossRef](#)]
28. Kim, J.; Lee, J. An analysis of spatial accessibility changes according to the attractiveness index of public libraries using social media data. *Sustainability* **2021**, *13*, 9087. [[CrossRef](#)]
29. Osaka, J. Private sector utilization in the development and operation of public facilities: Directions and issues in PPP/PFI promotion. *Issue Brief* **2017**, *952*, 1–11.
30. Sasabe, T. Flexibility in local libraries as public spaces: A case study of Tsutaya Library. *Annu. Rev. Inst. Adv. Soc. Res.* **2019**, *16*, 77–84.
31. Fuzimoto, K.; Kana, K.; Akasaki, K. A study on the use realities of the sidewalk cafe on the public space of Kyoubashi riverside in Hiroshima city, and resident’s consciousness to the space. *J. City Plan. Inst. Jpn.* **2008**, *43*, 619–624. [[CrossRef](#)]
32. Izumiyama, R.; Akiyama, H.; Kobayashi, M. Study on the application and management of “privately owned public spaces” in the urban central area: Through research and analysis to community management organization registration system the Tokyo Municipal Ordinance on promoting the creation SYARETA-MACHINAMI of Tokyo. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2015**, *80*, 915–922.
33. Toki, A.; Kajima, M. Practical use model from spatial composition and multipurpose of parking lots in the central area of mito: A study on design method of plaza type parking lots in local cities. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2010**, *75*, 2213–2220.
34. Tanaka, R.; Murase, H.; Nakai, T. A study of ideal composite depend of the usage behavior and use sphere of the compound facilities with the library. *Proc. Tokai Chapter Archit. Res. Meet.* **2016**, *54*, 381–384.
35. Gehl, J.K.J. *Life between Buildings: Using Public Space*; Island Press: Washington, DC, USA, 2011.
36. Yuasa, K.; Ikebe, K. Management and public space concepts in the case of adjacent public facilities and urban parks. *Landsc. Archit. Res.* **2018**, *81*, 583–588. [[CrossRef](#)]
37. Kawanami, M.; Oi, N. A study of continuity between indoor space and outdoor space: The concept of continuity and the influence of border. *Res. Rep. Kyushu Branch Archit. Inst. Jpn. 2 Dep. Environ.* **2002**, *41*, 101–104.
38. Association, J.L. *The Library Architecture Award of JLA, 1985–2006*; Japan Library Association: Tokyo, Japan, 2007.
39. Aoyama, Y.; Kondo, A. The optimal distance between residential location and urban facility. *J. City Plan. Inst. Jpn.* **1986**, *21*, 295–300. [[CrossRef](#)]
40. Fujisawa, M. Intersection of inside and outside museums. *Gakujuitsu Kenkyu Educ. Acad. Stud.* **2009**, *57*, 7–19.

41. Sonoda, S.; Nozawa, Y. A study on the conversion of low-unused land to public space by chain reaction: The case of Waiwai!! container project in Saga city. *AIJ J. Technol. Des.* **2015**, *21*, 297–300. [CrossRef]
42. Ushiyama, Y.; Takata, N. A study on the vague boundaries around the openings of contemporary houses in city. *Archit. Plan* **2013**, *2013*, 649–650.
43. Tooya, A.; Kana, K.; Hisao, H. Study on the yearly change of activity of users in public space. In case of the street furniture setting social experiment in western sidewalk of north building of Grand Front Osaka. *J. City Plan. Inst. Jpn.* **2019**, *54*, 375–382. [CrossRef]
44. Seta, S.; Matsumoto, N.; Takagi, K.; Miwa, N. The influence of the urban space elements upon the estimation of sensitivity analysis: Notation of emotional meaning of urban outdoor spaces based on brain waves Part 2. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2004**, *69*, 65–72.
45. Kawamura, Y. *Analysis of the Residents' Behavior of Library Use in the Cities with Good Access to Libraries in a Widespread Area: A Study of Regional Planning of Public Libraries*; University of Tsukuba: Tsukuba, Japan, 2010.
46. Naganuma, R.; Yoshikawa, M.; Hirakawa, R.; Komada, H.; Nakai, T. Usage behavior based on the expansion of usage areas and user attributes: A study of organically connected library networks in local cities, part 2. *Collect. Res. Rep. Kanto Branch Archit. Inst. Jpn.* **2020**, *90*, 295–298.
47. Li, J.; Oi, N. Behavioral situations and intention to use public spaces. *Man -Environ. Res. Assoc. J.* **2019**, *22*, 30.
48. Sakai, K.; Oshima, H. Present status of installed library and facilities, and influence that facilities give to number of visitors of library: Study on library planning which established in the complex facility, Part 1. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2018**, *83*, 1909–1918. [CrossRef]
49. Furuta, D.; Kojima, Y.; Komatsu, H. Tendency of spaces and operation in Japanese public libraries from the viewpoint of citizens' multipurpose uses. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2019**, *84*, 1057–1065. [CrossRef]
50. Kitamura, A. A "Place outside the home" in older adults. *Life Des. Rep.* **2013**, *205*, 35–37.
51. Hino, K.; Ishii, N. Utilization of third places among elderly people and their significance. *Trans. AIJ J. Archit. Plan. Environ. Eng.* **2014**, *79*, 2471–2477.
52. Tsuji, M.; Watanabe, H.; Fujimaki, K.; Katō, S. Community platform creation through the use of public spaces: Machikado Share initiative in Miyamae-ku, Kawasaki City. *J. Hous. Res. Found. "Jusoken"* **2022**, *48*, 209–218.
53. Japan Library Association. Japan Library Statistics. 2021. Available online: <http://www.jla.or.jp/library/statistics/tabid/94/Default.aspx> (accessed on 7 May 2023).
54. Shirato, S.-I. Current status and issues of urban regeneration policies: On the case of Kawagoe-City. *Meiji Univ. Glob. Jpn. Stud.* **2022**, *14*, 69–87.
55. Kuno, K. A study on the new and critical methodology of "library as place". *Libr. World* **2014**, *66*, 268–285.
56. Mumford, L. *The City in History: Its Origins, Its Transformations, and Its Prospects*; Penguin Books: London, UK, 1991.
57. Claudelin, A.; Tuominen, K.; Vanhamäki, S. Sustainability perspectives of the sharing economy: Process of creating a library of things in Finland. *Sustainability* **2022**, *14*, 6627. [CrossRef]
58. Izumiya, R.; Ishida, Y. Trial of a human resources development program for public space utilization through "Park(ing) Day" using on-street parking spaces—Through Sotonova Studio and "Park(ing) Day" 2019 Shibuya Miyamasuzaka. *Urban Plan.* **2020**, *2020*, 1045–1046.
59. Barclay, D.A. Space and the social worth of public libraries. *Public Libr. Q.* **2017**, *36*, 267–273. [CrossRef]
60. Shimizu, H.; Murooka, T.; Taniguchi, M. Realizing a 15-minute city in Metropolitan Tokyo. *J. City Plan. Inst. Jpn.* **2022**, *57*, 592–598. [CrossRef]
61. Kujawski, A.; Nürnberg, M. Analysis of the potential use of unmanned aerial vehicles and image processing methods to support road and parking space management in urban transport. *Sustainability* **2023**, *15*, 3285. [CrossRef]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.