

A Study on Design and Construction of Urban Street for Intervention of Leisure and Recreational Space in Residents' Public Life

Lingchao Meng, Kuo-Hsun Wen

Macau University of Science and Technology
Macau Special Administrative Region of the People's Republic of China
mlc00087@126.com

Abstract

This paper analyzes all sorts of data related to the leisure and recreational space in urban streets and residents' public life. It explores how space can be more effectively involved in public life, as well as the connection of the quality between space and living, such as dimensional aspects of participation, social and environmental space.

Key words: Urban streets, Leisure and recreational spaces, Public life, Participation

Introduction

The research area lies in leisure and recreational space in streets nearby St. Anthony's Church in Macau. Macau, a city blends Sino-Portuguese culture where the urban streets are crowded with Chinese and Portuguese architecture. With a population density of 21,205 per square kilometers, Macau is such a typical compact city with high residential density. Due to limited land area, it has to carry growing population with changing demographic structure constantly and the increasing number of elderly people. In this case, how urban street space meets various needs such as physical and mental health in residents' public life has become critical. From the perspectives of humanization and emotion, this paper tries to seek for related researches on the relationship between leisure and recreational spaces in residents' public life especially on how residents participate in and interact with leisure spaces. In fact, there are only a few researches related to this aspect. But empirical evidence indicates that "active participation" or "passive acceptance" has a much greater impact on the use frequency of the leisure and recreational space in residents' public life. Therefore, this paper aims to study whether the leisure and recreational space of urban streets in Macau may intervene residents' public or not, so as to contribute to the effective use and design of leisure and recreational space for urban streets.

The Review of Related Researches

I. Public Leisure Space in Urban Streets

Public leisure space, as one of the "public place", is an emotional and vital space that connects and maintains "urban temperature". There are intrinsic and extrinsic attributes of the public leisure space, the intrinsic one refers to the transition and connected space of the streets; the extrinsic one is the space formed by the street plane and various forms of architectural interface. The characteristic of streets' leisure space in Macau is "small", which defines its spatial scale but gives flexibility and possession. Under

this sort of trait, the perceived content such as "hearing", "viewing" and "smelling" of residents is amplified to maximized condition Street leisure space is a major carrier for residents' daily activities bearing ecological and openness for promoting their physiological and psychological health. As such, street leisure space is seemed to be very helpful for reducing depression and generalized anxiety.

II. Public Life of Urban Residents

Public life should contribute to the acquisition of personal public interest. "Everyone is looking at and listening in a different position. This is the meaning of public life."^[1] Many activities in public life are publicly spontaneous or influenced by the environment. Therefore, the scope of public life should not be limited. "Life" may be defined as "there are people on the street." This definition is close to people's experience in reality. Lively streets are the one with people go and forth in it, while the dead streets are streets where no one is inside. Children spend time playing on the street, if the street is suitable for playing. Adults spend time on the street—if they have something to do, or just need a place to sit down^[2]. From Jan Gale's discourse, it reveals that people is the main factor of the environment; the established space makes no sense if no one uses it. This study also found that public life stems from the interactions between different groups of people in the public space, as well as the urban design, environment, culture and landscape features of the space. It not only provides people with space pleasure and comfort in cities, but also focuses on important urban functions related to people's lives^[3]. Street spaces should provide various contents of usage for different group of users according to their characteristics, which affects whether urban residents are doing meaningful public activities or not.

Data and Researches

I. Data Sources

This paper takes the statistical data of the Macau Statistics and Census Bureau as a sample to sort out and classify the relevant data affecting public leisure and recreational space in streets and residents' public life. The adopted data is as follows: the covering area and the number of streets in the St. Anthony district of Macau, the occupied area of leisure and recreational space, total population, the population density, time periods of going-out and travel modes of residents in the district.

i. Area and Streets

Based on the statistics of the Statistics and Census Bureau of Macau in 2017, total area of the district is 13.72 square

kilometers, with 12 main historical streets and more than 100 various sized streets (Fig. 1, Table I).



Fig. 1 Spatial Distribution and Area Occupation of Leisure & Recreational Space

TABLE I
 SPATIAL DISTRIBUTION AND AREA OCCUPATION OF LEISURE & RECREATIONAL SPACE

AREA (m ²)	NAME
0-100	1. Temporary Leisure Area at Rua de Joo de Arago
	2. Leisure area at Travessadas Plumas
	3. Leisure area at Rua de Toms Vieira
	4. Temporary Leisure Area at Beco da Ostra
	5. Temporary Leisure area at Beco da Rosa
	6. Leisure area at Beco da Melancia
100-200	1. Temporary Leisure Area at Beco do Cavallo
	2. Leisure Area at Pito de Alm-Bosque
	3. Temporary Leisure Area at Beco dos Fatties
	4. Leisure Area at Rua de Santo Antnio
	5. Temporary Leisure Area at Travessa do Armazm Velho
200-500	1. Avenida de Demetrio Cimatti
	2. Leisure area at Rua dos Estaleiros
	3. Leisure Area at Rotunda de Carlos da Maia
	4. Leisure Area at Rua da Barca
1000-2000	1. Temporary Leisure Area at Lam Mau
	2. Temporary Leisure Area at Lam Mau
	3. Leisure Area in Praa das Orqudeas
10000-20000	1. Temporary Leisure Area at Lam Mau
	2. Temporary Leisure Area at Lam Mau
	3. Leisure Area in Praa das Orqudeas

Based on the online map of Macau and cadastral bureau, there are 20 public leisure areas and mostly located in southwestern of the district, only a few locate in the east and northeast. Besides, sport facilities locate in the central area.

ii. Total Population and Population Density

In 2017, St. Anthony’s parish has a population of 137,200 and its population density is 124,727 people per Square Kilometer, which make it ranked as the second dense population among seven parishes in Macau. According to the demographic data classified by different age groups in Macau (shown in Fig. 2), the population of different age groups and its obtained percentage provides the comparison of population by age groups in this parish.

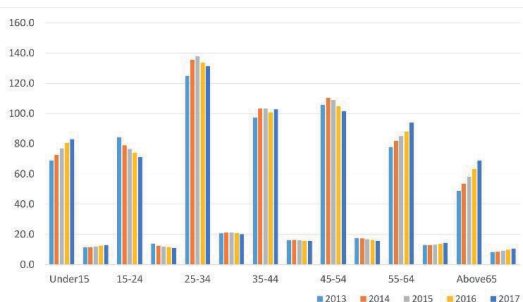


Fig. 2 Demographic data of Macau by age groups 2013-2017

iii. Residents’ Travel Periods and Modes

Based on the statistics of the first and second quarters of 2018, the public travel time is concentrated at two periods: 07:00-07:59, 08:00-08:59, while there is the least go-out population during the period of 18:00-23:59. (Fig. 3). In additions, there are nearly 18,000 people do not go out. The major travel modes are bus and walking (Table 4).



Fig. 3 Statistics of residents’ travel modes in the first and second quarters of 2018 (per thousand people)

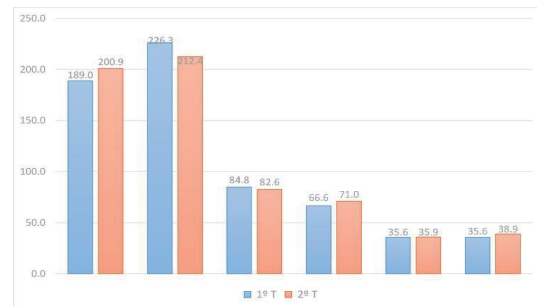


Fig. 4 2018 1st & 2nd quarter of Resident Travel Mode, Macau
 Remarks: blue color represents the first quarter and the color red is the second quarter; the horizontal axis of the histogram; from left to right is as follows: walking, bus, motorcycle, private car, other methods, and other situations.

Under the background conditions of urban construction, public spaces for resting are not well built and even scattered in the parish demonstrating the lack of leisure space for residents. Besides, the distance between temporary Leisure Areas such as Beco da Ostra, Beco da Rosa, Beco da Melancia and Travessa do Armazm Velho are not far away from each other (≤ 50 m). But most of the space only provides fitness equipment and benches; and their surrounding traffic is mixed and complicated. The usage rate of those spaces are very limited by time.

In the parish, there are a number of streets and some historical areas that are included in the World Heritage List. According to the distribution map of historical streets and vital urban textures in *The Historic Centre of Macau*, many streets locate in the core and buffer area. In accordance with the requirement of measuring management, the historic centre of Macau is necessary to avoid from changing connection between spatial and appearance of the area. Doing so is to emphasize that these streets are the most important channel to observe and feel urban features in the historic centre of Macau, and it also plays a significant role in the establishment, accumulation and psychological feeling of walking experience in these urban areas^[4]. Generally, walking experience obtained in leisure space focuses on the action of walking. However, the necessity of getting rest after walking could make the intervention of the

leisure space indispensable. Consequently, the leisure and recreational space is one of the key contents for streets. Under the premise of protecting and respecting interface and spatial connection to the original space, how to attract residents and tourists by making the most use of spaces needs to explore more when constructing leisure space to urban streets in Macau. Referring to Fig. 2, through the comparison of data from 2013 to 2017, total number and percentage of the children under age 15; and the elderly over 65 are increasing. Changing age structure will directly affect contents of streets and it should be updated in time. In the future, there is a need for more space suitable for children to interact and play with. When taking into account the physical and emotional needs of elderly, there is also needs for interaction, leisure, entertainment, and physical fitness. The activity content determines the spatial role for various groups. Apart from effects of dietary and genetics, the change of built environment has led to the lack of physical activity of citizens, which is the crucial reason for problems regarding to public health^[5]. From the data of Fig. 3 and Fig. 4, it is known that Macau residents' main travel time is centered at 07:00-08:59; and travel mode relies on walking and transportation. The analysis of data indicates residents' participation in public activities varied in time, and main travel modes such as walking and public transportation have increased interactions between residents and leisure spaces. They all imply that the public leisure space really play functional attraction to residents during free time. According to the report of World Health Organization on global health resulting in physical inactivity, reasons are because of insufficient free time to participate activities. Consequently, people are more inclined to use 'passive' transportation which also leads to the reduction of physical activity^[6]."

Indications from Researches

Based on the essential attribution of leisure space and analysis of its "physical characteristic" and various elements acting in spaces, whether residents choose to use or to reject the space are depending on their perception and action. An analytical model of leisure space evaluation is proposed by this research (Fig. 5).

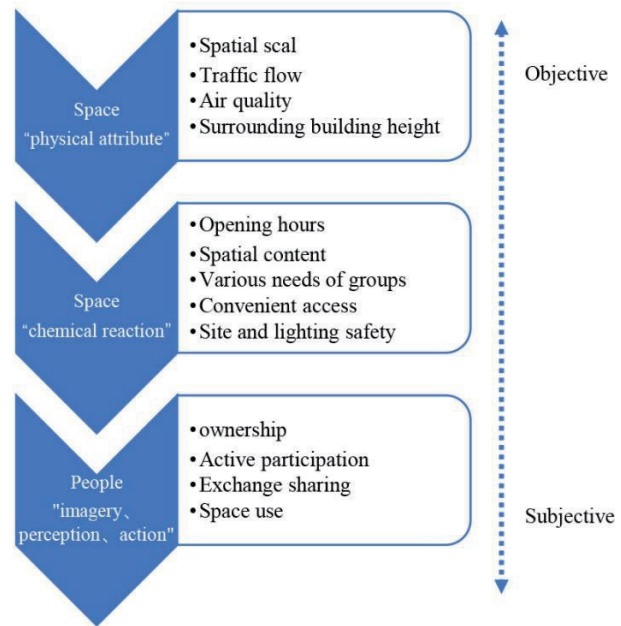


Fig. 5 Model of Spatial Usages through Various Aspects

I. Participational Dimension

The leisure space presents itself a semi-closed and open state in varied streets, and mostly in the form of street crossing or building enclosure. The space segmentation is relatively rigid. A rigid and non-vibrant interface can depress the street space, in which people won't stay or slow down their paces, not to mention interacting with the space. No visual guidance and transition zones, it can result in a weak connectivity and accessibility of the leisure space. This paper suggests solutions are 1) it should be provided the visual guidance combining with spatial contents and walking systems so as to residents and visitors are able to discover it; 2) to prepare a manual guiding residents on how to use the leisure space in streets; 3) to conduct recording daily images and residents interviews for obtaining data and information as an effective supporting information for design or renovation of leisure areas reflecting the respect on the "top-down" daily use of residents.

II. Social Dimension

Leisure area is one of the carriers to implement public life for residents. Planning or designing street must fulfill common respective obligations to maintain the sustainable development for leisure spaces. Kaplan believes that like certain landscapes and built environments are just for "these places provide assurance of participation and meaning of public life. [7]" Residents use leisure spaces for communication, solitude, or a tool based on various circumstances. Through research, and feedback, this paper came out with several indications. For example, people should have the right to participate in and interact with streets, and it is necessary to create ideal leisure space for streets by considering open and variety where people can make democratic decisions, free gathering and enjoying dynamic facilities.






III. Environmental Space Dimension

When leisure space was early constructed, it was limited

by land use planning and distribution. Therefore, the maximum usage of the space has been neglected resulting in single space pattern with the same pavement and benches, and standardized fitness equipment, even with the similar environment. At the same time, it was also accompanied by air pollution, noise, traffic, road safety and other issues. Once the function of public space is reduced to an inflexible phenomenon, complex human activities in streets will be broken into impersonal corresponding fragmentation which ultimately deprives the vitality and vigor of the space as well as the city^[8].

Leisure spaces in the parish are divided into five types according to location and distance. Before designing and constructing leisure spaces for streets, characteristic should be considered, so that their respective spatial contents may become a complementary to others. This paper proposes to collect five types of real-life photos on streets with surrounded leisure spaces trying to obtain four sorts of mean data for better understanding relations between residents and leisure spaces of urban streets..

TABLE II
 EVALUATION OF THE CURRENT OF LEISURE SPACES IN STREETS

Area Distribution			
a. Temporary Leisure Area behind Camoos Garden	f. Temporary Leisure area at Beco da Rosa		
b. Leisure Area at Rua de Santo Antnio	g. Leisure area at Beco da Melancia		
c. Temporary Leisure Area at Beco dos Falties	h. Leisure area at Travessadas Plumias		
d. Temporary Leisure Areaat Travessa do Armazm Velho	i. Leisure Area at Pto de Alm-Bosque		
e. Temporary Leisure Area at Rua de Joo de Arajo			
a. Temporary Leisure Area at Lam Mau	d. Leisure Area in Praa das Orquideas		
b. Temporary Leisure Area at Lam Mau	c. Leisure area at Rua dos Estaleiros		
c. Avenida de Demetrio Cinatti			
a. Temporary Leisure Area at Rua de Joo de Arajo			
b. Temporary Leisure Area at Beco do Cavallo			
a. Leisure Area at Rotunda de Carlos da Maia			
b. Leisure Area at Rua da Barca			
a. Leisure area at Fortaleza do Monte			
b. Mount Fortress Park			
c. Leisure area at Rua de Toms Vieira			
Space interface			
			
			
			
			
			
Green viewing rate	Building area ratio	Road area ratio	Sky area ratio
15.8	50.43	5.24	7.72
15.48	35.26	8.38	4.68
6.33	50.46	9.7	4.01
6.85	43.35	7.46	3.43
37.57	24.7	6.17	12.56

Remark: by photographing the surrounding environment of leisure areas with mean value of 2 meter as one unit, collecting relative number of information as follows: 330, 153, 61, 183, 119, via software analysis.

Some useful information is identified from Table II. Most

areas are in hard pavement with facilities mainly for fitness and sitting only. Spaces for sunshade, greening, water dispenser and entertainments are not provided properly. Leisure areas at Avenida de Demetrio Cinatti, Rua da Barca and Rua de Toms Vieira locate at the intersection of main road or nearby streets remain many unsafe factors such as noise and pollution. Based on the data in Table II, it may conclude that most of horizontal zone are in hard pavement and with less greenery. As a result, people are prone to generate anxiety and other negative emotions. Meanwhile, it could lead to a higher temperature causing uncomfortable environment. In general, the vegetation provides shade and humidity reducing temperature and to be regarded as a potential adaptational strategy for the global warming era^[9]. Those environment with low greenery covering rate (<15%) are unattractive, while those with more than 15% are more attractive^[10]. Green covering rate is positively correlated with the ratio of building and road area. However, in the compact space, high greenery covering rate helps to reduce artificial construction traces and attracts people to participate with the environment. Death rate of respiratory diseases with those greenery covering rate lower than 5% is higher than these with 25%^[11]. The enclosing boundary of leisure and recreational space along streets should be considered carefully and outdoor seats must be increased, so as to those facilities with single function would need to be more convenient and practical as street furniture. The quality and diversity of street space may exert influence on spatial function. Thus this is the basic guarantee for residents to implement daily activities with reflecting mental perception of better life.

Conclusion

The vitality of space depends on dynamic activities and is influenced by appearance, content and the space. In fact the spatial order is also an coordination between human beings. In general, the composition of the familiar streets is usually defined by those urban constructors but from the exploration of this research it indicates that only by employing the unlimited imagination of users and the way of constructing street environment can make these spaces to be meaningful. It is not to be ignored in particular the inner complexity of spaces. Leisure space of urban streets must be embedded with the sense of place. Therefore, to construct leisure spaces of urban streets must involve with residents via constant observation of learning their use of leisure spaces. Indeed, all urban professionals should construct public lives with robustness and avoid from engaging subjective opinion into planning and designing phases in pursuing sustainability.

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