华南理工大学

South China University of Technology

专业学位硕士学位论文

Research on the Creation of External Parent-Child Spaces in Industrial Renovation Creative Parks: A Case Study of Wisdom Bay in Baoshan District, Shanghai

作者姓名	丁熠
学位类别	建筑学硕士
指导教师	导师组
所在学院	建筑学院
论文提交日期	2025 年 6 月

Research on the Creation of External Parent-Child Spaces in Industrial Renovation Creative Parks: A Case Study of Wisdom Bay in Baoshan District, Shanghai

A Dissertation Submitted for the Degree of Master

Candidate：Ding Yi

Supervisor：SCUT-PoliTO co-supervisors

South China University of Technology

Guangzhou, China

摘　要

工业园区是城市文化遗产中的独特标识。存量工业园区更新推动城市高质量发展，其外部空间的活化和提升也是当下提升城市空间品质的重要议题。然而当前存量工业园区更新大多聚焦于建筑本体功能置换，忽视对外部公共空间的改造，不少工业旧改园区外部空间存在千篇一律、活力不足的问题。要想更好地激活和更新这些存量工业空间，其活化方向应该与当下人们真正需要、感兴趣的内容相结合。近年来亲子间以亲缘关系为基础的亲子互动广受关注，随着育儿数量的开放及亲子互动理念的转变，对亲子空间也提出了更多数量、更高质量的要求，人们不再满足于一般城市空间中仅供玩耍的娱乐场地。旧工业园区公共空间自带工业历史文化，具有科普教育意义，将其更新改造与亲子互动相结合，不仅可以为亲子提供多样活动的特色空间，延续工业文明记忆，也能更好地激活工业空间，带动园区发展。尤其对于那些空间充裕，周边有学校、大规模住区，附近缺乏户外亲子活动场的旧工业园而言，应结合当下亲子互动的需求考虑空间的改造。

本文研究的是亲子互动空间营造与存量工业园区外部公共空间更新的结合，以文献研究法、案例分析法、问卷调研法和实地调研法为主要研究方法。首先界定了符合亲子场景营造要求的旧工业园区需具备的基本条件，这是后续研究开展的前提。随后系统研究与亲子互动空间营造相关的内容，包括亲子主体特征及互动类型、亲子空间营造的理论基础及设计策略。接着研究针对旧工业园区空间的亲子互动场景营造策略，包括梳理旧工业空间更新的发展历程和空间不足，阐明营造旧工业空间亲子场景的积极意义，收集和学习当下工业园区空间与亲子活动相融的实践案例，归纳总结旧工业空间与一般城市公共空间在营造亲子场景时存在的差异，提出有针对性的补充策略和操作方法。再选定符合亲子场景营造的园区条件的上海智慧湾创意园区进行多层面的实地调研，评估园区不同类型空间与亲子场景的适配度。最后以上海智慧湾为例完成设计实践，提出不同类型空间亲子场景营造的详细建议，并选定区域完成了一个具体方案设计。

本研究为特定旧工业园区公共空间更新提供了一种新视角和思路，也为不同类型场所中的亲子互动空间建设提供策略补充。同时设计部分为城市存量发展和日后同类型园区的空间更新提供了实践指导和参考。

关键词：旧工业园区改造；公共空间更新；亲子互动

Abstract

Industrial parks are unique identifiers of urban cultural heritage. The renewal of existing industrial parks promotes high-quality urban development, and the revitalization and improvement of their external spaces are also important issues for enhancing the quality of urban spaces at present. However, most of the current renewal of existing industrial parks focuses on the functional replacement of the building itself, neglecting the renovation of the external public spaces. Many old industrial renovation parks have problems such as uniformity and lack of vitality in their external spaces. To better activate and update these existing industrial spaces, the activation direction should be combined with the content that people truly need and are interested in at present. In recent years, intergenerational interaction based on kinship has received widespread attention. With the opening of the number of parents and the transformation of the concept of intergenerational interaction, more quantity and higher quality requirements have been put forward for intergenerational spaces. People are no longer satisfied with the general urban spaces that are only for entertainment and play. Integrating the renewal and transformation of the public spaces of old industrial parks with intergenerational interaction can not only provide a distinctive space for intergenerational activities, continue the memory of industrial civilization, but also better activate industrial spaces and drive the development of the park. Especially for those old industrial parks with ample space, surrounding schools, large-scale residential areas, and a lack of outdoor intergenerational activity areas, the renovation of space should be considered in line with the current needs of intergenerational interaction.

This study focuses on the combination of creating intergenerational interaction spaces and the renewal of external public spaces of existing industrial parks, using literature research method, case analysis method, questionnaire survey method, and field research method as the main research methods. Firstly, the basic conditions that old industrial parks need to meet for creating intergenerational scenarios are defined, which is the prerequisite for the subsequent research. Then, systematic research is conducted on the content related to intergenerational interaction space creation, including the characteristics of intergenerational subjects and interaction types, the theoretical basis and design strategies for intergenerational space creation. Next, the strategies for creating intergenerational scenarios in the space of old industrial parks are studied, including sorting out the development process and space deficiencies of the renewal of old industrial spaces, clarifying the positive significance of creating intergenerational scenarios in old industrial spaces, collecting and learning practical cases of the integration of

industrial park spaces and intergenerational activities, summarizing the differences in creating intergenerational scenarios in old industrial spaces and general urban public spaces, and proposing targeted supplementary strategies and operational methods. Then, a multi-level field research is conducted on the Shanghai Zhihuiwan Creative Park, which meets the conditions for creating intergenerational scenarios, to assess the compatibility of different types of spaces with intergenerational scenarios. Finally, a design practice is completed based on Shanghai Zhihuiwan, providing detailed suggestions for the creation of intergenerational scenarios in different types of spaces, and selecting an area to complete a specific scheme design.

This study provides a new perspective and idea for the renewal of external public spaces of specific old industrial parks and also provides strategic supplements for the construction of intergenerational spaces in different types of places. At the same time, the design part provides practical guidance and reference for the development of urban stock and the space renewal of similar parks in the future.

Key words: Renovation of the old industrial park；Parent-child interaction area；Public space renewal

Catalogue

摘　要 ..... **I**

Abstract ..... **II**

List of figures ..... **IX**

List of tables ..... **XVI**

Charpter One Introduction **1**

1.1 Research background 1

1.1.1 The renovation of public spaces in existing industrial parks is a requirement for high-quality development 1

1.1.2 More and better outdoor parent-child interaction spaces need to be built at present 2

1.1.3 The renovation of public space in existing industrial parks should be combined with the needs of parent-child interaction 3

1.2 Basic concepts explained 3

1.2.1 Old industrial area 4

1.2.2 Public space renewal 5

1.2.3 Parent-children interaction area 5

1.3 Study review 8

1.3.1 Research on parent-child interaction 8

1.3.2 Research on the space of parent-child interaction 17

1.3.3 Research on the renewal of public space in old industrial parks 20

1.3.4 Summary of domestic and foreign research 22

1.4 Research purpose and significance 23

1.4.1 Purpose of research 23

1.4.2 Research meaning 24

1.5 Research content and method 25

1.5.1 Research contents 25

1.5.2 Research methods 25

1.6 Research framework 27
Charpter Two Basic research on the creation of parent-child interaction spaces 29
2.1 The type of park compatible with the renewal of parent-child friendly spaces 29
2.2 Research on the parent-child entities and parent-child interaction behaviors 30
2.2.1 Parent-child subject characteristics 30
2.2.2 Parent-child interaction type 37
2.3 Relevant theoretical basis 38
2.3.1 Behavioral demand theory 38
2.3.2 Maslow's hierarchy of needs 39
2.3.3 Environmental behavior and behavioral scene theory 40
2.4 Principles of space creation 41
2.4.1 Safety 41
2.4.2 Amenity 42
2.4.3 Interesting 43
2.4.4 Diversity 44
2.4.5 Educational 45
2.5 Space creation methods 46
2.5.1 A pleasant and enjoyable environment for parent-child activities 46
2.5.2 Varied Facilities for Parent-Child Activities 56
2.6 Chapter summary 61
Charpter Three The strategies and methods for creating a parent-child interaction space in the old industrial park 62
3.1 Overview of public space in old industrial parks 62
3.1.1 The development of the renewal of existing industrial parks 62
3.1.2 The lack of public space renewal in old industrial parks 63
3.1.3 Characteristics of public space in industrial renovation park 64
3.2 The Positive Significance of Creating Parent-Child Scenarios in Old Industrial Spaces 66

3.2.1 Provide a unique space for parent-child interaction 66
3.2.2 Parent-Child Activities Facilitate Park Development 68
3.3 Domestic and foreign case studies 68
3.3.1 Domino Park in New York, USA 68
3.3.2 Langyuan Station industrial renovation park, Beijing 70
3.3.3 Zhongcheng Zhigu Industrial Renovation Park, Shanghai 72
3.3.4 A bus-themed space on the street in Changping, Beijing 75
3.3.5 Case study summary 78
3.4 Supplementary Strategies for Creating Parent-Child Scenarios in Old Industrial Spaces 81
3.4.1 Segmenting the customer base into parent-child groups 81
3.4.2 Integrating industrial culture 92
3.4.3 Combining the parent-child business model 97
3.4.4 Planning parent-child activities 97
3.5 Operating steps for creating a parent-child interaction scenario in an old industrial park 99
3.5.1 Functional requirements and population positioning 99
3.5.2 Spatial layout and scale adjustment 100
3.5.3 Space atmosphere and facilities match 101
3.5.4 Site environment and landscape shaping 102
3.6 Chapter summary 103
Charpter Four Field Investigation of the Smart Bay Industrial Renovation and Innovation Park in Baoshan District, Shanghai 104
4.1 Basic condition evaluation, research methods and contents 104
4.1.1 Shanghai Wisdom Bay Creative Park has the necessary conditions for family-oriented development 104
4.1.2 Research method and research content 108
4.2 Research on parent-child behavior activities in Wisdom Bay Creative Park 109

4.2.1 Distribution characteristics of activity numbers 110
4.2.2 Activity time distribution characteristics 113
4.2.3 Distribution characteristics of activity types 116
4.2.4 Brief summary 119
4.3 Cognitive survey of parent-child space in Wisdom Bay Creative Park 119
4.3.1 Parent-child structure characteristics in the park 120
4.3.2 The status quo of parent-child interaction 122
4.3.3 The current situation of parent-child interaction space 125
4.3.4 Parent-child space needs in the park 128
4.3.5 Brief summary 130
4.4 Research on the current situation of public space in Wisdom Bay Park 131
4.4.1 Overall planning and layout of the park 131
4.4.2 Classification of external space outside the park 134
4.4.3 Square space situation 138
4.4.4 Green space situation 145
4.4.5 Node space situation 147
4.4.6 Street space conditions 149
4.4.7 Activities held in the park 154
4.5 Research summary 154
4.5.1 The current situation of the space in the garden 154
4.5.2 The Relationship Between Indoor Spaces and Parent-Child Interaction 157
4.5.3 Type spaces are associated with parent-child behaviors 159
4.6 Chapter summary 161
Charpter Five A strategy for updating the external public space of an old industrial park based on parent-child interaction 162
5.1 Design goal 162
5.2 Priority of Creating Parent-Child Scenarios in the Park Area 162
5.3 Compatibility of different spaces with parent-child scenarios 164

5.4 Suggestions for Design of Various Spaces within the Park..... 165
5.4.1 Creation of a Parent-Child Activity Scene in the Square Space 165
5.4.2 Green space parent-child activity scene creation 175
5.4.3 Node space parent-child activity scene creation 178
5.4.4 Creation of parent-child activity scenes in street space 179
5.5 Specific design for creating parent-child scenarios in the park 185
5.5.1 Selection of the design scope 185
5.5.2 Spatial Positioning and Theme..... 187
5.5.3 Master plan..... 189
Conclusions and outlook..... 200
Reference..... 204
Appendix 209
Acknowledgement 212

List of figures

Figure 1-1 Classification of outdoor parent-child interaction space ····· 7
Figure 1-2 The relationship between environmental uncertainty and arousal and emotional evaluation ····· 9
Figure 1-3 The relationship between wake-up and performance, interaction quality ····· 9
Figure 1-4 Research framework ····· 28
Figure 2-1 The spatial needs of children affected by psychology ····· 34
Figure 2-2 Main types of parent-child interaction behaviors ····· 38
Figure 2-3 Model of the relationship between behavior and spatial environment ····· 39
Figure 2-4 Maslow's hierarchy of needs ····· 39
Figure 2-5 Five types of curves requiring gradual change ····· 39
Figure 2-6 The effects of internal and external stimulation on behavior ····· 40
Figure 2-7 The effects of body, behavior and environment ····· 41
Figure 2-8 Space creation methods ····· 46
Figure 2-9 The diverse and rich site environment within the park ····· 49
Figure 2-10 Adjustment of site D/H ····· 49
Figure 2-11 Human eye line of sight range ····· 50
Figure 2-12 Influence of different types of plants on sight and path ····· 51
Figure 2-13 Schematic diagram of different forms of water scenery ····· 52
Figure 2-14 Interactive function of the landscape wall ····· 53
Figure 2-15 Steps as stage and seating landscape ····· 53
Figure 2-16 Divides the paved area ····· 54
Figure 2-17 Guides the flow line of the paved pavement ····· 54
Figure 2-18 Jupiter Exploration Park ····· 56
Figure 2-19 Community park design of "Yueshan Songlin Collection" ····· 56
Figure 2-20 Location, orientation and view of rest facilities ····· 59
Figure 2-21 Seats at different angles and shapes ····· 60
Figure 2-22 Landscape furniture that is both a seat and a facility ····· 60

Figure 2-23 Seat with modular combination ····· 60
Figure 3-1 The main problems of the industrial renovation park space ····· 64
Figure 3-2 Children feel the process of sugar making while playing ····· 69
Figure 3- 3 Using industrial relics to build amusement facilities ····· 69
Figure 3- 4 Use interesting colors and materials ····· 70
Figure 3- 5 Five main theme parks ····· 71
Figure 3-6 Targeted facilities for young and old children ····· 71
Figure 3-7 Business conditions near the Warm Family Parent-child Park ····· 72
Figure 3-8 Zhongcheng Zhigu train garden ····· 73
Figure 3- 9 The locomotive is reused as a landscape and restaurant ····· 74
Figure 3-10 Various temporary activities for parents and children held in the park ····· 74
Figure 3-11 A long play project of a small train that can be experienced by parents and children ····· 75
Figure 3-12 The past and present of Changping bus theme space ····· 76
Figure 3-13 Field area by age ····· 76
Figure 3-14 Facilities of different difficulty levels in the site ····· 77
Figure 3-15 Various types of activities and facilities in the site ····· 77
Figure 3-16 Spaces and facilities shared by parents and children ····· 78
Figure 3-17 Parent rest area with shade ····· 78
Figure 3-18 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 1 ····· 79
Figure 3-19 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 2 ····· 79
Figure 3- 20 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 3 ····· 80
Figure 3-21 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 4 ····· 81
Figure 3-22 Wave-shaped facility with composite functions ····· 82

Figure 3-23 Squares and open Spaces are suitable for sports ····· 83
Figure 3- 24 The parking facility provides the function of accompanying care for parents ····· 84
Figure 3-25 A seating landscape combining steps and seats ····· 84
Figure 3-26 Wave forest with good landscape environment ····· 85
Figure 3-27 Open grass slope with slight undulation ····· 85
Figure 3-28 Semi-private flower space for casual conversation ····· 86
Figure 3-29 Various game facilities in the field ····· 86
Figure 3-30 Fun landscape wall as a recreational facility ····· 86
Figure 3-31 Playground facilities drawn on the ground ····· 87
Figure 3-32 The sliding field relies on the terrain ····· 87
Figure 3-33 The pink beach with natural ecology ····· 87
Figure 3-34 A shaded parent area near the activity facility ····· 88
Figure 3-35 A parent area where parents can accompany and supervise as well as rest and communicate ····· 88
Figure 3-36 A composite activity facility that can be used for both play and rest ····· 89
Figure 3-37 Popular science and culture devices of different types and forms ····· 89
Figure 3-38 Space design combined with water cycle theme ····· 90
Figure 3-39 Rich green plants combined with natural science ····· 91
Figure 3-40 Design concept of "Tanwan Island" ····· 93
Figure 3-41 The intangible cultural heritage symbols extracted from the Li ethnic culture of Sanya ····· 94
Figure 3-42 Industrial remnants in Xiaohexi Park become urban furniture ····· 95
Figure 3-43 Shantou Lion Dance Park ····· 96
Figure 3-44 Amusement facilities that follow the theme storyline of Li ethnic group's intangible cultural heritage ····· 96
Figure 3-45 Differences in needs of children by age group ····· 101
Figure 3-46 The transparent building facade allows the line of sight to penetrate ····· 103

Figure 4-1 Location analysis ····· 104
Figure 4-2 Schematic diagram of "No.1 Innovation Belt" ····· 104
Figure 4-3 Transportation analysis ····· 107
Figure 4-4 Business analysis ····· 107
Figure 4-5 Schematic diagram of the observation points in the creative park ····· 110
Figure 4-6 Parent-child gathering and distribution map in the park ····· 111
Figure 4-7 Distribution of parent-child business in the park ····· 111
Figure 4-8 Location of activities held in the park ····· 112
Figure 4-9 Time distribution of parent-child activities in the park ····· 113
Figure 4-10 Parent-child activities in the creative park space at different times ····· 115
Figure 4-11 Distribution of parent-child activities in typical Spaces in the park ····· 118
Figure 4-12 Combination mode of parent-child travel ····· 121
Figure 4-13 Number of children in parent-child combination ····· 122
Figure 4-14 Parent-child interaction preference ····· 122
Figure 4-15 Age of children who play with their partners ····· 122
Figure 4-16 Frequency of playing with other children in the creative garden ····· 123
Figure 4-17 Willingness to play with other parent-child families ····· 123
Figure 4-18 Parent-child behavior activity preference in creative garden: multiple choice ····· 124
Figure 4-19 Common places for parent-child activities in creative parks: multiple choice questions ····· 125
Figure 4-20 Total duration of parent-child activities in the Creative Garden ····· 125
Figure 4-21 Duration of parent-child activities in the external space of the Creative Garden ····· 125
Figure 4-22 Current satisfaction of the external space of the creative park ····· 126
Figure 4-23 Factors affecting the duration of parent-child activities in creative parks: multiple choice questions ····· 127
Figure 4-24 Improvements to the external space of the Creative Park: multiple choice

questions ····· 127
Figure 4-25 Purpose of parents and children to visit the creative park: multiple choice questions ····· 128
Figure 4-26 Do parents have personal expectations: multiple choice questions ····· 128
Figure 4-27 Design objects to be considered for the external parent-child space of the creative park ····· 129
Figure 4-28 Spatial characteristics of parent-child focus ····· 130
Figure 4-29 Organization of road traffic in the Creative Park ····· 132
Figure 4-30 Functional layout of creative industrial park ····· 133
Figure 4-31 Distribution of various formats in the Creative Park ····· 134
Figure 4-32 Types of outdoor parent-child interaction in creative parks ····· 134
Figure 4-33 Position distribution of type Spaces in the Creative Park ····· 137
Figure 4-34 Location map of the performance square in the Creative Park ····· 138
Figure 4-35 Power play facilities ····· 145
Figure 4-36 Parents wait to watch ····· 145
Figure 4-37 Parents stand by the river ····· 145
Figure 4-38 Location map of node space in creative park ····· 147
Figure 4-39 Activity table and activity holding situation in the park ····· 154
Figure 5-1 The priority for creating family-friendly scenarios in the park area ····· 163
Figure 5-2 Different types of spaces are suitable for different types of parent-child interactions ····· 165
Figure 5-3 Time-sharing conversion of site functions within a week ····· 166
Figure 5-4 Sports venues for children of different ages ····· 166
Figure 5- 5 Schematic diagram of flexible and variable public facilities ····· 167
Figure 5-6 Base plane ratio of the activity site ····· 168
Figure 5-7 Schematic diagram of laying area and nearby rest area ····· 168
Figure 5- 8 Schematic diagram of two types of leisure squares ····· 169
Figure 5-9 Schematic diagram of the proportion of peripheral commercial extension · 169

Figure 5-10 Creating some small scale space in the square ····· 169
Figure 5- 11 Influence of different plant combinations on openness ····· 170
Figure 5- 12 Schematic diagram of personal space and local open areas ····· 170
Figure 5- 13 Functional composite fun curved seat ····· 171
Figure 5-14 Controlling the surrounding commercial facilities ····· 171
Figure 5-15 Creating a parent-child viewing and leisure node ····· 172
Figure 5-16 Schematic diagram of the edge passage area of the sit ····· 172
Figure 5-17 Local cooperation popular science sign ····· 172
Figure 5-18 Schematic diagram of site age zoning ····· 173
Figure 5-19 Schematic of site selection requirements for care areas ····· 173
Figure 5-20 Schematic diagram of cognitive area facilities for young children ····· 174
Figure 5-21 Schematic diagram of exploration area facilities for children aged 3-6 ··· 174
Figure 5-22 Schematic diagram of facilities in the expansion area for ages 6-12 ····· 175
Figure 5-23 Schematic diagram of multi-functional green space ····· 176
Figure 5-24 Open sunny lawn ····· 176
Figure 5-25 Using terrain and facilities to create a hill ····· 177
Figure 5-26 Schematic diagram of "five senses stimulation" of plants ····· 177
Figure 5-27 Hosting a camping night talk ····· 178
Figure 5-28 Nodes in front of the building portal ····· 179
Figure 5-29 Nodes at street corners ····· 179
Figure 5-30 Keep a passage distance of 2.5 meters ····· 180
Figure 5-31 Minimum width of landscape belt with rest seats ····· 180
Figure 5-32 Schematic diagram of landscape zone function ····· 181
Figure 5-33 Schematic diagram of the scene of the street side playground ····· 181
Figure 5-34 Bright and interesting ground signs ····· 182
Figure 5-35 Adding parent-friendly walking paths ····· 182
Figure 5-36 Time-sharing strategy for secondary roads ····· 182
Figure 5-37 Spatial measures of pedestrian walkway in walking area ····· 183

Figure 5-38 Scene effect of pedestrian path combined with green corridor ····· 183
Figure 5-39 Schematic diagram of time-sharing opening of swivel seats ····· 184
Figure 5-40 Schematic diagram of control of commercial overhang partition ····· 185
Figure 5-41 The main activity routes for parents and children in the park ····· 185
Figure 5-42 The main designed areas that have been selected for construction ····· 186
Figure 5-43 Key nodes and flow lines within the garden ····· 186
Figure 5-44 Detailed diagram of the spatial function positioning for the design ····· 187
Figure 5-45 Space theme and storyline ····· 188
Figure 5-46 Master plan ····· 190
Figure 5-47 Axonometric drawings of each node within the garden ····· 190
Figure 5-48 plan of Ruins Garden ····· 191
Figure 5-49 Plan of Impression Station ····· 192
Figure 5- 50 Plan of Vitality Time Machine ····· 194
Figure 5-51 Plan of Civilization Origin Point ····· 194
Figure 5-52 Plan of Future Stage ····· 195
Figure 5-53 Plan of Dream Bridge Garden ····· 196
Figure 5-54 Plan of Hope Theatre ····· 197
Figure 5-55 Plan of Dreamland ····· 198

List of tables

Table 1-1 Industrial renovation and renewal direction ····· 4
Table 1-2 Major theories of developmental psychology ····· 10
Table 1-3 Gender development differences between boys and girls ····· 13
Table 1-4 Four temperament types of children ····· 14
Table 1-5 Four parenting styles of parents ····· 15
Table 1-6 Parenting views of parents in different generations ····· 16
Table 1-7 Literature review of public Spaces in old Industrial Parks ····· 20
Table 2-1 Growth and development of children at different stages ····· 31
Table 2-2 Coupling of Maslow's hierarchy of needs and spatial characteristics ····· 33
Table 2-3 Influence of site enclosure scale on spatial perception ····· 47
Table 2-4 Influence of site foundation surface ratio on spatial perception ····· 47
Table 2-5 Spatial distance of different types of social interaction ····· 48
Table 2-6 Plant configuration in the park public space based on parent-child needs ····· 51
Table 2-7 Comparison of different paving materials ····· 54
Table 2-8 The relationship between color and emotion ····· 55
Table 2-9 Ages and height of children ····· 57
Table 2-10 Diverse play facilities for children ····· 57
Table 4-1 Changes in registered population of Baoshan ····· 106
Table 4-2 Types of parent-child behavior activities ····· 116
Table 4-3 Sample distribution ····· 120
Table 4-4 Types of public spaces in Creative Parks ····· 135
Table 4-5 Classification of external public spaces in industrial renovation creative parks based on parent-child activities ····· 136
Table 4-6 Square space —— Performance square ····· 139
Table 4-7 Square space —— Inward-looking leisure small square ····· 140
Table 4-8 Square space —— Outward-oriented leisure small square ····· 142
Table 4-9 Square space —— children's play area ····· 144

Table 4-10 Green space —— Public green space ····· 145
Table 4-11 Node space —— a small node located in front of the building portal ····· 147
Table 4-12 Node space —— Other types of small nodes ····· 148
Table 4-13 Street space —— various types of roads ····· 149
Table 4-14 Types of commercial outdoor space in street and alley space —— ancillary space ····· 152
Table 4-15 Correlation analysis between spatial problems and parent-child behavior needs ····· 156
Table 4-16 Analysis of spatial transformation in park types ····· 158
Table 4-17 The correlation between the characteristics of the type space and the parent-child function and population ····· 159

Charpter One Introduction

1.1 Research background

1.1.1 The renovation of public spaces in existing industrial parks is a requirement for high-quality development

The 2024 Government Work Report of The State Council proposed that the urban renewal initiative should be steadily implemented. Urban renewal will be an important engine for promoting high-quality urban development. As an agglomeration spatial carrier that emerges at a specific stage of urban development, the renovation and reuse of old industrial parks is an important part of urban renewal. At present, a series of policy documents on the renewal of industrial parks have been issued from the national to local levels, including the "Notice of the Ministry of Natural Resources on Carrying Out Pilot Work for the Redevelopment of Low-Efficiency Land" issued by the Ministry of Natural Resources in 2023, which encourages the independent renewal and transformation of low-efficiency industrial land and joint redevelopment, and supports the consolidation and redevelopment of adjacent industrial land. Cities such as Beijing, Guangzhou, Shanghai and Hangzhou have proposed to promote the quality improvement and efficiency enhancement of low-efficiency industrial parks, increase land utilization efficiency and improve service facilities, etc.

As an important part of urban memory, existing industrial parks themselves bear industrial imprints and symbolize industrial civilization. The transformation of external public Spaces during their renewal is also an important issue for improving the quality of urban space in the current era of existing industrial parks[1]. As urban renewal has been elevated to a national strategy, renovating and upgrading the external space of old industrial parks holds significant practical significance for enhancing the vitality of urban development and achieving high-quality urban growth.

At present, the renewal practices of old industrial parks mostly focus on the transformation and functional replacement of the buildings themselves, while the attention paid to the transformation of external Spaces needs to be enhanced. Many external public Spaces in industrial old renovation parks have problems such as uniformity, lack of differentiated design,

and insufficient vitality. The activation and utilization of Spaces are not ideal. The external Spaces of existing industrial parks have a large number of high-quality resources. However, it is difficult to give full play to the advantages of industrial culture and its own value. In view of the many problems faced in the current spatial transformation and renewal, it is urgently necessary to seek a new design idea and perspective at present.

1.1.2 More and better outdoor parent-child interaction spaces need to be built at present

With the full relaxation of the two-child policy in 2016 and the full implementation of the three-child policy in 2021, the continuous growth of the child population has led to an increasing demand for parent-child interaction Spaces. At the same time, in the new era, the interaction concepts between parents and children have changed. They pay more attention to accompanying their children and cultivating their comprehensive qualities. They hope to provide their children with a good growth environment that can promote the simultaneous development of their physical and mental health. Therefore, they have put forward higher requirements for the form and quality of parent-child interaction Spaces. They are no longer satisfied with the entertainment venues in ordinary urban Spaces that are only for play. We pursue more diverse and complex interactive venues that are beneficial to children's growth and can combine education with entertainment.

As children grow up, the family space and indoor space cannot meet their activity levels and the desire for knowledge and exploration. The lack of space in the family environment will prompt families to use public open Spaces[2]. At present, in the face of the integrated development of urban and rural areas, urban land prices are soaring, outdoor game and activity Spaces are constantly being compressed, and there is a shortage of venues for parent-child play and interaction. However, the existing activity venues are mostly uniform activity facilities, lacking interactivity. The designs are mostly from the perspective of children, ignoring the needs of parents. This requires that in addition to the outdoor activity Spaces specifically designated for parent-child use, as many outdoor parent-child interaction platforms as possible should also be built in other urban Spaces. At the same time, the quality of the Spaces should

be improved to create high-quality parent-child interaction Spaces.

1.1.3 **The renovation of public space in existing industrial parks should be combined with the needs of parent-child interaction**

In response to the common problems such as homogenization and lack of vitality in the renewal of public Spaces in old industrial parks, to activate industrial Spaces and achieve differentiated transformation, it is necessary to pay attention to the content that people truly need, are interested in, and have certain cultural value at present. In recent years, the activity methods based on kinship between parents and children have received widespread attention and have a good development trend. In the renewal of public Spaces in industrial parks, considering the combination with the needs of parent-child interaction provides new ideas and directions for industrial transformation projects. It not only provides a parent-child space with industrial characteristics for parents and children, allowing them to experience the unique industrial culture through interaction, but also combines education with entertainment in sightseeing and activities, witnesses growth, enhances communication and emotional relationship between "parents" and "children", and improves children's comprehensive abilities in terms of cultivation, knowledge, education and physical fitness, etc. It can also inspire children's sense of national pride. Enhance national cultural confidence. In addition, it can also well carry forward the culture of The Times and industrial memory, and at the same time drive the development of the surrounding areas of the park.

Especially for some specific types of existing industrial parks with suitable geographical locations, a good foundation for parent-child development in the surrounding area, and spacious and ample space themselves, their space renewal should take into account the combination of parent-child interaction, striving to build a park that not only meets the characteristics and interaction needs of both parents and children but also highlights the industrial and cultural features of the park itself. An outdoor parent-child interactive space that enables parents and children to play, relax and study in the environment, strengthens the emotional connection between parents and children, and promotes parent-child science popularization education.

1.2 **Basic concepts explained**

1.2.1 **Old industrial area**

（1） Existing industrial parks in cities

Urban industrial parks are spaces where industrial production activities are arranged within specific urban areas. As the urban social structure adjusts and the economic landscape transforms, industrial activities have gradually moved away from city centers, leaving behind idle industrial parks and factories that urgently need renovation and reuse. Therefore, existing urban industrial parks refer to those in urban areas that have lost their original industrial functions and are now idle in the post-industrial era.

（2） Renewal of existing industrial parks

The protection of modern urban industrial heritage began in the 1970s. Since the 1980s, discussions on the upgrading and transformation of industrial parks have shifted from a single focus on development and utilization to a multi-dimensional approach to sustainable development. The main directions for the upgrading and transformation of industrial parks are listed in Table 1-1.

Table 1-1 Industrial renovation and renewal direction
(Chart source: self-drawn by the author)

Industrial museum	Public recreation places	Industrial tourism area	Creative industry park
The original structure, facilities and equipment will be retained to protect the heritage in the function of industrial history exhibition and create an exhibition area integrating culture and art.	The industrial wasteland will be updated into a landscape park for leisure and entertainment, and an urban open space coexisting with nature will be created.	Some low-value industrial relics will be combined with urban development to create an integrated industrial tourism area.	Through functional replacement and environmental design update, we will build a creative park integrating leisure, culture, creativity, tourism and commercial services.
			
Shenyang Tiexi New District Museum	Seattle Gas Works Landscape Park, USA	Beijing Shougang Industrial Zone	IBA, Ruhr Region, Germany
(Photo credit: https://image.baidu.com/)			

Today, the protection and renewal of industrial parks emphasize systematic and holistic

approaches, requiring more detailed analysis of the park's spatial layout. Currently, most existing industrial parks in domestic cities are being transformed into cultural and creative industry parks. Based on their original spatial dimensions and basic conditions, smaller parks are often converted into office spaces, while larger, more spacious parks are primarily transformed into comprehensive consumption-oriented creative parks.

The industrial old renovation creative park is a type of creative park that leverages industrial heritage as its value foundation. It utilizes industrial buildings, structures, and other material and intangible cultural relics to transform them into spaces for creative activities, economic activities, science education, and tourism. These parks integrate multiple functions such as leisure, culture, creativity, tourism, and commercial services[3]. The primary activities involve the production and consumption of creative products, endowing the park with unique cultural value and social attributes[4].

1.2.2 **Public space renewal**

Public space renewal refers to the process of revitalizing and enhancing public space in urban areas, which has two dimensions: material and social. The essence of urban public space design is to meet people's various needs and take providing better urban life and quality as the design goal. Its renewal represents a positive development of a city.

The quality and vitality of public spaces, in attracting people to engage in activities, largely depend on whether the space meets people's spatial needs. Therefore, studying the psychological needs and behaviors of people within the space can guide its optimized design. The value of public spaces is realized through the diverse activities of people within them, fundamentally supporting public activities. Without human behavior and activity, the space would become a lost place.

1.2.3 **Parent-children interaction area**

1.2.3.1 **Parentage**

There are various interpretations of parent-child relationships: 1. At the biological genetics level, it refers to the blood-related connection between parents and children[5]; 2. At the sociological level, it refers to the social relationship between parents and children, emphasizing

legal and status connections; 3. At the psychological level, it refers to the emotional bond between parents and children[6], which is a significant aspect of individual and social life.

In a broad sense, parent-child relationship mainly refers to the intergenerational relationship in a family. "kin" refers to the family members other than children, including the parents of children and the grandparents of the previous generation. In a narrow sense, parent-child relationship specifically refers to the affection between parents and children[7].

This paper mainly focuses on the narrow sense of parent-child relationship, "parent" specifically refers to parents, "child" specifically refers to minor children, and parents and children are the closest direct blood relatives.

1.2.3.2 **Parent-children interaction**

Parent-child interaction involves the mutual influence and psychological engagement between parents and children [8], characterized by blood ties, kinship, and long-term nature[9]. Family affection serves as the bond that sustains the parent-child relationship, and a harmonious parent-child relationship is built on a foundation of positive interaction. Therefore, parent-child interaction is not a one-sided act where one party holds the initiative; it is a two-way, interactive relationship between 'parent' and 'child.' Only by meeting the dual needs of both parents and children can parent-child interaction be meaningful.

The communication activities between parents and children belong to the scope of parent-child interaction. Parent-child interaction can provide a two-way equal communication and learning opportunity for parents and children, so that parents can shape children's comprehensive ability from daily interaction, and promote the positive and healthy development of psychology and body.

1.2.3.3 **Parent-child interaction area**

（1） Definition

Parent-child space is a place created for the behavior activities of parent-child groups, which can meet the needs of both "parent" and "child" in terms of behavior patterns and psychological characteristics[10]. The design of parent-child space is conducive to enhancing the emotion between parents and children, practicing and reflecting on parent-child education methods, and enriching the spiritual life of parent-child families.

（2） Classification

Parent-child interaction space includes indoor parent-child interaction space and outdoor parent-child interaction space. Most of the indoor parent-child interaction space is located in closed buildings, such as parent-child playgrounds and parent-child restaurants in shopping malls, while the outdoor parent-child interaction space is located in more open urban public Spaces, such as urban parks and open playgrounds.

This paper focuses on the combination of parent-child interaction and outdoor space. According to previous studies, there are many different ways to classify outdoor parent-child interaction space (Figure 1-1):

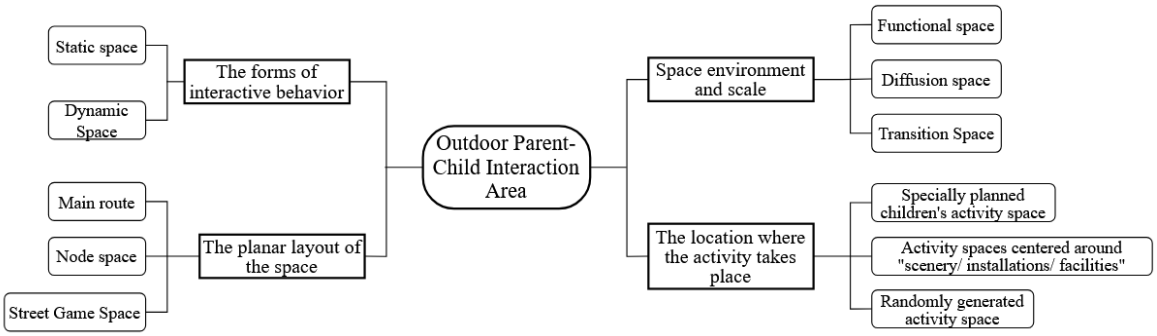


Figure 1-1 Classification of outdoor parent-child interaction space
(Image source: self-drawn by the author)

1. Based on the 'dynamic' and 'static' types of parent-child activities in space, outdoor parent-child spaces can be categorized into static and dynamic types. Dynamic parent-child spaces are designed for more intense and vigorous activities, such as climbing, running, exploring adventures, and playing on trampolines. In contrast, static parent-child spaces are suitable for more relaxed and gentle activities, such as watching movies together, enjoying scenic views, and listening to stories[11].

2. Based on spatial structure, spaces can be categorized into functional spaces, diffusion spaces, and transitional spaces. Functional spaces are typically linear, such as roads primarily for pedestrian traffic. Diffusion spaces are larger, more expansive areas, like squares or expanded nodes. Transitional spaces are scattered in a point-like form, such as areas along roads where people can rest, linger, or engage in activities[12].

3. According to the plan layout of the activity space, it can also be divided into main routes, node squares and street game Spaces.

4. According to the place where parent-child activities take place, they can also be divided into specially planned children's activity space, activity space centered on "landscape/installation/facility" and randomly generated activity space[13].

1.3 Study review

1.3.1 Research on parent-child interaction

1.3.1.1 Theoretical research on parent-child psychology

（1） Behavioral and environmental psychology

Environmental psychology primarily focuses on the psychological experiences of individuals in their environment. It posits that behavior encompasses not only observable activities and patterns but also includes psychological processes and phenomena such as sensation, perception, and cognition, analyzing people's cognitive responses and psychological traits in the context of their environment using psychological theories and methods[14]. The theoretical framework of environmental psychology covers the perception process, emotional responses, and the impact of the environment on individual psychology. In recent years, it has been widely applied across various disciplines, including urban planning and design, architectural design, and landscape design, to address a variety of environmental challenges.

1. Sensory experience

Sensation is the individual's subjective response to objective reality, serving as the fundamental means of information exchange between humans and their environment. When external stimuli act on a person's sensory organs, the brain integrates these stimuli based on their physical characteristics and interrelationships, forming an individual's subjective perception. The process of sensation relies on the coordinated work of multiple sensory organs, primarily involving five basic senses: vision, smell, taste, touch, and hearing. Each of these senses plays a crucial role in the formation of overall perception. Synesthesia refers to the phenomenon where different sensory stimuli interact, allowing multiple sensory stimuli in the environment to either enhance or inhibit each other, thus influencing an individual's perception of the overall environment. Of course, human sensory experiences are also influenced by various factors, such as physiological differences, emotional states, cultural backgrounds, and

personal experiences.

2. Emotional arousal

Emotions are a complex concept that encompasses behavior, psychological changes, and subjective experiences. Awakening refers to the activation of a physical state to maintain its activity. Emotions have two attributes: intensity and form. The intensity is determined by the level of arousal, while the form is shaped by cognition and evaluation. Brehm studied the relationship between environmental uncertainty, arousal, and emotional evaluation. As environmental uncertainty increases, the arousal level increases in a linear manner, also continuously rising; however, emotional evaluation shows an inverted U-shaped curve with environmental uncertainty. This means that as environmental uncertainty increases, it first rises, then falls, reaching its peak in the middle (Figure 1-2). Therefore, an environment with moderate uncertainty is the best for maintaining interest and stimulating the motivation to explore.

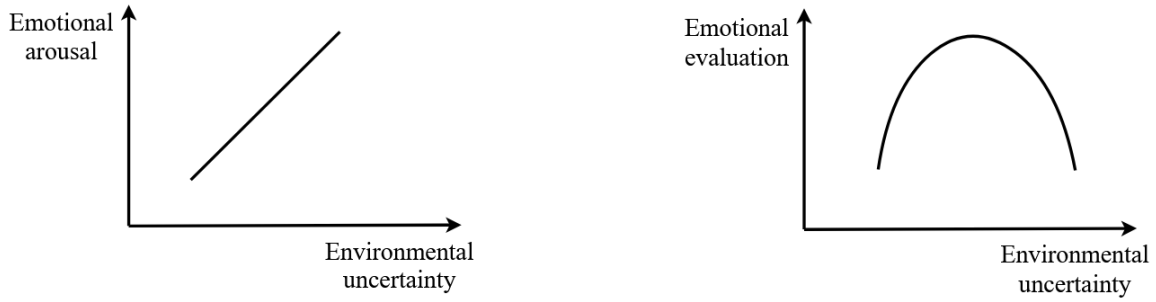


Figure 1-2 The relationship between environmental uncertainty and arousal and emotional evaluation (Image source: redrawn by the author)

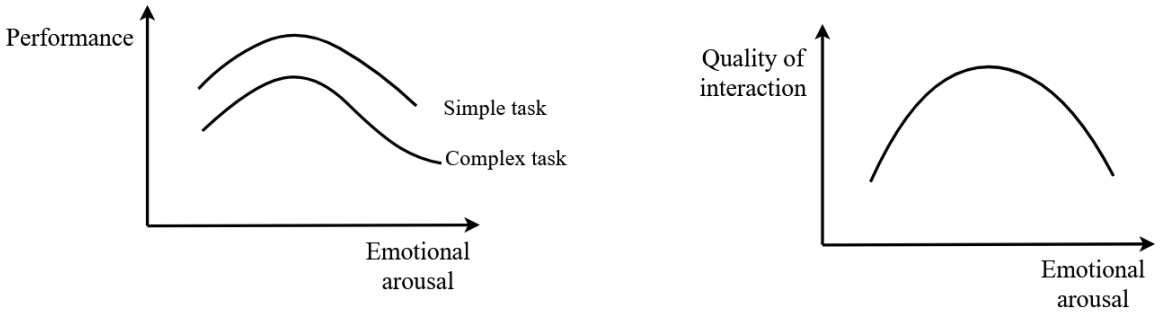


Figure 1-3 The relationship between wake-up and performance, interaction quality (Image source: redrawn by the author)

The Yerkes-Dodson Law also suggests that optimal stimulation and performance are achieved only when the level of arousal is moderate (Figure 1-3). This leads to more positive parent-child emotions, which in turn enhances communication and interaction between parents

and children, promoting healthy parent-child interactions. Therefore, in parent-child interactions, overly mundane or complex environments can lead to low mood[15], thereby weakening the interaction and communication between parents and children.

When designing parent-child interaction space, it is necessary to control the principle of moderation and make the emotional evaluation at its best value, which is more conducive to the interaction between parents and children.

（2） Developmental psychology

The field of developmental psychology, which originated from child psychology, was significantly refined in 1980 when German psychologist Elfriede Belscher introduced the 'lifelong development' theory. This theory focuses on the study of psychological development patterns, examining phenomena and uncovering the underlying principles of psychological development[16]. The research spans various stages of life, including infancy, early childhood, preschool age, childhood, adolescence, young adulthood, middle age, and old age. The entire lifecycle of an individual, from conception to birth and through aging, is referred to as the developmental process. Key figures in the field of developmental psychology include Sigmund Freud, Jean Piaget, Erik Erikson, Carl Stern, Alfred Adler, and Lawrence Kohut (Table 1-2).

Table 1-2 Major theories of developmental psychology
(Chart source: self-drawn by the author)

Branch of learning	time	figure	theory	brief introduction
This discipline (psychanslysis)	1900	Freud	Psychoanalytic theory	The concepts of id, ego and superego are proposed. The so-called "Oedipus" complex is used to explain children's identification with their parents. This identification has an impact on children's behavior, which eventually leads to the development of children's own gender development and the formation of gender roles.
This discipline (psychanslysis) sociology		Ericksen	Psychosocial development theory	It is believed that the gradually formed self plays a major role in human development. The stage theory is proposed: Infancy (0~3) years: gain a sense of

Branch of learning	time	figure	theory	brief introduction
				trust, overcome the sense of doubt; gain a sense of autonomy, overcome the sense of shame; Early childhood (3~6 years old): gain a sense of initiative, overcome guilt; Childhood (6 to 12 years old): gain a sense of diligence and overcome feelings of inferiority; there are also adolescence, early adulthood, middle adulthood, and late adulthood.
This discipline (Spiritual analysis —— developing the self)		bridle	Separation-individuation theory	The development of self-psychology focuses more on the psychological development of children aged 0-3.
This discipline (Spiritual analysis —— developing the self)	1985	Steane	The theory of psychological development stages of infants and young children	It is believed that infants' sense of self (sense of self), social emotional competence, and the way they get along with others are in a process of progressive accumulation and development, and remain throughout life. The hierarchical accumulation of self sense promotes the connection between infants and others.
This discipline (cognitive science)	1955	Piaget	cognitive development theory	It is believed that psychology, intelligence and thinking do not originate from innate maturity or acquired experience, but from the action of the subject. The psychological development of human beings is divided into four stages: 1. the stage of perception and movement; 2. the pre-operational stage; 3. the concrete operational stage; 4. the formal operational stage.
This discipline (Spiritual analysis, cognitive science) ecology		Balne	Attachment theory	The emotional bond between children and their primary caregivers (usually mothers) is an important foundation for children's psychological security and social adaptation. Secure attachment helps children build trust, which has a profound impact on their future social

Branch of learning	time	figure	theory	brief introduction
				relationships and emotional development.
This discipline (Cultural history)		Vygotsky	Social and cultural development theory	It emphasizes the central role of social interaction and culture in individual cognitive development. It is believed that children can truly understand and master various cognitive skills and knowledge through communication with adults and peers, especially in guided interactions.
This discipline (actionism) sociology		Bandura	social learning theory	It mainly discusses the process of individual learning behavior through observation, imitation and interaction, and emphasizes that learning is realized by observing the behavior and results of others. Children form their own standards of self-evaluation in observational learning, and then adjust their ideas and change their behavior. It has focused on aggression, gendering, self-reinforcement and prosocial behaviour.

Developmental psychology provides a theoretical framework for individual development for the study of parent-child relationship, and emphasizes the key role of parent-child interaction in children's psychological, emotional and social development. In particular, Piaget's cognitive development theory, Erikson's psychosocial development theory and Bandura's social learning theory are very helpful to understand and study children's behavior.

1.3.1.2 **Factors influencing parent-child interaction**

（1） Gender of the child

Sociological theory suggests that individuals learn and develop psychological traits, such as values and attitudes, within specific social contexts. They also learn and master behavioral patterns to adapt to various social environments. Bandura, a key figure in social learning theory, introduced the concept of 'observational learning' to explain the imitation process. He posited that children can learn and mimic new behaviors by directly observing others' actions in social settings.

The family is an integral part of society, and as a crucial setting for early socialization, the role of parents is unparalleled. Children primarily learn through imitation, observing and mimicking their parents. The assimilative influence of parents on children can also impact gender development, as different genders exhibit certain behavioral patterns, as shown in Table 1-3. Boys often learn from and mimic their fathers 'behaviors, while girls tend to emulate their mothers' actions.

Table 1-3 Gender development differences between boys and girls
(Chart source: compiled and drawn by the author)

	Male student	Female student
Model and characteristics	Father, stronger and more powerful Like competitive sports, competition, sports and other dynamic activities	Mother, more gentle and kind They prefer cooperative, leisure and other relatively static activities
Favorite game genre	Structural games, fighting games	Candies, plush toys, art game materials
Performance in the game	Good negotiator and can disagree with people. Gaming groups tend to be larger and more organized, and they like games that don't have established rules.	They often use language to communicate and make suggestions. Games are usually played in groups, taking turns to play to avoid conflict.
Different behavioral characteristics	They prefer to play games independently and are interested in adventure, exploration and defiance of authority.	They like to seek help from their surroundings, prefer to play quietly and explore cooperative relationships

（2） Childhood temperament

Children are born with certain basic temperaments, which evolve through their interactions with the external environment. Research indicates that the development of children's temperament is influenced by their parents' behaviors, particularly the mother's behavior, which has a particularly significant impact[17]. Additionally, during parent-child interactions, factors such as parenting styles, personality traits, educational background, and social environment all influence the psychological and behavioral development of children.

The temperament of children refers to the relatively enduring personality traits that manifest in their psychological activities, which are reflected through their behavioral patterns and individual characteristics. Due to the diverse personalities of each child, the temperaments

they develop also vary. According to Thomas and Chess's temperament theory, children can be categorized into four types: easy-to-raise, average, slow-to-warm-up, and difficult-to-raise, as shown in Table 1-4. Children who are easy to raise often form a harmonious parent-child relationship with their families.

Table 1-4 Four temperament types of children
(Table source: compiled and drawn by the author)

	Easy to raise	Chronic	Hard to raise	intermedius type
Characteristics of temperament	They are positive, adaptable to environmental changes, like to explore new things, and have the most moderate relationship with their parents.	The activity level is low, the mood is easy to be negative, the adaptation to the environment and new things is slow, and there will be a withdrawal reaction.	Emotional response is intense, irritable and anxious, it is difficult to adapt to the new environment, resistance to new things.	It has two or three temperament characteristics at the front, which is a mixture of the first three temperament characteristics.
Interactional situations	Parents and children get along well and can communicate with each other.	It is difficult to communicate and interact effectively.	Parent-child interaction is more negative.	This type of child should be treated on a case-by-case basis.
Interactive needs	Parents encourage their children to respond positively and effectively, which can attract more attention from adults.	Parents need to be more affectionate and educated to cultivate their interest in new things and self-confidence.	Parents need to be more patient with their children and spend more time in pleasant environments such as nature.	It depends on the specific situation.

There is a close relationship between children's temperament and parent-child interaction, which indicates that parents should care more about their children and pay attention to the quality and frequency of parent-child interaction, so as to help children develop good personality.

（3） Parenting

The interaction between parents and children is crucial for a child's development, particularly in cognitive and social aspects. Children's behavioral patterns and personalities are influenced by their parents 'parenting styles. During the growth stage, children have limited

cognitive abilities to understand things and often learn by imitating their parents' behaviors. The communication and educational methods used between parents and children directly shape the children's behavior.

The impact of family education on children is lifelong. Parents play a crucial role in guiding their children's living habits and moral standards, and they should set a good example for their children. Each family has its unique parenting style. American psychologist Baumrind, through his research and analysis, identified four primary parenting styles: authoritative, authoritarian, permissive, and neglectful, as shown in Table 1-5.

Table 1-5 Four parenting styles of parents
(Table Source: compiled and drawn by the author)

	Authoritative	**Authoritarian**	**Indulgency pattern**	**The neglectful type**
Feature	Set certain behavioral standards for your child. Positive attitude towards children.	Protect and supervise all the child's behavior. Be cold to your children.	Lack of control over children's behaviour. Have a positive attitude towards your child.	Lack of feedback on children's behaviour. Neglectful attitude towards children.
Advantages and disadvantages	Pay attention to your child's needs and encourage them to express their feelings, thoughts and wishes.	Emotional or psychological control of children, children fear their parents, do not want to communicate.	The relationship is good, but they are too indulgent and lack control over their children.	Lack of affection, ignoring the inner needs and feelings of children.
Interactional situations	Timely feedback, mutual respect and recognition between parents and children.	Neglect the child's own demands and wishes.	Parents are in a weak position in the interactive relationship.	Poor parent-child relationship and poor interaction.

In addition, family atmosphere, economic conditions, parents' educational level and so on will affect the choice of parenting style, which has a direct or indirect impact on the interaction behavior between parents and children.

1.3.1.3 **The evolution of the concept of parent-child interaction**

By comparing the differences in parenting environments across different generations and analyzing the variations in parenting philosophies and interactions among parents of various

age groups, we can better understand the needs of parents in today's parent-child interactions. Parents are categorized into three age groups: young, middle-aged, and elderly, and compared with parents from the 1950s and 1960s, the 1970s and 1980s, and the 1990s and 2000s (Table 1-6).

Table 1-6 Parenting views of parents in different generations
(Table Source: compiled and drawn by the author)

	50s, 60s	70s, 80s	90s, 00s
Life experience	They were caught up in the planned economy, faced with material shortage and basic survival problems. The previous generation had no time to pay attention to their growth and development, education, emotional needs.	There are often multiple children in the family, who are raised from an early age and whose emotional needs are largely ignored, but their material and spiritual lives have improved a lot.	Most of them are the only children in their families, who bear all the expectations of their parents and are forced to learn knowledge. Generally, they lack time and opportunities for play and leisure.
Childcare background	1. Living standards have risen and almost everyone has multiple children. 2. The era of opportunity attaches importance to career struggle and tends to ignore the growth needs of children.	1. With the family planning policy, most of the children are single children. 2. With the development of information technology, we can hear the voices from the outside world and broaden our thinking.	1. Open up to encourage multiple births, and families with multiple children as well as only children. 2. Information technology is mature, easy to access outside opinions and views, usually more independent.
Child-rearing methods	Traditional parenting. Pay attention to the traditional experience passed down by the older generation.	Parenting that combines tradition and modernity. The subconscious is influenced by the traditional parenting views of the previous generation, but as the horizon broadens, they will also learn some new parenting knowledge on their own.	Scientific parenting. Don't agree with the old generation who give in to children without limits. Be very willing to take the initiative to learn a lot of advanced parenting knowledge.
Parenting concepts	1. Have the idea of self-dedication, work hard and be willing to help when children have emotions, such as comforting	1. Realize that beating and scolding children is not a correct and effective way of education, respect their own ideas, get along with children	1. Pursuing a parent-child relationship like that of friends, respecting children as individuals with thoughts, often setting a good example

	50s, 60s	70s, 80s	90s, 00s
	children. 2. Believe in "stick education" and be strict with children, but pay insufficient attention to their emotional and psychological conditions in the process of growth.	in a more equal way, and hope to make progress together through positive guidance. 2. Recognize the importance of learning and education, believe that knowledge changes destiny. Pay special attention to children's development in learning, but also give children necessary guidance and help in other aspects.	by oneself, not blindly spoiling them, but mainly guiding them. 2. Pay more attention to comprehensive development of children's overall quality, not just on grades; 3. Willing to spend time with their children and help them grow up, but support parenting while enjoying life at the same time.
Interaction attention	There is little conscious parent-child interaction.	They are becoming aware of the value of parent-child interaction.	Attaching great importance to participating in parent-child interaction and parent-child relationship.

As times have evolved, the concept of parent-child interaction has also changed to some extent. Nowadays, parents in the parent-child community generally recognize the importance of parent-child interaction and actively engage in a variety of activities with their children. In these interactions, they do not solely focus on the child; they also have personal expectations and desires to be satisfied. Therefore, the design of parent-child spaces should take into account the feelings and experiences of parents.

1.3.2 **Research on the space of parent-child interaction**

1.3.2.1 **Current situation of overseas research**

Foreign countries have carried out earlier research in the field of parent-child interaction space, and have formed a relatively complete theoretical basis, and the scope of research is quite extensive.

In the theoretical domain, it covers the characteristics of behaviors between parents and children, the spatial needs for parent-child interaction, and the design strategies for parent-child spaces. Additionally, many urban public spaces have specifically designated areas for parent-child interaction. In his book 'Communication and Space[18], Yang Gai analyzed the relationship between children and their environment, explaining children's habits in activities and play, and

proposed that parent-child interaction has an instinctive tendency, providing design guidelines for parent-child interaction spaces. In his book' Play and Child Development[19], Joe L. Frost emphasized the crucial role of play in children's development, particularly in cognitive, social, and emotional growth, and provided guidance on the construction of play areas from both psychological and practical perspectives, advocating for the creation of interactive and creative play environments. In his book 'Research on Urban Parks and Open Space Planning and Design' [20], Alexander Gavin studied and summarized specific design cases of numerous parks and open spaces, summarizing methods for designing spaces that meet the needs of parent-child interaction, offering valuable references for the design of parent-child interaction spaces. In her book 'Human Places: Guidelines for the Design of Urban Open Spaces[21], Carolyn Francis conducted in-depth research on childcare open spaces, considering the needs of children at different age levels, and comprehensively summarized and summarized the key points of designing children's activity areas.

In practical applications, many countries have specifically planned spaces for parent-child activities in urban public areas. These spaces cater to the diverse play needs of children during their growth, offering more opportunities for interaction and enhancing parent-child relationships. Meanwhile, international outdoor area designs have effectively integrated elements of parent-child activities into space planning, featuring a variety of interactive projects. For example, Tokyo's tire playground uses countless tires to create facilities like dinosaurs, swings, and slides, with numerous tires scattered around for families to climb, stack, and roll. The Hart Mill Children's Playground in Australia, based on the history of flour mills, has designed play facilities suitable for different age groups, from young children to teenagers and even adventurous adults. Additionally, many private residences in Western countries have created unique interactive spaces through courtyards and rooftops.

1.3.2.2 **Status quo of domestic research**

Compared to foreign countries, the study of parent-child interaction spaces in China is still in its early stages. Currently, most research focuses on children's education and child development psychology, with fewer studies from a design perspective. In recent years, there has been a noticeable increase in papers and books related to spatial design, primarily divided

into indoor and outdoor parent-child spaces.

Research on indoor spaces for parent-child interaction has become increasingly diverse, including parent-child themed restaurants, home environments, picture book libraries, tea rooms, museum spaces, and library spaces. For instance, Ye Jiaxing (2021) analyzed the psychological and behavioral traits of children and the patterns of parent-child interactions during reading, proposing design principles for children's reading spaces[22]. Hong Huimin (2022) focused on the design of suburban parent-child homestay spaces, exploring design principles and strategies in this context[23]. Fang Wen and Zhou Weiwei (2023) explored the concept and current state of experiential parent-child dining spaces, integrating the developmental characteristics of children with product design principles to propose design strategies for such spaces[24].

Currently, research on outdoor parent-child interaction spaces remains relatively broad. Most studies focus on kindergarten grounds, children's theme parks, amusement parks, urban parks, and residential areas. Li Xibo (2014) analyzed the factors influencing parent-child interactions, categorized types of parent-child activities, and proposed design principles for outdoor parent-child interaction spaces[25]. Xu Xuemeng (2017) studied the needs of both parents and children, surveyed the current state of interactive spaces in residential areas, and suggested that space creation should integrate with nature and emphasize improvements in form and scale[26]. Sun Yuxuan and Luo Zhengli (2021) analyzed the issues in residential area parent-child spaces from the perspective of parent-child interaction behavior needs and proposed corresponding strategies[27]. Jiang Haoran (2022) explored children's preferences by interpreting their paintings, proposing design principles and strategies to revitalize parent-child interaction spaces in urban parks[28].

At the same time, many current designs for parent-child interaction spaces focus primarily on children's perspectives, often overlooking parents as key participants in these interactions. For instance, Zhang Ying points out that in many children's activity venues, parents are often relegated to a subordinate role, and designers frequently overlook their needs, resulting in a lack of genuine parent-child spaces[29]. Huang Qilin suggests that the creation of outdoor parent-

child spaces should not only focus on children's activities but also consider the needs of parents from different age groups[30]. Duan Li proposes that combining static and dynamic parent-child spaces can enhance the variety of parent-child activities, meeting the diverse needs of different types of parent-child relationships[31].

1.3.3 Research on the renewal of public space in old industrial parks

1.3.3.1 Attention to public space in the renewal of existing industrial parks

On the whole, there are not many academic studies focusing on the external space design and renovation of existing industrial parks, but there is a trend of increasing in recent years, which shows that the attention to the renovation and renewal of public space in the current renewal of existing industrial parks has been improved. The existing literature is organized according to the timeline as follows:

Table 1-7 Literature review of public Spaces in old Industrial Parks
(Table source: compiled and drawn by the author)

Year	Author	Title of paper	Research contents
2007	Xiao Dong Xu, Xuan Ren	Preliminary study on the reuse of old industrial sites and the creation of external space [J].	This paper introduces the development background and practice of the reuse of old industrial areas, discusses the theoretical support of external space construction, and seeks a design method to promote the renovation of old industrial parks[32].
2015	Zhang Sumin	Analysis of the dynamic elements of the transformation of the external space of the old industrial area——Taking Shenzhen as an example [J].	Take the transformation case of old industrial area in Shenzhen as an example, analyze and summarize the dynamic elements of external space transformation, and discuss the problems of spatial dynamic design in space transformation[33].
2020	Zou Yuxiang	Creating Open Spaces in the Transformation of Industrial Heritage —— A Case Study of Jingdezhen Art Porcelain Factory [J].	Taking the renovation project of Jingdezhen Art Porcelain Factory as an example, this paper explores the construction of open space in the renovation of industrial heritage from the perspective of the organization mode, scale, nodes and paths of open space[34].
2020	Cheng Wei	Research on the evaluation of the value of the external space transformation of industrial heritage under the guidance of stock development [D].	Establish a spatial value evaluation index system, establish a value evaluation model, and verify the scheme through the Yunnan 871 Creative Workshop scheme to put forward suggestions for the improvement of the

Year	Author	Title of paper	Research contents
			scheme[35].
2020	Xin Lu, Jiang Haitao	Open Space Design in the Transformation of Industrial Heritage [J].	The significance of open space in the transformation of industrial heritage is expounded from the perspective of city and architecture, and the spatial design is analyzed in detail with Songshan Cultural and Creative Park and Huashan 1914 Cultural and Creative Park as examples[36].
2024	Nie Chuanen, Chen Yabin, Liu Wenbo	Strategies for improving the quality of public Spaces in the renewal of industrial parks —— Taking ZhiChuang Supply Town in Binjiang District, Hangzhou as an example [J].	From the perspective of improving the quality of public space in the renewal of existing industrial parks, this paper puts forward the strategies of overall pattern improvement, classified special improvement and local plot improvement, and takes the urban design of Smart Manufacturing Supply Town in Binjiang District, Hangzhou as the practical application[37].
2025	Zou Bailin	Exploration of design strategies for public Spaces in Urban Industrial Parks —— A Case study of Seeking Tranquility [J].	This paper discusses the spatial transformation of industrial parks from the three aspects of "retention, improvement and optimization", and explores the core elements of urban industrial park design strategy[38].
2025	Wang Dong, Shengshi Jia, Qin Sudoong	A study on the activation strategy of industrial heritage open space based on walking suitability: A case study of Xuzhou Creative 68 Industrial Park [J].	From the perspective of walking, this paper systematically discusses the optimization strategies of open space of industrial heritage by analyzing the case of Creative 68 Industrial Park and summarizing the problems [39].

In addition, it is also found from the practice of a large number of industrial park renewal projects that most of the existing industrial park renewal focuses on the improvement of the development capacity of the park, and focuses more on the replacement and renewal of the function of the factory building itself, while neglecting the transformation and improvement of the external public space of the park.

1.3.3.2 **The combination of industrial space stock renewal and parent-child interaction**

Su Jia (2015) noted in his article that the spatial renewal of existing industrial parks can be achieved through landscape design techniques, creating unique spatial types. These designs can integrate entertainment activities with industrial heritage, utilizing the natural ecological

environment, industrial buildings, and equipment on abandoned industrial sites to develop indoor themed entertainment, outdoor expansion projects, health and wellness resorts, outdoor leisure, and children's activities. This approach allows people to relax and experience a special lifestyle amidst the monotony of urban life and busy work schedules[40]. It is evident that scholars have long recognized the connection between diverse group activities and the reuse of industrial heritage, and their positive integration can create a promising future.

Currently, there are only a few studies that combine parent-child activities and interactions with industrial heritage, industrial buildings, and spaces. Only two related papers have been published in the past three years, indicating that this field is still in its early stages. Wu Han (2023) explored the potential of transforming industrial heritage buildings into parent-child educational bases in his paper[41], focusing on the architectural domain. Scholars Cao Pan Gong and Wu Xing Yu investigated the benefits of integrating industrial heritage with parent-child interactive spaces and proposed initial design strategies[42].

1.3.4 **Summary of domestic and foreign research**

Theories of environmental psychology, developmental psychology and cognitive psychology are helpful to the study of interactive behaviors among parent groups.

Foreign studies on parent-child interaction and space tend to focus more on children, but the content related to children is more comprehensive and perfect than that in China. The child-friendly design of urban public space has been paid attention to from both theoretical and practical aspects for a long time, which has good reference value for this study.

Research on the integration of parent-child interaction and space in China primarily focuses on indoor environments, with a substantial amount of research dedicated to the detailed analysis of various types of indoor spaces. In contrast, studies on outdoor public spaces, such as parks, residential areas, and playgrounds, are more common, but there is a lack of research on different types of outdoor venues. Moreover, current research on parent-child interaction and space often focuses on psychological aspects, using psychological theories for analysis. Additionally, many studies are from the children's perspective, often overlooking or underestimating the needs of parents.

Due to the late start of the renovation and renewal of idle industrial parks in China, there is a lack of academic research on this topic. Most studies focus on practical cases of actual renovations. Additionally, from the numerous ongoing industrial park renewal projects, it is evident that most efforts concentrate on increasing the development capacity of the parks, while paying insufficient attention to enhancing the quality and renovating the public spaces within these parks.

At present, there are few cross studies on parent-child interaction and industrial space renewal. At present, the integration of industrial space and parent-child activities is mostly in the practical stage, and lacks systematic research.

1.4 **Research purpose and significance**

1.4.1 **Purpose of research**

The renovation of public spaces in existing industrial parks is essential for the high-quality development and enhancement of urban space quality. However, current spatial renovations often suffer from issues such as homogenization and a lack of vitality. There is an urgent need to align the renovation direction with the current focus on parent-child interaction and the demand for spaces that foster such interactions. This article offers a new perspective on the renovation of external public spaces in existing industrial parks.

This study takes the creation of parent-child interaction scenarios as the entry point, and explores the renovation and improvement strategies for the external public spaces of specific types of old industrial parks. Before the research was conducted, the types of old industrial parks suitable for the perspective of parent-child interaction renovation were defined and clarified. Then, the contents related to the creation of parent-child interaction spaces were systematically organized, including summarizing the physical and mental, psychological, behavioral characteristics of parents and children, as well as the types of parent-child interaction. Relevant theories were sorted out, and common design strategies for parent-child spaces were summarized. Subsequently, the development process of the renovation of old industrial parks, common problems of their spaces, the benefits of combining the creation of parent-child spaces with the space renovation of existing industrial parks were clarified, and strategies for creating

parent-child interaction spaces in old industrial parks were supplemented, along with operation steps. Then, a field survey was conducted in Shanghai Wisdom Bay Creative Park, and design practice was completed to verify the operability of the measures.

1.4.2 **Research meaning**

1.4.2.1 **Theoretical significance**

At present, the integration of public space renewal in existing industrial parks and interactive spaces for parents and children mostly exists in the practical stage. This study explores the possibility of combining industrial space renewal with interactive scenarios for parents and children and proposes strategies for creating interactive scenarios for parents and children in the old industrial park spaces. Given the current research on interactive spaces for parents and children mostly focuses on general urban public spaces such as communities and parks, with less attention paid to different types of venues, this study supplements measures and methods for creating interactive scenarios for parents and children in this specific type of venue, industrial parks. At the same time, it provides a more positive supplementary significance for the current theoretical and strategic updates of external public spaces in existing industrial parks, offering a novel perspective and triggering thoughts on the development of urban stock.

1.4.2.2 **Realistic meaning**

The renewal of public spaces in existing industrial parks is a requirement for the high-quality development of cities and the improvement of urban spatial quality. Currently, most public spaces suffer from homogenization and lack of vitality. It is urgent to combine the renewal direction with people's current needs. Based on the current focus on parent-child interaction and parent-child interaction spaces, this paper provides a new design perspective and direction for the renewal of public spaces in existing industrial parks, especially for those existing industrial parks with a good foundation for parent-child development, a shortage of parent-child interaction spaces in the surrounding area, and spacious and abundant space. The discussion and specific design practice in the research on the combination of the renewal of public spaces in old industrial parks and the creation of parent-child interaction scenarios provide practical guidance for the creation of external parent-child scenarios in similar old industrial parks.

1.5 Research content and method

1.5.1 Research contents

This paper explores the feasibility and strategies for integrating the spatial renewal of existing industrial parks with the creation of interactive spaces for parents and children. Firstly, it defines the basic conditions that an old industrial park must possess to meet the requirements for creating a parent-child scenario. Then, it delves deeper into how to combine the creation of parent-child scenarios with the old industrial space. It first systematically studies the content related to the creation of parent-child interactive spaces, including the characteristics of the parent-child subjects and the types of interaction, the theoretical basis and design strategies for creating parent-child spaces. Then, it studies the strategies for creating parent-child interactive scenarios for the old industrial park space, including summarizing the development process and space deficiencies of the old industrial space renewal, clarifying the positive significance of creating parent-child scenarios in the old industrial space, collecting and learning practical cases of the integration of industrial park space and parent-child activities, summarizing the differences in creating parent-child scenarios between the old industrial space and general urban public spaces, and proposing targeted supplementary strategies and operational methods. Next, a suitable Shanghai Smart Bay Creative Park is selected for on-site investigation to assess the compatibility of different types of spaces in the park with parent-child scenarios. Finally, a design practice is completed based on Shanghai Smart Bay as an example, providing detailed suggestions for creating parent-child scenarios in different types of spaces, and selecting an area to complete a specific scheme design.

1.5.2 Research methods

（1） Literature analysis

Based on the themes of old industrial park renovation and parent-child interaction spaces, a large number of relevant literature materials such as books, journals, doctoral and master's theses, and theoretical works from both domestic and international sources were collected and sorted out. The research experiences of domestic and foreign scholars on parent-child interaction and space renewal were analyzed and summarized. At the same time, the physical,

psychological, and behavioral characteristics of parents and children, as well as the types of parent-child interaction, and the related theories and design strategies for creating parent-child spaces were systematically organized.

（2） Case study method

This paper collects and analyzes a number of domestic and foreign practical cases related to parent-child interaction and industrial space renewal, sorts out the enlightenment of combining industrial space renewal with parent-child interaction in these cases, accumulates and summarizes excellent experiences and practical methods, and provides reference and support for the targeted strategies of external space renewal of old industrial parks based on the perspective of parent-child interaction in the following text.

（3） Questionnaire survey

A survey was conducted among the parent-child groups within the Shanghai Wisdom Bay Old Town Renovation Creative Park to understand the basic structural characteristics of these groups, the composition of the traveling population, the needs for parent-child interaction, and their spatial cognition. This process not only provided a solid foundation for subsequent analysis but also ensured the objectivity and authenticity of the research, thus offering robust data support for the conclusions and recommendations of the thesis.

（4） Method of behavior observation

The method of behavior observation was used to carry out field research on the space of the old reform park in Wisdom Bay, so as to understand the current situation of the spatial environment and the behavior activities of parents in the park, and find out the existing problems in the current spatial renewal of the old industrial park, so as to lay a foundation for the subsequent targeted spatial renewal strategy and specific design practice.

（5） Interdisciplinary research

Based on the behavior demand theory, this paper combines the research results and theoretical knowledge of environmental psychology, child development psychology in the direction of parent-child research, social learning theory and other related disciplines, and comprehensively applies the achievements of multiple disciplines to this study, so as to conduct

a more comprehensive analysis of the research problems and guide the spatial renewal design.

1.6 **Research framework**

The first chapter, the introduction, raises the questions and introduces the research background. It clarifies the research background, research objects, research purposes and significance, research contents and methods, and proposes the research framework.

Chapter 2 and Chapter 3 are studies on the strategies and methods for creating parent-child scenarios in the old industrial parks. Before the research began, the types of existing industrial parks suitable for creating parent-child interaction scenarios were first defined. Then, Chapter 2 mainly focused on the research on the relevant contents of creating parent-child spaces, and sorted out and summarized the characteristics of the parent-child subjects, types of parent-child interaction, relevant theoretical foundations, and general spatial strategies. Chapter 3 mainly studied the strategies for creating parent-child scenarios in the old industrial parks. It first reviewed the development process of the renewal of old industrial spaces and the common problems in public spaces, clarified the positive significance of creating parent-child interaction spaces in old industrial parks, and then combined relevant actual cases at home and abroad, analyzed and summarized the differences in creating parent-child scenarios in old industrial spaces and general urban spaces, and proposed targeted supplementary strategies and operational methods.

Chapter 4 and Chapter 5 are field research and design practices of the external public space of Shanghai Smart Bay Industrial Old Renovation Creative Park. Chapter 4 mainly conducted on-site research on the environmental status, parent-child behavior demands, and parent-child behavior activities of Shanghai Smart Bay Creative Park through questionnaire surveys and behavior observations, clarified the compatibility of different types of spaces in the park with parent-child scenarios, and clarified that not all spaces in the park are suitable for supporting parent-child activities, and different types of spaces with different characteristics support different types of parent-child activities, preparing for the subsequent specific design. Chapter 5 mainly focuses on the design practice of creating parent-child interaction spaces in Shanghai Smart Bay Creative Park, proposed more detailed design suggestions for the types of spaces in

the park, and selected an area to complete a specific design plan.

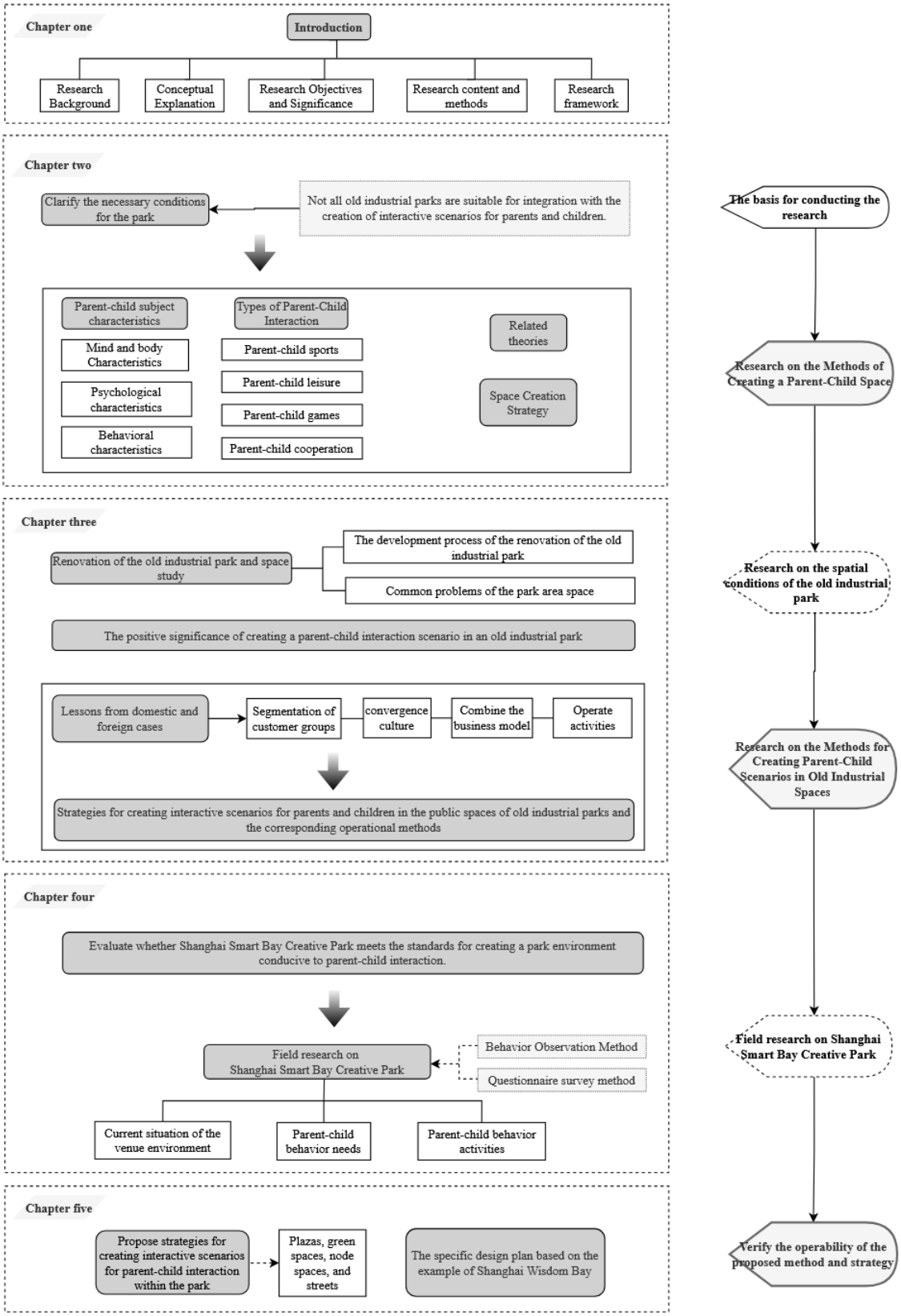


Figure 1-4 Research framework
(Image source: self-drawn by the author)

Charpter Two Basic research on the creation of parent-child interaction spaces

This chapter mainly focuses on the basic research on the creation of the parent-child space. Firstly, the prerequisites for the research were clarified, and the specific types of old industrial parks suitable for creating a parent-child interaction space were defined. Subsequently, a series of studies were conducted around the creation of the parent-child interaction space, including the organization and summary of the characteristics of the parent-child subjects and the types of parent-child interaction, the review of relevant theories for space creation, the proposal of space creation principles, and the summary of space creation methods.

2.1 **The type of park compatible with the renewal of parent-child friendly spaces**

Existing industrial parks can be categorized into urban and suburban types based on their location relative to the city center. Urban industrial parks are situated in the city center or near the outskirts. These parks have a closer connection with other urban areas, communities, and open spaces. Suburban industrial parks, located at the city's edge or far from the city center, serve as venues for ecological tourism and suburban leisure activities. In this article, the term' existing industrial parks' primarily refers to the first type, those found within the city.

In addition, it should be made clear that not all the public space renovation of urban industrial parks is suitable for the combination with parent-child interaction needs. That is to say, the specific industrial parks discussed and studied in this paper have the following basic conditions:

1. Good development foundation: The surrounding transportation facilities of this kind of industrial park are accessible, such as subway stations and multiple bus stations. In addition, there are large-scale residential areas, primary and secondary schools, kindergartens and other places within 5km of the park. The household density should be more than 4000 households/square kilometer, and the proportion of children should be more than 18%.

2. Lack of surrounding sites: There is limited or insufficient space for family and children's activities within 3km around this kind of industrial park, which is difficult to meet the diverse

interactive needs of parents and children. At present, there is a gap in outdoor parent-child activity sites.

3. Spatial Characteristics: These industrial parks feature ample and open public spaces, which can provide ample venues for a wide range of outdoor activities for families. For instance, sports and group activities for families require large spaces that are hard to achieve in smaller venues. Industrial parks with spacious and well-equipped areas can support a variety of family activities.

In addition, if the park still wants to maintain a good development trend and momentum in the later period, it is also necessary to consider the long-term attraction of the park to the parent-child groups in the near and far future, such as:

1. Create a comprehensive experience and entertainment mode, introduce parent-child related service formats in the park, such as community commerce, children's retail, education and training, experience, etc., to attract more parent-child families from the surrounding area, and meet the diverse consumer needs of parent-child groups in catering, shopping, entertainment and other aspects.

2. Introduce family-friendly cultural and tourism products, implement creative marketing strategies, and promote them through a comprehensive range of channels. Manage your own video account, leverage trending topics for promotional marketing, and develop online and traditional travel agency channels. Focus on family-oriented channels, including schools, educational institutions, study tours, research trips, summer camps, and winter camps, to build long-term stable partnerships with these groups and attract more family tourists.

2.2 Research on the parent-child entities and parent-child interaction behaviors

2.2.1 Parent-child subject characteristics

2.2.1.1 Parent-child physical and mental characteristics

（1） Parents of different ages

Young parents under 35 are typically energetic and full of energy, at the peak of their physical strength. They have ample energy to engage in prolonged activities with their children, such as chasing, running, sports, and adventure, as well as more relaxed static activities. They

can communicate and play with their children, building a strong interactive relationship and showing a high level of attention to their children.

Middle-aged parents between the ages of 35 and 50 have more knowledge and social experience, but they show a downward trend in physical strength and mental strength. When engaging in parent-child communication activities, they tend to feel tired. They often have more than enough heart but not enough strength for long or intense dynamic activities, and are more inclined to accompany their children to do some relatively static interactive activities.

（2） Children of different ages

Combined with Piaget's cognitive development theory, it can be found that children at different stages of development have different ranges of activities and control over their bodies (Table 2-1).

Table 2-1 Growth and development of children at different stages
(Table source: compiled and drawn by the author)

age grades	Physiological condition	Growth and development needs
Infants aged 0-3 years	Before the age of one, the mobility is weak, mainly relying on the caregiver, and the range of activities is limited; after the age of one, they gradually learn to walk, jump, run, etc., and the range of activities is expanded.	It depends on the care of caregivers and focuses on providing a safe, healthy, hygienic and friendly environment.
Preschool children aged 4-6	The ability to act is enhanced, the scope of activities is expanded, there is autonomy and selectivity, a tendency towards novel and lively activities and facilities, and a lot of exploratory behavior.	Focus on the development of potential intelligence, develop the ability to learn and distinguish right from wrong, parents need to play an example role.
School-age children aged 7 to 12	Study becomes the main activity, outdoor activities are reduced, sports group activities are increased, more interest in intellectual activities, and behavior is impulsive.	We should shift from feeling to abstract intellectual activities and cultivate the sense of collective cooperation and independence.
Over 13 years of age	Study is still the main activity, sports activities are enhanced, cultural and recreational activities are increased, and group activities are valued.	Focus on cultivating a sense of community and social awareness, while taking into account self-esteem and self-confidence to avoid feelings of inferiority and isolation.

Infants and toddlers aged 0-3 years depend on parents and other caregivers for related

activities, and need the care and assistance of parents. Parents are the dominant interactive leaders, do not have independent behavior ability, and cannot cooperate with peers to play games. The key consideration is safety, health and other issues.

Preschool children aged 4 to 6 have developed the ability to move independently, but their control over their bodies is still limited. They require close parental supervision and care. These children engage in peer play and are developing a positive decentralized approach to growth. They show a strong curiosity and desire to explore their surroundings, often using chasing and touching to discover the world. However, they tend to be self-centered during activities, which can lead to excessive focus on play and overlooking potential dangers.

Children aged 7 to 12 are highly curious and focused in their actions, having largely completed their decentralized development. They can now play and exercise independently and start to engage more with peers in group activities, with an increase in sports and social activities. Outdoor activities during this stage not only include physical games and play but also incorporate intellectual development games.

Adolescents aged 13-14 enter puberty, pay attention to interpersonal communication, are more inclined to play with peers, attach importance to group activities, and interact less with parents.

2.2.1.2 **Parent-child psychological characteristics**

The psychological needs of parents and children for space differ. By applying Maslow's hierarchy of needs theory, it is evident that parents prioritize the safety of the venue, privacy protection, a pleasant and comfortable environment, and educational entertainment. Children, due to their unique psychological traits, have different needs from adults, focusing more on fun and engaging spaces, the ability to play with friends, and the opportunity to showcase themselves. When designing a parent-child space, it is essential to consider and integrate the needs of both parents and children, creating an activity area that caters to the physical and mental characteristics of both parties.

（1） The psychological needs of parental space

1. Venue Safety: Only when there is a strong sense of security, ensuring the physical and mental safety of both parents and children, will parent-child interactions and social activities

take place. The pursuit of safety is always the top priority in parent-child activities. Therefore, in parent-child interaction spaces, it is essential to ensure the physical and mental safety of the group, prevent any harm, maintain the safety and stability of facilities, and prioritize the safety of the venue as the primary concern for most parents.

2. Good environment: Parents have a great demand for outdoor space. They attach great importance to the comfort and suitability of the environment, and like quiet and close to nature. They need fresh air, beautiful green landscape and rest facilities to help them relieve fatigue and relax their emotions after busy work and housework.

3. Social Interaction: Social interaction is an essential part of parents' lives, where both children and parents engage in communication in open outdoor spaces. Effective communication between parents and their children is crucial for high-quality parent-child interactions. For parents, socializing with family members and other parents, as well as engaging in leisure activities, can help reduce work stress and regulate emotions. Additionally, communication among parents can quickly strengthen family bonds and effectively assist children in building and understanding social relationships.

4. Protecting Privacy: Respecting needs is not only about parents wanting to be respected but also about families preserving space and mutual respect. Parents in parent-child interactions wish to protect their personal privacy, maintain a suitable social distance, and enjoy a private space. In the design, plants can be used to create boundaries, and changes in the interface can adjust the openness of the space.

5. Learning through Fun: The self-actualization of parents mainly involves three aspects: educating children, relaxing the mind and body, and rediscovering a sense of innocence. Therefore, parents hope that interactive spaces can: 1. integrate fun into learning to better nurture their children; 2. help them relieve stress; 3. allow them to rediscover joy and carefree moments through interactions with their children.

Table 2-2 Coupling of Maslow's hierarchy of needs and spatial characteristics (Source: Author's own drawing)

	Physiological needs	Security requirements	Social demand	Respect demands	Self-fulfilment

Accessibility	√	√	√		
Safety	√	√			
Amenity	√		√	√	
Diversity			√	√	√
Cultural					√

（2） The psychological needs of the son for space

Children in the stage of development have special psychological characteristics:

1. Curious: Children are born with a strong curiosity[50]. They maintain an initial state of cognition about the outside world, and are full of freshness and desire to explore surrounding things. They will be attracted by novel and interesting things.

2. Self-centered: Due to the characteristics of age and cognition, children will show a strong self-centeredness in play, especially younger children. They are easy to immerse themselves in their own little world, ignore the changes of the external environment and potential dangers, thus creating safety risks, which need the guidance and care of parents.

3. Achieving a Sense of Achievement: The essence of children's play is to achieve success and satisfaction by completing tasks. Feeling a sense of achievement can help children ignite their passion for activities and learning from within. Children also have a desire to express themselves, hoping to showcase their abilities in front of their parents and earn recognition and praise. By providing encouragement and appropriate challenges, we can help children build a positive sense of self-efficacy, fostering their autonomy and motivation to succeed.

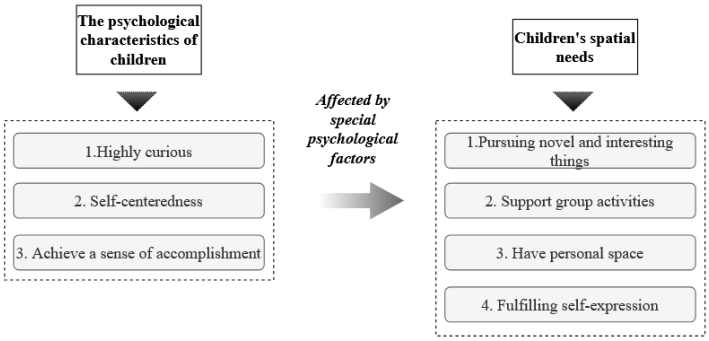


Figure 2-1 The spatial needs of children affected by psychology
(Image source: self-drawn by the author)

Influenced by their special psychological characteristics, children's demand for space is also different from that of adults[51]. The main differences are in the need for safety and supervision[52].

1. Pursuing fun and novelty: Children have a strong desire to explore and learn, prefer novel and interesting things, and are accustomed to exploring the external world with their five senses. They pay more attention to bright colors, material texture and modeling of the spatial environment. Interesting and diverse space venues can attract children and stimulate their imagination and creativity.

2. Support group activities: Young children are highly dependent on their parents. Positive parent-child interactions and positive feedback can enhance their sense of belonging, boost their confidence and security, which positively impacts their future as independent individuals. Older children enjoy playing with peers, and social interactions with peers have multiple positive effects on their growth and development. Therefore, it is important to provide a large space for group activities.

3. Personal Space: Children, especially older ones, desire a private space where they can freely explore and play. They are not just interested in amusement facilities but also crave a private and appropriately sized area for their own time. Therefore, when designing, it is important to include more secluded personal thinking areas that meet their needs for privacy and independence.

4. Fulfilling Self-Expression: Children seek to gain approval through their actions. Therefore, in the design of outdoor parent-child interaction spaces, facilities or areas that allow children to showcase themselves should be added, such as small stages, to enhance interactive experiences and provide opportunities for children to learn and display their talents. This helps children gain parental recognition, achieve self-worth, and boost their confidence.

2.2.1.3 **Parent-child behavior characteristics**

（1） Characteristics of children's behavior and activities

1.Cohesion of the same age

Children tend to gather with peers during outdoor activities, enjoying the company of their age group[53]. This means that children of similar ages often engage in activities and collaborate

with each other[54]. In particular, older school-age children frequently play and exercise with their peers, and research indicates that children prefer to participate in outdoor sports activities with their friends[55]. Younger toddlers, who are more dependent on their parents, lack the autonomy to initiate activities independently. Their interactions are primarily led by their parents, and they have a closer bond with them.

2.Time difference

Parent-child activities are significantly influenced by time and weather. On weekdays, parents have to work, and school-age children need to attend school. Younger children often require parental guidance for activities, leading to a certain pattern in the timing of parent-child group outings and outdoor activities. According to summer survey results, the most parent-child pairs engage in outdoor activities on mornings or near evenings. Additionally, the survey found that the number of parent-child pairs participating in outdoor activities during rainy days is notably lower.

3.Random behavior

Compared with adults, children's behavior is more random and changeable[56]. Their behavior is often affected by mood and growth, and may change at any time. Because of their strong curiosity, children are also more likely to be attracted by novel things around them and have the desire to explore.

（2） Characteristics of parents' behavior and activities

Fathers are generally taller and stronger than mothers, with more energy and physical strength. They tend to engage in more sports and play activities with children, often playing for extended periods and participating in more intense games. They are particularly suited for physical games like chasing and wrestling. Fathers also place a greater emphasis on fun and creativity in their interactions with children, often taking the lead in dynamic parent-child activities such as sports, games, and exploratory play, focusing more on the child's physical development.

While the mother's physical strength is less than that of the father, she plays a more educational role. The way mothers interact with boys and girls is similar. Mothers are more

inclined to engage in intellectual games and play with their children, such as reading, puzzles, and hide-and-seek. These activities are more static and gentle, often involving cooperative and intellectually stimulating tasks. Mothers frequently organize these activities, focusing on emotional bonding and the development of practical and thinking skills in children.

2.2.2 **Parent-child interaction type**

The types of parent-child interaction include the interaction between parents and children and the interaction between parent-child groups. The interaction between parents and children refers to the interaction behavior between parents and children within a single parent-child family, while the interaction between parent-child groups refers to the interactive group interaction behavior among different parent-child families.

2.2.2.1 **The interaction between parent and child**

The interactions between parents and children primarily include parent-child sports, leisure activities, games, exploration, exhibitions, and cooperation. Sports-related parent-child interactions involve physical activities, where children's movements are usually guided by their parents. Younger children can engage in activities like jumping and climbing with their parents to meet their exercise needs, while older children can run or play ball with their parents. Leisure activities, which are relatively simple and relaxed, mainly consist of ecological sightseeing, entertainment, and cultural leisure. Outdoor cultural leisure activities can help children gain knowledge and cultivate their sentiments through cultural immersion. Cognitive activities and cooperative exploration are forms of parent-child interaction that arise from specific activity requirements and the creativity of both parents and children. These activities not only foster emotional bonds but also enhance coordination and cooperation between parents and children.

2.2.2.2 **Interactions between parent groups**

Interactions among parent-child groups, including children's peer games, parents' social activities, and family cooperation, often occur among multiple parent-child families. As an extension of the parent-child interaction relationship, interactions among multiple parent-child groups within a family contribute to the 'decentralization' of children's healthy growth. This helps children better adapt to their roles in the group, improves their self-centered views, and enhances their understanding of their parents, thereby promoting the positive development of

parent-child interactions. Children enjoy group activities with peers, and peer culture significantly boosts their confidence. For parents, the need for social interaction is essential; appropriate conversations with others can help regulate emotions and reduce stress. Group cooperation among parent-child families promotes mutual understanding through various means, such as language, body language, emotional exchanges, mutual understanding, and problem-solving[57].

Based on previous research on parent-child interaction types, common parent-child activities are primarily categorized into four types: parent-child sports, parent-child leisure, parent-child games, and parent-child cooperation. Among these, parent-child cooperation emphasizes group activities, as shown in Figure 2-2 **错误!未找到引用源。**. Since children's peer activities and parents' social activities are integrated into various types of parent-child interactions, they are not classified separately.

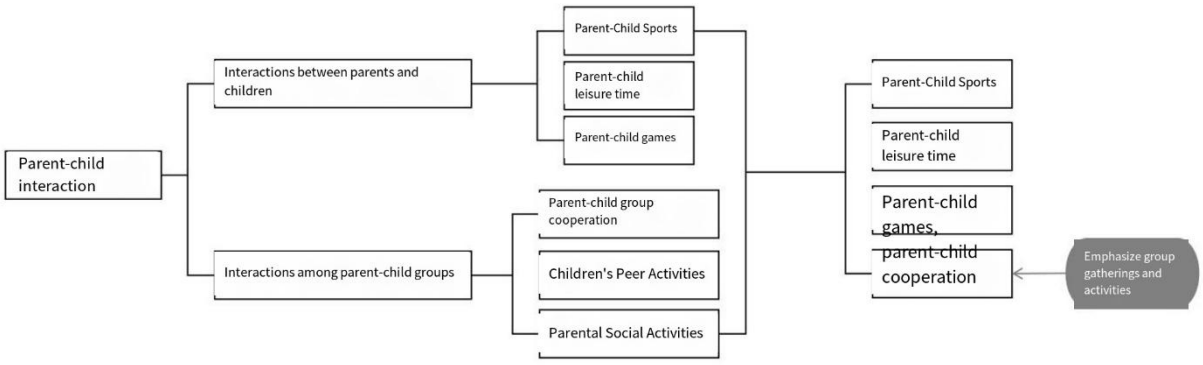


Figure 2-2 Main types of parent-child interaction behaviors
(Image source: self-drawn by the author)

2.3 **Relevant theoretical basis**

2.3.1 **Behavioral demand theory**

When individuals are influenced by external environments or internal drives, they develop certain behavioral needs that lead to the initiation of related activities. Behavioral needs are the driving force behind these activities, while the environment provides the material basis for these activities. Therefore, behavioral needs are the demands of behavior on the spatial environment, encompassing both behavioral psychology and behavioral activities[43]. The exploration of behavioral psychology is analyzed and explained through Maslow's hierarchy of needs, while

the exploration of behavioral activities must be integrated with theories of behavioral environment and behavioral place.

Users 'needs for the environment will change under different situations, and there are also differences in the needs of different users[44]. Therefore, while considering the relationship between behavior and space, it is also necessary to combine the influence of parents' own physical and mental characteristics on behavior. The complete relationship model between behavior and space is shown in Figure 2-3.

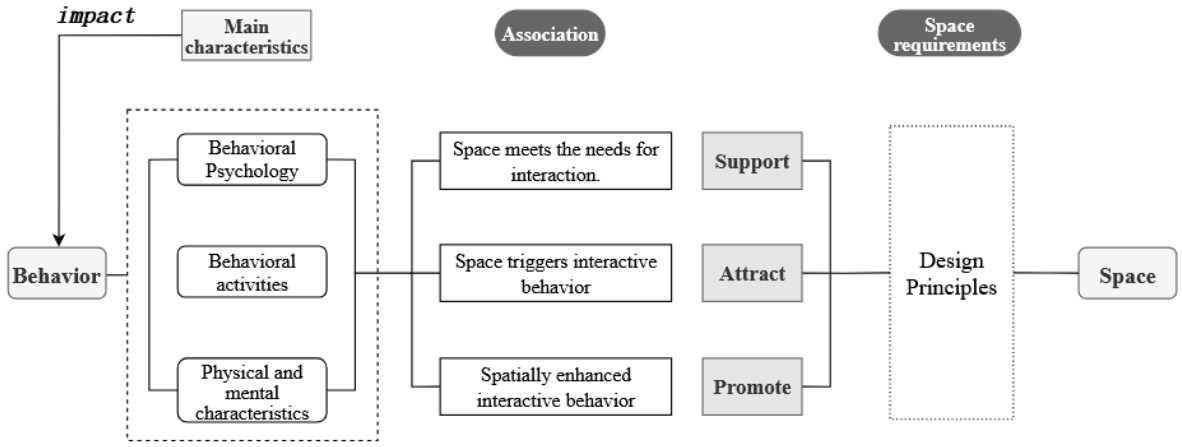


Figure 2-3 Model of the relationship between behavior and spatial environment
(Image source: self-drawn by the author)

2.3.2 **Maslow's hierarchy of needs**

To understand human behavior in urban settings, it is essential to delve deeper into the fundamental needs and internal motivations of individuals. Abraham Maslow, an American psychologist, introduced the hierarchy of needs, which categorizes human basic needs into five levels from the most basic to the most advanced: physiological needs, safety needs, social needs, esteem needs, and self-actualization needs (Figure 2-4).

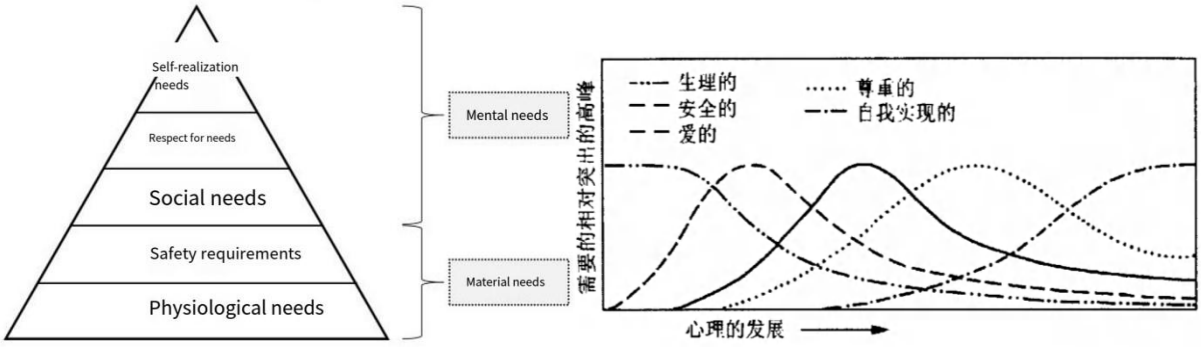


Figure 2-4 Maslow's hierarchy of needs

Figure 2-5 Five types of curves requiring gradual change

(Image source: redrawn by the author) (Quoted from Outline of Psychology, Vol. 2)

He noted that these needs evolve from lower to higher levels (Figure 2-5) and emphasized the significant differences in spatial needs among people.

The first is physiological needs, which are the most basic requirements of the human body and serve as the primary driving force behind human behavior. The second is safety needs, which pertain to personal safety and stability; a sense of security is essential for maintaining subsequent activities in any situation. The third is social needs, which involve emotional connections and a sense of belonging, representing a higher level of need. The fourth is respect needs, encompassing both personal feelings about achievements or self-worth and the desire for respect and recognition from others in the environment. The fifth is self-actualization needs, which represent the highest level of need. This theory is applicable to analyzing the common psychological needs and spatial preferences of parents and children in parent-child groups.

2.3.3 **Environmental behavior and behavioral scene theory**

2.3.3.1 **Environmental behavioural science**

The core of environmental behavior theory is divided into the organism, the environment, and behavior[45]. Behavior, influenced by thoughts in the mind, is an external activity that the organism responds to. These stimuli can originate from within the organism, such as motivation, needs, and internal drives, or they can come from the external environment (Figure 2-6).

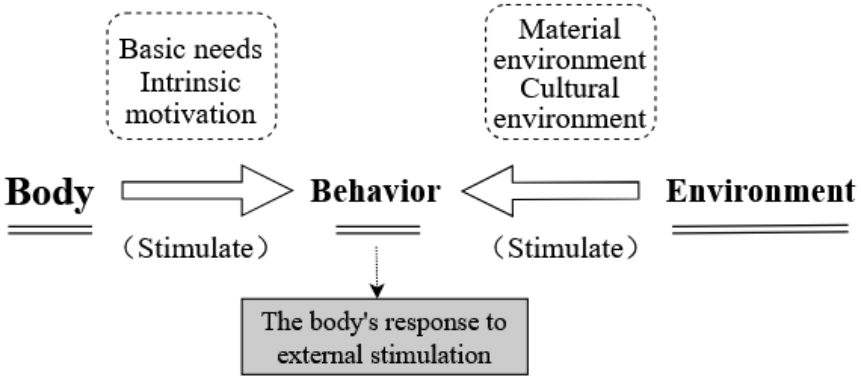


Figure 2-6 The effects of internal and external stimulation on behavior
(Image source: self-drawn by the author)

Behavior acts as a mediator between the organism and its environment, closely linking the organism with its surroundings (Figure 2-7). Human activities can alter the surrounding environment, while the organism's activities are also influenced by the environment, creating a mutual influence and integration, indicating that the two are not entirely independent. Kurt

Lewin's law B=f(P • E) illustrates that human behavior (B) is functionally related to both the individual (P) and the environment (E).

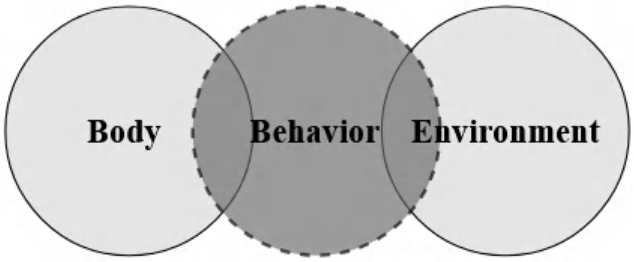


Figure 2-7 The effects of body, behavior and environment
(Image source: self-drawn by the author)

Environmental behavior studies primarily examines the relationship between spatial environments and human behaviors, exploring their interactions[46]. The research aims to highlight the interaction between the environment and people, seeking optimal solutions through spatial design and creation[47]. By applying environmental behavior theory to family-friendly and child-friendly design, the aim is to investigate the relationship between children's behavior, psychology, and the environment, and to propose design strategies that enhance parent-child interaction and education, thereby improving the environment's friendliness towards parent-child activities.

2.3.3.2 **Theory of action scenarios**

The theory of the place of behavior, proposed by Norbert Schultze, examines the relationship between individual behavior and specific places from the perspectives of behavioral science and psychology. This theory focuses on human behavior and interactions in specific environmental settings, grounded in psychological and behavioral research[48]. Schultze posits that a place of behavior is an integrated whole where specific individuals, environmental spaces, and activities are positively linked, with these elements interacting and influencing each other[49]. By integrating the characteristics of parent-child activities with the theory of the place of behavior, it is possible to create outdoor spaces for parent-child activities that not only meet the specific needs of these activities but also ensure safety and enjoyment, thereby providing strong support for children's growth and parent-child interaction.

2.4 **Principles of space creation**

2.4.1 **Safety**

When designing spaces based on the needs of parent-child interactions, safety is the primary concern, which aligns with Maslow's hierarchy of needs. Parent-child activities within the park are only conducted when the space ensures their safety, particularly those that are spontaneous and social. Safety encompasses three main aspects: venue safety, facility safety, and activity safety.

1. Site safety

The park must ensure that children and parents are safe while engaging in activities within the space, while also providing a comfortable and reliable environment for interactive activities. Young children often focus on self-directed activities and may overlook potential dangers. If boundaries are not clearly defined, they can easily step out of their designated areas unintentionally. Special activity areas should have clear boundaries, such as railings, barriers, or walls, to ensure the safety of these spaces. Additionally, the area should be flat, with soft materials used for paving to ensure the safety of both parents and children when moving around.

2. Facility safety

The park must ensure the safety of parents and children during activities and when using facilities. Children tend to be more focused and engaged in activities, paying less attention to external safety and reacting slowly, making them more susceptible to injuries. The materials for game facilities should be robust and durable, with sharp or pointed edges avoided. Regular inspections and maintenance of these facilities are also essential.

3. Safety of activities

When holding public activities, the park should take into account the physical and mental characteristics and limitations of parents and children, plan activities in line with different cognitive levels and ability levels of parents and children, and ensure the safety of parents and children in the process of participating in activities.

2.4.2 **Amenity**

1. Physical comfort

When parents are active in the park, they need a beautiful space environment more. They hope to improve their mood and relieve anxiety during activities. Outdoor sunshine, green

plants, water scenery and other natural landscapes and ecological elements can relax parents' emotions disturbed by work and trivial matters, and make the space become healthy, beautiful and vibrant.

Moreover, middle-aged parents, due to their declining physical strength and their children's boundless energy, particularly need spaces for rest and relaxation to help them recover. Comprehensive facilities can meet the diverse needs of families and support activities in these spaces, attracting people to stay and encouraging more spontaneous and social activities, thus enhancing the vitality of the space.

2. Psychological comfort

A reasonable spatial scale enables the activities of parents and children to intersect with each other, which is more likely to lead to rich activities among different parent-child families. Parents and children in a small space can clearly see the whole space and take into account the details, so as to better experience the spatial environment.

2.4.3 **Interesting**

To better attract parents and children who enjoy exploring and new things, the space should be engaging. Children are naturally curious but can lose interest quickly, so both the atmosphere and facilities should be highly engaging to keep their attention[58]. Engaging spaces are more likely to attract crowds, increasing the frequency and duration of parent-child interactions in the space.

1. Satisfy sensory experience

Based on the theoretical analysis of environmental psychology, the human body perceives the environment through its five senses. Children, in particular, enjoy directly perceiving the external world through embodied cognition, thereby acquiring information and feedback. By enhancing the spatial interest, parents and children can fully engage their visual, tactile, and olfactory senses, allowing them to gain richer spatial experiences and feelings through interactive activities.

2. Mobilize emotional perception

According to the psychological effect formula E=K/t, where E represents a person's

perception, K is the amount of information received, and t is the duration. The longer people spend in overly homogeneous and continuous spaces, their perception diminishes, leading to a loss of interest in these spaces[59]. Therefore, it is necessary to introduce more diverse and varied spaces, reduce the repetition of similar environments, and enhance the spatial appeal to boost parental engagement.

According to the theory of emotions, when environmental uncertainty is moderate, emotional evaluation is at its peak. However, overly rich environments or overly colorful spaces can lead to spatial confusion, causing parents and children to lose their visual focus. Therefore, the design of spatial interest should be moderate; an excessive pursuit of flamboyance can have the opposite effect.

2.4.4 **Diversity**

For parent-child groups, the spatial needs of different interaction subjects vary, such as preferences for functions and environments among parent-child pairs of different genders, ages, and combinations. To cater to all age groups and various types of parent-child groups, allowing them to freely engage in a variety of activities within the space, it is essential to have diverse and multi-dimensional spatial functions, forms, and uses.

1. Multi-functional and diverse

The diversity and richness of spatial functions mean that the venue can offer a variety of activities for families, allowing them to participate together and use the space. When designing the venue, it is important to consider multiple functions, as this can enhance its appeal to different groups of people, thereby encouraging a wide range of activities. By integrating spaces with various functions within the park, it meets the personalized needs of different parents and children regarding venues and facilities. This composite design provides more diverse services for family groups, enabling them to enjoy different activities in the same space, thus enhancing the practicality of the venue.

2. Various forms and sizes

Given the wide variety of parent-child activities, it is necessary to design and allocate spaces of various forms and sizes based on different types of activities in the space. This ensures

that all types of activities can be conducted smoothly and to a high standard, allowing parents and children of all ages and types to participate in activities and interactions within the space. It also meets the differentiated needs based on age and characteristics, fulfilling their own needs and expectations.

3. Multi-dimensional hybrid use

According to the research findings, there is a certain regularity in the activity time of parents and children in the park, so the time rules of parents and children can be fully considered, and some activity sites can be used at different times to better adapt to different needs.

2.4.5 **Educational**

According to the social learning theory, children will imitate their parents' behavior and way of doing things, so that parents can educate their children and impart correct views and knowledge in a subtle way. The parent-child space in the park should further deepen the feelings between parents and children in activities, and accept popular science propaganda under the influence of industrial history and culture, so as to realize education and fun.

1. Feel the industrial history and culture

The industrial renovation park, with its strong regional and historical industrial characteristics, enhances the overall atmosphere of the park by repurposing industrial relics and hosting events. These activities not only preserve the area's historical memory but also serve as an educational tool for children, promoting industrial science education. The spatial design integrates environmental elements with educational interactions, guiding children to learn about industrial civilization and history, thereby enhancing their understanding of industrial history and ambiance.

2. Improve parent-child emotional communication

The parent-child space in industrial renovation is not only a place for parents and children to enjoy leisure and entertainment, but also an outdoor educational environment that enhances communication, strengthens emotional bonds, and guides children's growth. Emotional exchanges between parents and children form the foundation of a healthy parent-child relationship. Through interactions within the park, these exchanges subtly foster parent-child

education and strengthen the bond between them.

2.5 **Space creation methods**

Most current research on the creation of family-friendly spaces focuses on the design of physical spaces, mainly including the environment of family activity areas and the facilities for family activities. Below, we will summarize a number of space creation measures from two aspects: the pleasant and interesting family environment and the diverse family facilities.

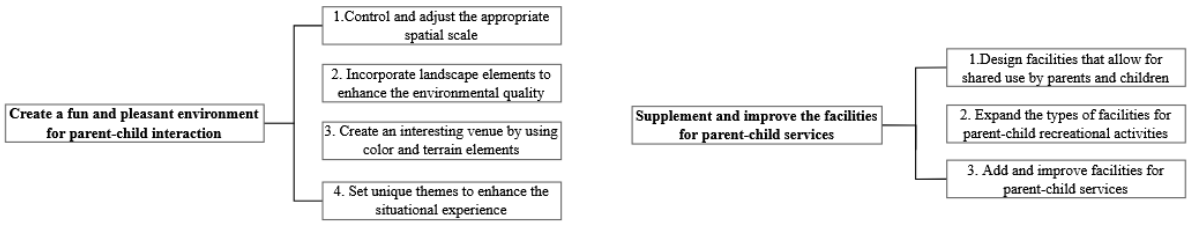


Figure 2-8 Space creation methods
(image source: self-drawn by the author)

2.5.1 **A pleasant and enjoyable environment for parent-child activities**

The functions of the space are different, and the environment required is also different. This section puts forward the construction strategies of the spatial environment based on the psychological characteristics of parents and children from the perspective of design focus and elements.

2.5.1.1 **Controlling and adjusting the appropriate spatial scale**

The spatial dimensions of a venue should align with people's visual aesthetics and usage needs, as their suitability can significantly impact the experience and feelings of parents and children in the space. In design, it is essential to prioritize human-centric principles, considering the existing conditions and functional requirements of the space to create an environment that is suitable for parent-child interactions, ensuring that both parties feel safe, comfortable, and at ease. Overall, the spatial dimensions can be evaluated from three perspectives.

Regarding the scale of the site enclosure, Ishihara Yoshinori's "Design of External Space" suggests that different scales of external space can create varying impressions. When the D/H ratio is too high, it creates a sense of distance; when it is too low, it can feel oppressive and restrictive, as shown in Table 2-3 Influence of site enclosure scale on spatial perception. Different spatial scales and levels of openness significantly impact the experience of parent-

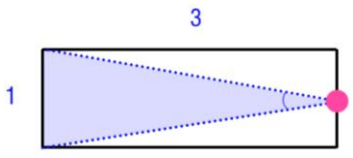
child interactions. Larger spaces provide a sense of openness, while smaller spaces offer a sense of security. However, overly narrow or excessively wide spaces can make people feel uncomfortable. Generally, a D/H ratio between 2 and 3 is considered optimal[25], which also encourages more active participation in site activities. An appropriate spatial scale can help parent-child groups feel psychologically safe and comfortable.

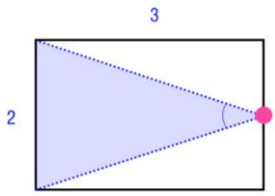
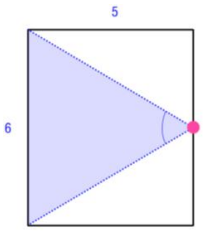
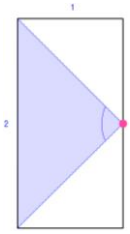
Table 2-3 Influence of site enclosure scale on spatial perception
(Table source: compiled and self-drawn by the author)

D/H price	Vertical viewing range	space perception
D/H<1	45°	There is a sense of oppression, strong enclosure, and great influence from surrounding buildings.
2>D/H>1	27°	Spatial proportion balance begins to create a sense of distance, but it also has a definite sense of limitation.
D/H>2	18°	The sense of space closure gradually decreases and becomes open.
D/H>4	14°	The space loses the sense of enclosure, becomes discrete and has a strong sense of distance.

At the same time, different types of parent-child activities have varying requirements for the space's openness and feel. For example, when designing spaces for dynamic activities between fathers and children or between children and their peers, a more spacious area is typically required to support intense physical activities. Attention should be paid to the base-to-top ratio of the venue, as the human eye's field of vision is limited to 20 to 42 degrees; beyond 60 degrees, it becomes blurry. Refer to Table 5-2 for specific details. The ideal base-to-top ratio for the venue is between 2:3 and 5:6, within this range, the spatial experience for parent-child activities is optimal, with a suitable field of vision, clear observation angles, well-defined boundaries, and a sense of harmony, without feeling cramped.

Table 2-4 Influence of site foundation surface ratio on spatial perception
(Table source: compiled and self-drawn by the author)

Depth/wide	Horizontal viewing range	Diagrammatic sketch	Space perception
3	20°		The field of vision is very narrow, the sense of space is very cramped, and the sense of pressure is strong.

Depth/wide	Horizontal viewing range	Diagrammatic sketch	Space perception
3/2	40°		The vision is clear, and the objects observed within the field of vision are moderate. As a square, the spatial effect is relatively closed.
5/6	60°		The boundary becomes loose and blurred, but the overall space is still defined by the boundary, which can be clearly grasped.
1/2	90°		The boundary becomes very blurred, the boundary cannot be grasped, and the square space is unusually open.

For the more peaceful and leisurely interactions between mothers and children, it is essential to create small, intimate, and engaging spaces for rest and interaction, meeting women's needs for safety and privacy. These smaller spaces are ideal for family activities, ensuring that parents and children can interact in a comfortable and secure environment while maintaining their privacy. Additionally, older children who desire personal space can benefit from quieter, more independent areas. The design of these spaces should incorporate social psychological distance, as Edward Hall of the United States categorized social distance into four types: intimate distance, personal distance, social distance, and public distance. Given the physiological differences between children and parents, the social distance between children and parents is generally closer than that between adults, typically falling between intimate and personal distances. Therefore, when designing spaces for families, it is crucial to identify the primary users of the area, considering the differences in spatial and psychological distances between children and parents, and to highlight the family-friendly aspects of the space design through appropriate spatial scales.

Table 2-5 Spatial distance of different types of social interaction
(Table source: compiled and self-drawn by the author)

Types of spatial distance	Distance range (M)
Intimate proximity	< 0.45
Personal distance	0.45-1.2
Social distance	1.2-3.7
Public distance	3.7-7.5

For example, in the bamboo weaving park of Haitang River Ecological Park, there are both large-scale open spaces and smaller, more intimate spaces. These spaces can be well adapted to different types of activities. The small-scale spaces provide the possibility for private conversations between parents and children, while the large-scale spaces are suitable for dynamic activities and group interactions among families.

Figure 2-9 The diverse and rich site environment within the park
（Image source：https://www.gooood.cn）

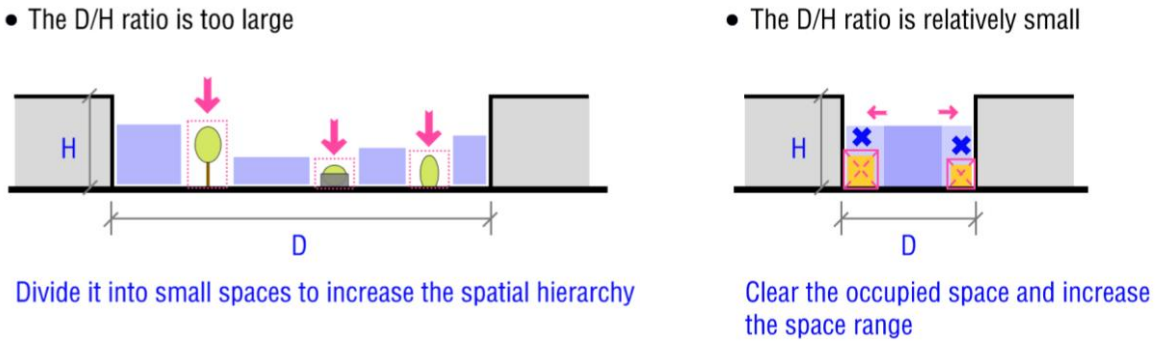


Figure 2-10 Adjustment of site D/H
(Table source: compiled and self-drawn by the author)

For the overly open and poorly proportioned square spaces within the park, the spatial scale can be adjusted according to the needs of different types of parent-child activities. This can be achieved by dividing or enclosing spaces with potted plants, altering the height differences on the ground to define areas, etc. For example, for spaces with a low D/H ratio (the ratio of depth to height), the scope of activity space should be expanded as much as possible, and public areas that have been occupied should be cleared (Figure 2-10). Integrating spaces with varying enclosure sensations can enhance the park's spatial interest and provide more

diverse and rich experiences for parent-child groups.

2.5.1.2 **Adding landscape elements to improve the quality of the environment**

According to the theory of environmental psychology, the human body perceives the environment through its five senses. Children, in particular, form impressions of their spatial environment through sensory experiences. Enhancing the parent-child's perception of the environment through' sensory stimulation' can be achieved by using the rich visual colors in the environment to effectively engage the emotions of both parents and children[64]; the tactile differences between various plants can help children better perceive and explore their surroundings; the emotional nature of smell means that placing some fragrant plants in the environment can evoke specific memories, making the interactive activities more memorable and creating beautiful memories for both parents and children.

Parents and children need a well-designed and beautiful green landscape to relax their tense minds and bodies. For children, the undulating terrain and vibrant colors are particularly appealing. When designing landscape elements, it is important to consider that human vision has a limited sensitivity range. The color recognition is most acute within 60 degrees horizontally, 30 degrees above and 40 degrees below the standard line of vertical vision (Figure 2-11). Children's visual range is even narrower. Therefore, when designing, it is essential to consider the visual characteristics of parents and children. Children generally focus more on the foreground and ground scenery, while they are more easily attracted by colors and shapes in the middle and background views[65].

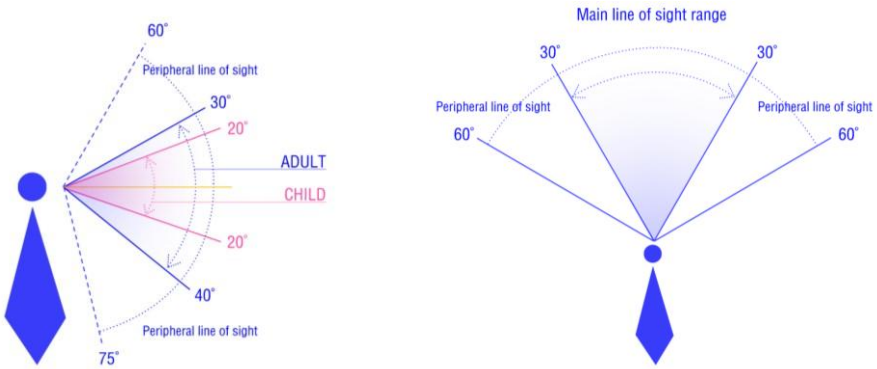


Figure 2-11 Human eye line of sight range
(Image source: self-drawn by the author)

（1） Natural landscape

1. Plant

The desire to be close to nature, sunlight, and greenery is a human instinct. Natural and ecological elements such as sunlight, plants, and water features are essential for public spaces to attract families and enhance their vitality. The introduction of natural landscape elements can significantly improve environmental quality, enhance the environmental experience for families, and stimulate more interactions within the space.

Natural landscape elements, such as green plants and water features, can be used to divide and shape spaces. Pruned plants are often used to partition or enclose areas. For example, to create a more open space for parent-child activities, turf and ground-cover plants can be used to ensure clear sightlines and pathways. In semi-private spaces, low shrubs can be used to create an unobstructed view while maintaining visibility (Figure 2-12).

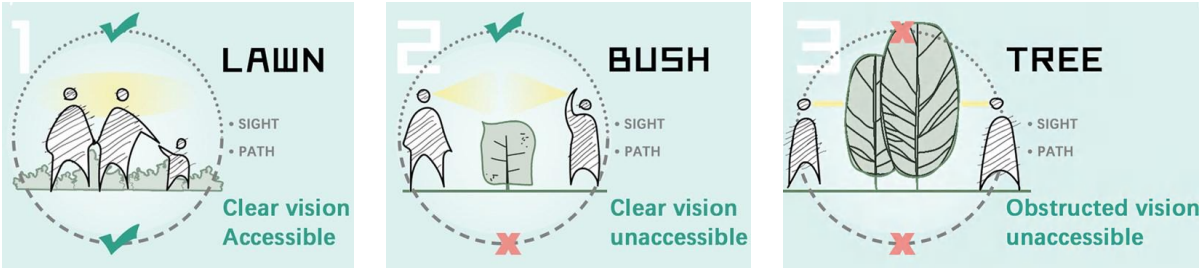


Figure 2-12 Influence of different types of plants on sight and path
(Image source: self-drawn by the author)

Combining different enclosed spaces can add interest and variety to the park, offering a more diverse and engaging experience for parent-child groups. Integrating plants with landscape features and facilities can also create flexible small areas, enhancing the overall appeal of the space.

In hot summer, green plants can be used to shade the sun, regulate the microclimate in the space, and cast abundant light and shadow, making the spatial environment more comfortable and pleasant, suitable for parent-child activities and use. In combination with the safety, comfort and science education needs of parent-child activities in the park, the following points should be paid attention to when configuring the plants in the park's green space:

Table 2-6 Plant configuration in the park public space based on parent-child needs
(Table source: compiled and self-drawn by the author)

Design emphasis	Specific functional considerations	Optional plant type
Territoriality	Native plants are easier to grow and manage, and can improve the microclimate locally. Select local tree species in Shanghai according to the environment and soil conditions of the space.	
Aesthetics	Considering the change of the four seasons, we can observe the blooming and falling of flowers, the falling of leaves and the bearing of fruit, which is also beneficial to children's natural cognitive education.	Viewing plants: maple, ginkgo, Chinese tallow Viewing plants: Golden locust, etc Flower plants: azalea, hydrangea Viewing plants: Judas tree, firethorn, kuan tree
Popular science	Add fragrant plants to enhance the spatial experience from the sensory level, and make it easier for parents and children to learn and enjoy, understand nature and leave a good memory.	Aromatic plants: jasmine, magnolia, tulip Medicinal plants: Tiankui, Nantianzhu, citron Trigger plants: Mimosa pudica, crape myrtle
Safety	Avoid toxic, hairy, spiky and berry plants to reduce the possible damage, with soft aromatic non-toxic plants as the main.	Spiky plants: roses, roses Flying fluff: willow, kapok Toxic: Nerium, five-colored plum Berries: mulberry

2. Wave

Children have a natural affinity for water, especially young children. In a parent-child space, water can be used not only for viewing but also for interactive activities, allowing parents and children to touch, play, and observe the water together. Water bodies are primarily categorized into dynamic and static types (Figure 2-13). Dynamic water, with its strong movement and vitality, is more likely to attract parents and children to interact, such as fountains, splash pools, and cascades. Static water, on the other hand, provides a serene and peaceful setting, like ponds and lotus ponds.

Figure 2-13 Schematic diagram of different forms of water scenery
(Image source: Baidu)

When designing dynamic water features, it is essential to prioritize the safety of both parents and children during interactions. The design of fountains should consider factors such as water pressure, water column height, and the depth of the splash pool. Dry land fountains can satisfy children's desire for water play while being safer. The water in shallow pools must be kept clean and free from pollution, with a depth of less than 35 cm. Ramps can also be installed in the pools to facilitate walking over them, making it fun and enhancing the cooperation between parents and children. In specific designs, combining static and dynamic water elements can create a more diverse and engaging landscape space.

（2） Featured landscape

Landscape structures primarily consist of scenic walls and steps. In creating a parent-child space, scenic walls can be used to divide and guide the space, such as to block views, create private or semi-private areas, or delineate different activity zones, serving as visual guides. Artistic scenic walls can enhance the space's appeal and educational value, and can also integrate functional elements with children's cognitive development or play.

Figure 2-14 Interactive function of the landscape wall
(Photo credit: https://www.gooood.cn)

In addition to solving the height difference and limiting the space, the steps can also be used as a seat landscape. When arranged into a small theater, it will give children a stage for performance and meet their needs for self-expression.

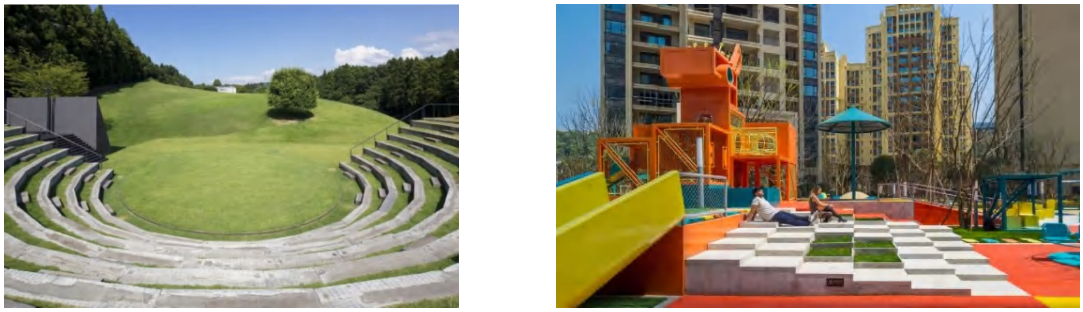


Figure 2-15 Steps as stage and seating landscape

(Photo credit: https://www.gooood.cn)

（3） Floor paving

Floor paving is a crucial element in spatial visual design, influencing the overall aesthetic appeal and creating a specific atmosphere. By using different materials, colors, and paving methods, floors can naturally delineate various functional areas. For instance, by using different colored or materialized floor paving, game areas, rest areas, and interactive zones can be clearly defined, preventing functional confusion and enhancing the space's efficiency and intuitiveness (Figure 2-16). Additionally, the patterns and designs on the floor can guide user flow and behavior. For example, through path patterns or signs on the floor, children can learn about the layout of the space and are encouraged to explore or interact along designated routes.

Figure 2-16 Divides the paved area

(Photo credit: https://www.gooood.cn)

Figure 2-17 Guides the flow line of the paved pavement

(Photo credit: https://www.gooood.cn)

The paving materials used in parent-child activity spaces should first consider safety. Soft materials such as rubber mats and wooden floors can absorb impact forces and reduce injuries when falling. Suitable ground paving materials should be selected according to different activities, and specific paving materials are shown in Table 2-7.

Table 2-7 Comparison of different paving materials
(Table source: compiled and self-drawn by the author)

Paving materials	characteristic	Applicable type	Target population
Hard surfaces	The hardness is too high to be used in a dedicated game field, but the service life is long.	Not very applicable	Not very applicable
Artificial elastic materials, such as plastics	Colorful, with certain elasticity and hardness, can cushion and protect.	The venue for the mechanical games	Over 3 years old
Lining materials, such	You can play the game, but beware of dangers such as eye strain and abrasions.	Sandpit and other play areas	Over 3 years old

Paving materials	characteristic	Applicable type	Target population
as sand			
The floor is made of wood	More approachable.	Shore rest area	Over 3 years old
Lawn	Soft and natural, renewable. But maintenance is troublesome.	Sports and leisure venues	All ages
Lithotome	It can be processed into different roughness and has a long service life.	Roller skating, skateboarding, etc	Over 6 years old

2.5.1.3 **Use color terrain to create fun venues**

（1） Color usage

Children and women are highly sensitive to color, which is the first environmental information received by visual senses. The combination of color in spatial environment can well mobilize the emotions of parents and children and create special visual effects. See Table 2-8 for the relationship between color and emotion.

Table 2-8 The relationship between color and emotion
(Table source: compiled and self-drawn by the author)

Pigment	Feature	Mood
Orange	Warm, friendly and positive	Easy, confident
Yellow	Cheerful, bright	Focus your attention. A large area will excite you
Red	Shock, thrill	Impulsiveness, inability to concentrate
Blue	Peaceful, expansive	Comfortable, calm
Green	Nature, healing	Relax and reduce anxiety

In the space, colors should be used and coordinated reasonably. Generally, for static parent-child activity areas, more subdued cool colors are recommended to facilitate better engagement in conversations or reading. For dynamic activity areas, brighter warm colors can enhance the lively sports atmosphere, boosting the enthusiasm and morale of parents and children during exercise and competition.

In addition, the color selection of the parent-child space in the creative park should be harmonious with the style and environment of the park. The theme color of the park can also be considered. The site color and facilities can echo each other to make the interior of the space more harmonious and unified.

（2） Topographic change

The undulating terrain can spark children's curiosity and desire to explore. Soft surfaces, such as green spaces, are ideal for creating natural activity areas with rich and engaging features, like hills and grassy slopes. This allows children to freely explore while enjoying the natural environment without the risk of injury. When designing hard-surfaced squares for activities like parent-child skateboarding, incorporating undulating terrain can enhance the space's layers and variations, attracting more families to participate.

2.5.1.4 **Setting up special themes to enhance the situational experience**

The setting of spatial themes serves as a direct sensory expression, employing the contextualization approach to enhance the space's appeal through experiential design[66]. This not only satisfies curiosity and the desire to explore but also leaves a lasting impression, thereby enhancing cultural dissemination. Moreover, a unified theme ensures that the overall design of parent-child spaces is more harmonious and cohesive.

The IPs and themes of the parent-child space are often tailored to the interests and preferences of parents and children. Starting from their interests, we come up with some interesting and innovative themes that children like. For instance, the Jupiter Exploration Park designed by Andao chose celestial planetary elements as its theme, integrating Jupiter's characteristics and related elements into the site design (Figure 2-18). Additionally, by introducing a fun story line centered around the theme IP, it enhances the interactive experience for parents and children in the space. Another example is the community park design of Qingdao Laoshan Yuefu, which created the' Yueshan Songlin Ji' story IP with squirrels as the main characters. The story line and space integration provide a multi-layered immersive experience.

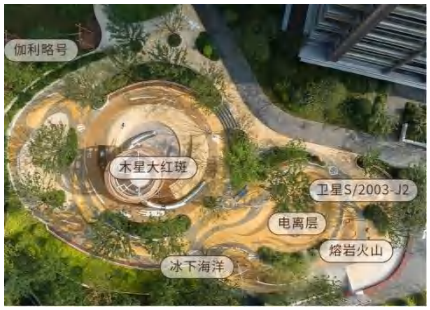


Figure 2-18 Jupiter Exploration Park (Image source: https://www.gooood.cn)

Figure 2-19 Community park design of "Yueshan Songlin Collection" (Image source: https://www.gooood.cn)

2.5.2 **Varied Facilities for Parent-Child Activities**

2.5.2.1 **Creating a scale of facilities shared by parents and children**

In the scale design of the facilities, it is advisable to consider parent-child sharing as much as possible, so that parents can also participate in the site more, and improve the quality and quantity of parent-child interaction.

The design of the scale of equipment and facilities should fully consider the physiological characteristics of both parents and children, taking into account their shared needs, to create activity facilities that suit their physical conditions. For example, based on the physiological characteristics of children, despite individual differences, their height can generally be calculated using the formula '75 + 5X' (where X is the age)[67]. Refer to Table 2-9 for height references by age.

Table 2-9 Ages and height of children
(Table source: compiled and self-drawn by the author)

Child age / years	Basic height /cm
1	75
2-3	85-90
4-6	95-105
7-12	110-135

2.5.2.2 **Rich types of facilities for parent-child play**

Game facilities serve as a vital platform for parent-child interaction and activities, offering children a variety of opportunities for development and growth. When designing these facilities, it is important to consider the unique characteristics of children at different age stages, as well as the active involvement of parents. The facilities must be safe and sturdy, with materials that are environmentally friendly to prevent accidental injuries from sharp edges. Many game facilities are modular, featuring a wide range of functions. For more details on the types, features, and target audiences of parent-child interactive game facilities, see Table 2-10.

Table 2-10 Diverse play facilities for children
(Table source: compiled and self-drawn by the author)

The way the game is played	Game features	Examples of specific facilities	Design points	Suitable people
Unpowered play facilities	Swinging	Swing	The material under the swing needs to be soft, and it can be designed according to different ages. It can be considered for parent-child sharing.	Over 6 years old Middle-aged and young parents
	Slippery	Slide	Usually combined with other	Over 3 years

			facilities, the end of the slide should have a buffer zone.	old Young parents
	Climbing style	Climbing frames, climbing walls, ropes	It should not be too high, the ground below needs to be laid with soft material, and safety warning needs to be set.	8 years old and above Young parents
	Rise and fall	Swings, trampolines	It can be combined with different themes and image designs, and the ends of the seesaw can be different weights. The trampoline can be more diverse in shape.	Over 3 years old Middle-aged and young parents
	Suspension type	Ring, ladder, horizontal bar, parallel bars	The scale can be adjusted according to different users, so that children can use it easily.	8 years old and above Young parents
Power facilities		Carousels, small planes, little trains	Pay attention to the principle of safety, consider the needs and physical characteristics of parent-child behavior.	Over 3 years old Middle-aged and young parents
Other		Sandpit	The sand pit should not be too deep or too small, the sand should be fine, and can be combined with other facilities.	Over 3 years old Middle-aged and young parents
		Building block	Young children need to be safe.	All ages
		Graffiti wall, convex and concave perception wall	It can be recycled. Pay attention to disinfection and cleaning.	Over 3 years old Middle-aged and young parents
		Maze	It can be combined with plant shrubs for vertical limitation, or it can be drawn on the ground for horizontal limitation.	All ages

2.5.2.3 **Add and optimize parent-child service facilities**

The rational arrangement and configuration of rest facilities are crucial for the humanized support that the square space can offer to parents and children. During the renovation, more public rest benches should be provided to accommodate the highest pedestrian flow, including pavilions, mobile tables and chairs, and planting pools at a height suitable for human use. These facilities should also be integrated with sun and rain shelters to help alleviate parents' physical

fatigue while providing a leisure area that supports social activities and scenic viewing.

When arranging leisure seating, consider the location, orientation, and line of sight of the rest areas. Seating for caregivers should be placed next to activity facilities and areas, with the selection of locations considering the line of sight and proximity to facilities, to facilitate parental supervision and protection of children. Generally, it is advisable to place seats in the child care area 1.8-4 meters away from play equipment, ensuring quick response to potential dangers while not disrupting parent-child interactions. Leisure facilities that enhance social interaction among parents can be positioned directly in front of scenic focal points or around public activity areas, focusing attention on the vibrant central area.

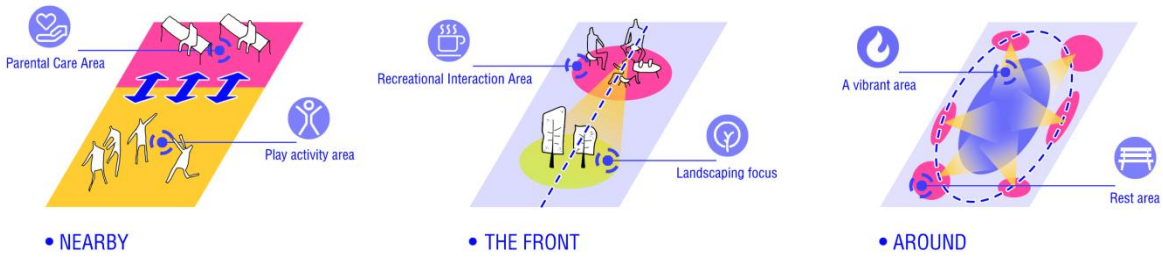


Figure 2-20 Location, orientation and view of rest facilities
(Image source: self-drawn by the author)

Different parent-child combinations have varying seating needs. To meet the diverse needs of family groups, the types, sizes, layouts, and shapes of seats should be designed flexibly. For example, the orientation of the seat itself or its placement can significantly impact the seating arrangement. A straight seat is oriented in a single direction, which is not conducive to group interaction; an L-shaped seat is ideal for sitting around and communication, enhancing interaction and making it a good choice; a V-shaped seat has different opening sizes on both sides, allowing parents and children to choose freely based on their needs, thus better adapting to usage; a curved seat has a beautiful design that blends well with the environment. In summary, seats can be arranged in various shapes, including right angles, V-shapes, U-shapes, curves, or irregular shapes (Figure 2-21), promoting social interaction between parents and children as well as among family groups. Additionally, depending on the specific needs, seats can also be designed in a semi-enclosed form, enhancing the sense of space and privacy.

Figure 2-21 Seats at different angles and shapes
(Image source: Baidu)

Furthermore, considering that children and parents enjoy fun and engaging activities, the park can incorporate seating not only as individual units but also as part of the landscape or with unique designs to serve as interactive features (Figure 2-22). For instance, the sculpture seats in Yutian City's village are designed in a balloon-like, round shape, serving both as benches and as fun sculptures. These seats not only provide a place for play and relaxation but also create spaces for social interaction. Another example is' Spring Hill,' which uses environmentally friendly materials to build a hill. The hill is constructed with stacked bricks in various heights, integrating tree pits, outdoor seating, and art exhibitions, making it more innovative and enjoyable compared to ordinary seating.

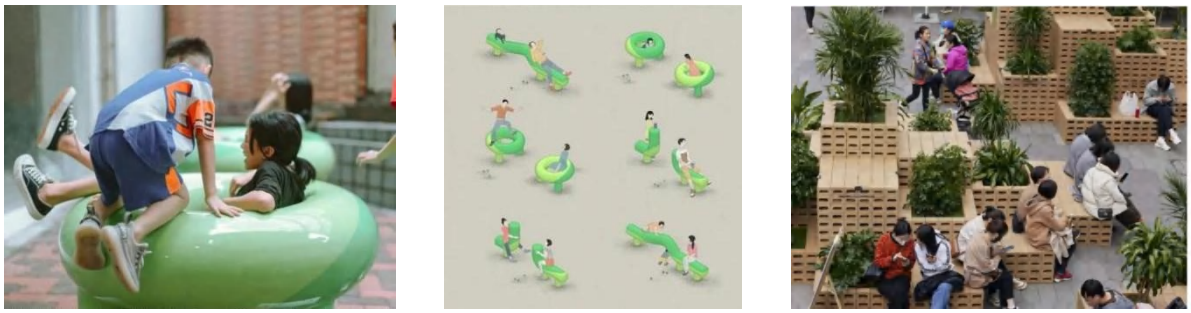


Figure 2-22 Landscape furniture that is both a seat and a facility
(Image source: Baidu)

Figure 2-23 Seat with modular combination
(Image source: Baidu)

At the same time, in order to meet the needs of different periods and different parent-child

groups, the seats in the space can also be designed with modular design, so that parent-child families can flexibly adjust the form and position of the rest seats according to their current needs, thus creating more abundant combination forms and providing possibilities for more diverse parent-child activities (Figure 2-23).

2.6 **Chapter summary**

This chapter first clarifies that not all the public space renovations of existing industrial parks are suitable for integration with the creation of interactive spaces for parents and children. Specific applicable parks are proposed to have certain basic conditions. It systematically organizes and summarizes the physical, psychological and behavioral characteristics of parents and children, as well as various types of interactive activities. It also sorts out the behavioral demand theories related to space creation, Maslow's hierarchy of needs theory and environmental behavior scene theory. It proposes five space creation principles: safety, comfort, fun, diversity and education. It summarizes the general methods for creating parent-child spaces, mainly including the environment of parent-child venues and parent-child activity facilities.

Charpter Three The strategies and methods for creating a parent-child interaction space in the old industrial park

This chapter mainly focuses on the research on the creation of interactive spaces for parent-child relationships in old industrial parks. Firstly, it studies the development of the renewal of old industrial parks and the common problems of their public spaces, clarifying the positive significance of creating parent-child scenarios in old industrial spaces. Secondly, it analyzes and learns from relevant practical cases at home and abroad, summarizes the differences between creating parent-child interaction scenarios in old industrial spaces and general urban spaces, and proposes supplementary strategies and operational methods for creating parent-child scenarios in old industrial spaces.

3.1 **Overview of public space in old industrial parks**

3.1.1 **The development of the renewal of existing industrial parks**

The origins of the transformation of old industrial areas can be traced back to the mid-20th century, with different countries having different timelines.

Western countries are the cradle of industrial civilization. Drawing on their industrial development history, developed Western nations entered post-industrial society much earlier than their domestic counterparts. Consequently, their research on the revitalization and reuse of old industrial areas and industrial heritage has reached a relatively mature stage. As early as the 1950s to 1970s, Europe and America began early practices in urban redevelopment of abandoned land. In the 1950s, with the decline of manufacturing, some American cities started converting abandoned factories into commercial spaces, such as the 1964 renovation of San Francisco's Jilardi Plaza, which is considered an early example. In Europe, the protection and revitalization of industrial heritage in Germany's Ruhr Area became a model in the 1970s. Large-scale systematic renovations began and expanded after the 1980s. The International Council for the Conservation of Industrial Heritage (TICCIH) was established in 1986, promoting the global conservation of industrial sites. The redevelopment of London's Docklands in 1981 is a prime example of the transformation of large industrial areas.

In contrast, China's efforts to revitalize existing industrial parks started relatively late. In

the 1980s, influenced by international trends, the focus was on transforming industrial buildings for the protection of industrial heritage and cultural preservation. By the late 1980s, artists began to settle in the former electronic factory that would later become the 798 Art District in Beijing. However, large-scale renovations did not begin until after 2000. In the early 2000s, with the implementation of urban renewal policies, projects such as the Suzhou River Art Warehouse in Shanghai and the officially recognized 798 Art District in Beijing (officially recognized in 2002) emerged, leading to rapid development in the renovation and revitalization of industrial spaces. Many old industrial sites were repurposed into commercial and entertainment hubs, incorporating public spaces like city squares and green areas.

3.1.2 **The lack of public space renewal in old industrial parks**

Nowadays, many cities have entered the post-industrial era. Many industrial buildings were constructed with specific production tasks during the industrialization period. However, during the development of the cities, their production attributes gradually faded away, leaving behind idle industrial spaces. The original users of these industrial zones were workers. They transported products and carried out labor production within the parks. The space was initially designed to facilitate the productive work of the workers. The space scale was large, the hard areas were spacious, and the industrial sector was the main industry, producing industrial products. The park aimed for production efficiency and output, and its relationship with the surrounding cities was relatively disconnected.

Industrial renovation parks are updated and transformed from existing industrial parks. Currently, there are some deficiencies in the public space renewal of existing industrial parks. For example, many parks pay more attention to the reuse and renovation of building factories and the transformation of industrial functions during the renewal process, but only do simple planning for the external space and pay less attention to the design. This lack of emphasis on the renovation of public spaces during the renewal process leads to problems such as uniformity, single functionality, and lack of design in the public spaces of industrial renovation parks. This makes the external spaces lack vitality and be difficult to function, with a monotonous and homogeneous form, a tendency towards convergence, and a lack of its own distinctive features.

It also causes a problem of a large amount of space resources being idle and wasted.

3.1.3 **Characteristics of public space in industrial renovation park**

The current renewal of existing industrial parks is mostly carried out in a top-down manner, with the design failing to take "people-oriented" principles into account, and insufficient attention being paid to external public spaces during the renewal process. This is due to the particularity of the predecessor industrial parks, which were dominated by industries. Compared to urban public spaces, the park spaces have been neglected, simplified and reduced in complexity. The characteristics of these park spaces are that the external spaces still appear in the form of large open areas, mainly with hard surfaces, and lack specific detailed designs. The greenery and facilities within the site are scarce, with excessive sizes, poor environments, making it difficult to attract people to use the space, often resulting in space idleness while people have nowhere to go. This problem is summarized as follows: It encompasses the following four aspects:

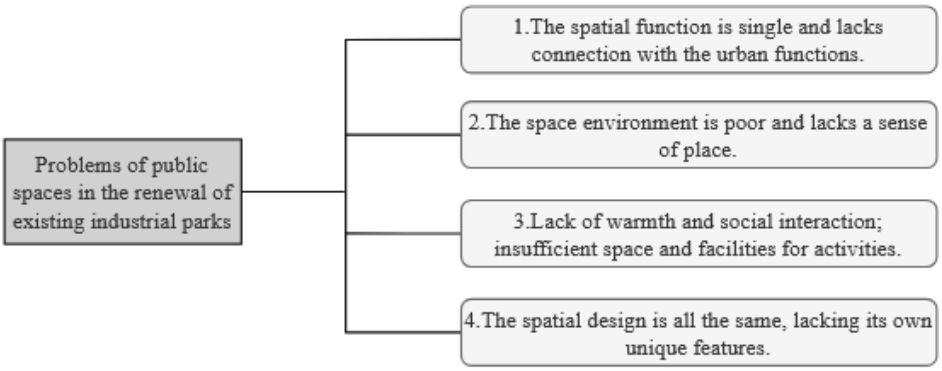


Figure 3-1 The main problems of the industrial renovation park space
(Image source: self-drawn by the author)

1. The spatial function is monotonous, lacking integration with urban functions: The original layout of the industrial park space was mainly focused on production functions, mainly serving industrial production, transportation, storage and other activities of workers. The function of the site was very simple and had weak connections with the external urban space and functions.

The external space within the old industrial park had a relatively ample overall area, but during the process of space renovation and renewal, little attention was paid to the transformation of public spaces. Most of them only made simple divisions of the site, and their

spatial functions remained simple and lacked functionality. This led to waste of space resources. Public spaces failed to fully realize their own value and were unable to accommodate the diverse interactions of parent-child groups, resulting in the lack of space venues that could support different activities of parents and children within the park.

2. Poor spatial environment and lack of place spirit: The productive old industrial park spaces are mainly composed of large areas of hard surfaces, with a lack of landscape plants and uniform, monotonous site spaces. This problem still exists in many public spaces of industrial old renovation parks nowadays. The original landscape conditions of the park spaces were not ideal, and during the renovation and upgrading of the existing industrial parks, more attention was paid to the renovation of buildings, while the design of external spaces was insufficient. The neglect in design has made it impossible to effectively improve this problem, resulting in a monotonous and dull space environment. The site is mainly composed of large areas of hard surfaces, lacking space subdivision, and there are also very few landscape plants in the site, leading to poor spatial experience.

3. Spatial Indifference and Lack of Activity Spaces and Facilities: Many existing industrial parks undergo top-down renovations, often neglecting a people-centric approach from the outset. These spaces often lack human-centered design and are seldom equipped with facilities to support and serve activities. As a result, most parks suffer from a severe shortage of supporting and activity facilities, such as a lack of rest benches and inadequate signage systems.

4. Spatial design is monotonous and lacks distinctiveness: Industrial spaces inherently possess the characteristics of industrial culture, yet many industrial renovation parks fail to adequately consider these aspects in their public space designs. This results in the inability to highlight the unique spatial features of these areas. Consequently, the design of these spaces is indistinguishable from ordinary ones, leading to a uniformity and homogenization of the external spaces in the renovation parks. There is a need to enhance the distinctive features of industrial culture.

The public spaces in industrial parks that have lost their industrial production functions, due to changes in the characteristics of users within the parks, can no longer meet the needs of

modern people's use and living. These public spaces, which occupy a significant amount of high-quality resources, urgently need renovation and updating to enhance economic and social benefits. This process should explore the historical and cultural value of industrial relics while meeting the new demands of contemporary people's production and life.

3.2 The Positive Significance of Creating Parent-Child Scenarios in Old Industrial Spaces

Industrial heritage-themed creative parks bear the responsibility of cultural inheritance. They combine the creation of family-friendly scenarios with the renovation of old industrial spaces, and adopt elegant and interesting spatial environment designs to attract more families. They provide excellent outdoor activity venues for families, which can offer unique experiences different from those of typical urban spaces for family activities, promoting family science education. At the same time, they can better address the common problems of lack of vitality, homogeneity, and difficulty in maintaining operation and development in current old industrial spaces, allowing a mutually beneficial and beneficial relationship to be formed between the two.

3.2.1 Provide a unique space for parent-child interaction

The industrial renovation park has a rich internal business layout, prominent cultural atmosphere, and ample space area. Combined with the scenes of family activities, it provides entertainment and exploration opportunities for parents and children, making the space a natural "museum" for family groups to conduct educational and scientific popularization learning. It can offer family-friendly scenarios different from those in ordinary urban spaces.

The rich commercial layout and ornamental features within the park can better serve the needs of family sightseeing and leisure, as well as experience consumption. The industrial relics and cultural atmosphere in the space promote educational and scientific popularization for families. At the same time, the spacious and diverse activity areas within the park can provide sufficient space for outdoor quality expansion activities for families.

The advantages of the family interaction scene within the industrial renovation park are as follows:

1. Sightseeing and leisure function

The industrial renovation creative park contains a variety of commercial facilities and stores. The site is closely linked to the business layout, making it easier to meet the diverse consumption needs of family groups, such as dining, shopping, and entertainment, providing services for families. The newly added creative industries have added an artistic atmosphere to the park. The interesting creative installations and small works make the space rich and diverse, giving families a sense of novelty, while the park still has many industrial relics, such as factory buildings and industrial devices. The industrial atmosphere of the park space itself has good visual appeal, allowing the visiting families to relax and enjoy themselves to the fullest here, and to rejuvenate their minds.

2. Educational and scientific popularization function

As a carrier of historical culture, industrial heritage creative parks can vividly display industrial civilization and provide rich cultural education experiences for the public. Their public spaces are different from ordinary urban public spaces. The rich industrial creative environment in the park can create a good cultural publicity and scientific popularization atmosphere, allowing family groups to unconsciously absorb industrial knowledge while engaging in activities in the park, achieving cultural inheritance. The rich creative facilities, scientific devices, and artistic small works all have educational significance for families. At the same time, the diverse and entertaining, and performance activities in the park allow families to participate in the space, achieving the purpose of education through entertainment.

3. Quality expansion function

Industrial relic-based creative parks are transformed from old industrial areas and usually have sufficient and spacious public spaces. The types and variety of space are also more and richer. Currently, the limited specialized outdoor space for families is planned specifically. While families are busy with work and study, they urgently need an outdoor venue for joint exercise, cooperation, and games. The external space of the industrial renovation creative park can provide physical venues for diverse activities for family groups. Especially for dynamic activities such as sports that require large spaces and venues, and some group family activities, it is difficult to achieve in indoor places or small venues. The diverse and spacious public space

of the creative park creates convenience and possibility for achieving diverse activities for families.

3.2.2 Parent-Child Activities Facilitate Park Development

3.2.2.1 Stimulating the vitality of public spaces in the park area

Combining the public spaces of the old industrial park with scenes of parent-child activities helps to differentiate and update the space, promotes the use and participation of parents and children in the park's public spaces, increases the behavioral activities in the space, injects new vitality into the currently dull and idle public spaces, improves the utilization rate of the park's space, and realizes the value and significance of the public space.

3.2.2.2 Parent-child potential drives the development of the park

In addition, the parent-child group has a huge consumer market and great development potential. By creating pleasant and interesting parent-child spaces to attract more parent-child groups to participate in activities in the park, the consumption and usage of parents and children can actively drive the overall development of the park, better maintaining the operation and revenue generation of the park.

3.3 Domestic and foreign case studies

This section analyzes the design cases of industrial space renewal and parent-child activities at home and abroad, focusing on two aspects: 1. How to integrate public space with parent-child activities to meet the spatial needs of parents and children; 2. How to maintain the characteristics of industrial culture in the renewal of industrial space for parent-child activities.

3.3.1 Domino Park in New York, USA

3.3.1.1 Project overview

The predecessor of New York's Domino Park was a historic sugar factory. In 2004, the Domino Sugar Factory closed, and the park's design draws inspiration from its industrial history. By preserving the original steel structure and mechanical facilities, the park integrates an industrial site with a children's playground, providing the Williamsburg community with an open space for leisure and entertainment, rich in educational value and creativity.

3.3.1.2 Parent-child space creation methods

（1） Convergence culture: The theme story of the sugar making journey

Domino Park Amusement Park pays homage to the former industrial sugar factory and its rich sugar-making history by integrating the sugar-making process into the amusement space design. The designers combine the creativity of the industrial era with children's education, creating a unique space that satisfies children's curiosity while conveying historical and cultural knowledge. Each part of the park symbolizes a step in the sugar-making process, allowing children to learn about industrial history as they play. By climbing slopes and navigating through pipes, conveyor belts, and bouncy slides, children can experience the entire process from cutting sugarcane to refining it, as if they were in a real sugar workshop.

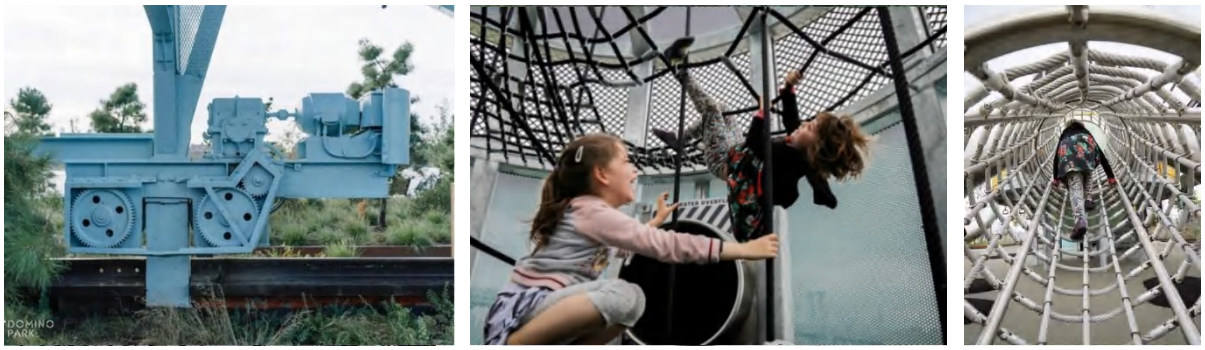


Figure 3-2 Children feel the process of sugar making while playing
(Image source: Baidu)

（2） Convergence culture: Industrial objects are transformed into amusement facilities

The play area features three main components: elevated cabins, tall silos, and industrial containers. These elements are integrated with the park's unique industrial heritage, featuring stainless steel slides, climbing areas, and walkways to transform the space into a children's playground. This design not only ensures that children have fun but also allows them to appreciate the charm of industrial architecture.

Figure 3- 3 Using industrial relics to build amusement facilities
(Image source: Baidu)

（3） Environment: unique colors and rich materials

The space and facilities blend bright yellow, teal, green, and brushed metal colors with existing industrial relics and elements, echoing the historical hues of the old sugar factory. The original factory workshop's wood is used for the elevated cabin's exterior, adorned with brightly colored valve wheels, creating a unique industrial atmosphere and offering a space rich in fun for families.

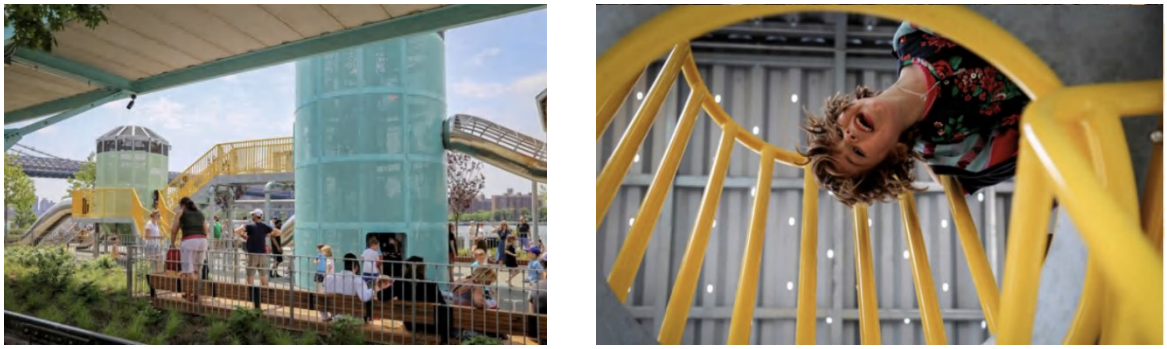


Figure 3- 4 Use interesting colors and materials
(Image source: Baidu)

3.3.2 Langyuan Station industrial renovation park, Beijing

3.3.2.1 Project overview

Langyuan Station, located in Beijing's Chaoyang District, was once the site of Beijing's textile warehouse. It was built in the 1960s and now attracts nearly 1,000 film and television companies and related supporting services to gather and take root here, becoming a creative park with cultural and artistic themes.

The park features a Warm Family Growth Center, designed by the internationally renowned architectural firm waa to meet the developmental needs of children aged 0-12. This center provides endless opportunities for children's joy within its limited space. In the central station square, an abandoned railway track is often used for weekend markets and occasional temporary family activities.

3.3.2.2 Parent-child space creation methods

（1） Convergence culture: Set a new theme for parent-child games

Based on their own memories of the childhood neighborhood, the designers put forward the concept of returning to the neighborhood for parent-child activity venues, aiming to supplement the lack of space for urban children to play freely. Five activity game areas (**错误! 未找到引用源。**) were designed in the growth center, so that children could improve their

understanding of their body senses in entertainment and stimulate their desire for independent exploration.

Figure 3- 5 Five main theme parks
(Image source: Baidu)

（2） Segment the customer base: Parent-child groups who pay attention to the service

Different activity areas are designed with differentiated features, considering children's behaviors, movements, and environmental exploration. For younger children, the area includes a variety of play facilities such as a slide, climbing hill, ocean ball pool, and merry-go-round. These spaces and facilities can evoke emotional responses in children, promoting emotional expression and physical coordination through play.

The outdoor area features large slides and trampolines, suitable for slightly older children, which help develop their sensory and motor skills, enhancing their balance and sensory integration. For older children, the area offers more challenging facilities, where the ability to cooperate and collaborate between parents and children can be developed and strengthened during adventurous activities.

Figure 3-6 Targeted facilities for young and old children
(Image source: Baidu)

（3） Convergence culture: Utilize industrial buildings to create spaces

The Warm Family Growth Center utilizes the warehouse of a textile factory, which includes both indoor and outdoor areas, featuring three main children's entertainment zones.

The architectural culture serves as the foundation for this design, with new constructions and renovations built upon it while preserving the original building form. The renovation is designed to enhance children's ability to control their environment, helping them explore their sensory and motor skills, and improve their balance and coordination.

（4） Combine the format: set up parent-child service formats near

The park has introduced a variety of family-oriented businesses, including home furnishings, cultural and creative products, and pet-related items. The business types near the family activity areas are more concentrated. In the factories around the Warm Family Parent-Child Park, a wide range of family-friendly activities have been introduced, such as baking, reading, and pottery. The improved accessibility of commercial facilities can better support and serve family activities.

Figure 3-7 Business conditions near the Warm Family Parent-child Park
(Image source: Baidu)

3.3.3 Zhongcheng Zhigu Industrial Renovation Park, Shanghai

3.3.3.1 Project overview

Zhongcheng Zhigu Creative Park is located in Changjiang Road, Baoshan District, Shanghai. Its predecessor was the freight container yard of Songhu Railway built in 1876, and in 1959 it became the Shanghai aid warehouse of China Complete Equipment Import and Export Co., LTD.

After the renovation in 2013, it has become a modern industrial park with the functions of cultural and creative industry, scientific and technological innovation and intelligent manufacturing industry. There are abandoned railway tracks of Songhu Railway, China's first operational railway, and abandoned train carriages beside the railway tracks in the park. The park has set up many places for parent-child activities combined with the elements of trains.

3.3.3.2 **Parent-child space creation methods**

（1） Convergence culture: Reuse idle land to create a space for parent-child interaction

Zhongcheng Zhigu Creative Park makes use of the abandoned protective green space in the park that was previously filled with construction waste. By leveraging the existing natural elements of the site, it extracts the park's iconic industrial cultural elements - trains - and integrates them to create a railway science and education park - the Train Garden. It also sets up a "One Meter Garden" to encourage parents and children to participate in planting and experience, providing natural science education. In the small garden, various activities for parents and children are often held, providing an interactive platform for them to observe, cooperate hands-on, get in touch with ecological nature, and enhance their scientific knowledge.

Figure 3-8 Zhongcheng Zhigu train garden
(Image source: Baidu)

（2） Facilities: The fun reuse of industrial elements

The Zhongcheng Zhigu Park is home to numerous industrial relics, including abandoned train carriages, locomotives, and railway tracks. The park has preserved some of these distinctive industrial locomotives as scenic features, such as the Time Train, Cowboy Train, and Bar Train, which are popular spots for families and visitors to take photos and admire. This enhances the park's appeal. Additionally, the remaining abandoned carriages have been repurposed into a family-friendly restaurant and an illustrated book library, offering services for dining and leisure activities, adding an element of fun.

Figure 3- 9 The locomotive is reused as a landscape and restaurant
(Image source: Baidu)

（3） Operate activities: Organize a variety of temporary activities for parents and children

The park frequently hosts a variety of temporary family activities on the railway lawn. These activities, such as the Family Garden Tour, cover six major areas: social interaction, nature exploration, sports, creativity, and more. The park offers a wide range of activities, including book markets, succulent planting, camping, and creative graffiti. Additionally, the Railway Vegetable Garden, leveraging its ecological and natural features, organizes numerous educational activities, such as crop science education and planting experiences. For example, 'A Grain of Wheat's Journey 'includes labor education and food education classes from farm to table, while' A Grain of Rice's Life' provides natural science education.

Figure 3-10 Various temporary activities for parents and children held in the park
(Image source: Baidu)

The introduction of parent-child temporary activities brings freshness and great attraction to parents and children who come to the park. During the activity, parents and children can promote the tacit understanding and cooperation between parents and children, learn from fun and enhance the emotional link between parents and children.

（4） Operate activities: Projects that provide interactive experiences for parents and children

The Old Locomotive and Rail Display is situated in the central public green space of Zhongcheng Zhigu Park. The park also features a Mini railway and a small train for children to drive. Children can ride the mini train around the old tracks, light up the signal lights, and experience the role of a young train conductor, completing a subtle yet effective educational journey for both parents and children.


Figure 3-11 A long play project of a small train that can be experienced by parents and children (Image source: Baidu)

3.3.4 A bus-themed space on the street in Changping, Beijing

3.3.4.1 Project overview

The bus-themed public space, located on the streets of Changping district in Beijing, covers an area of 300 square meters. The old Beijing bus BK640 was born in 1957 and is China's first self-made bus.

The design of the space is based on the shape of BK640. The site combines the transformation and reuse of abandoned old buses, which are disassembled and integrated into children's functions. It not only retains the historical memory and industrial atmosphere in the past, but also creates an interesting and rich parent-child activity space, and also gives more educational significance to the parent-child space.

3.3.4.2 Parent-child space creation methods

（1） Integrate Culture: Incorporate industrial themes into spatial design

The entire design, from the site to the facilities, effectively highlights the bus theme. Firstly, the abandoned bus bodies are preserved and utilized, dismantled, and placed in the site to create a space for family activities. Secondly, the design of the facilities, including their shapes and colors, closely follows the elements of the BK640 bus. The vehicle's red color is used as the main color of the space, featuring a' steering wheel' turntable, large tires, a gear shift lever, and other characteristic amusement facilities.

Through a distinct theme and high interest, the whole space closely links the historical imprints of the past with the new functional needs of the present, and also improves the perception of the parent-child space atmosphere, so that parents and children can contact and feel the industrial history in play, and complete the popular science education for children unconsciously.

Figure 3-12 The past and present of Changping bus theme space
(Image source: Baidu)

（2） Segment the customer base: differentiated design for different age groups

Considering the physiological development differences of children during the renovation, the whole site is cleverly divided into the main activity areas for children of different ages by a road connecting the external sidewalk, which is divided into two parts: front and rear (**错误!未找到引用源。**), so as to avoid the potential safety risks that may occur when young children play together with older children.

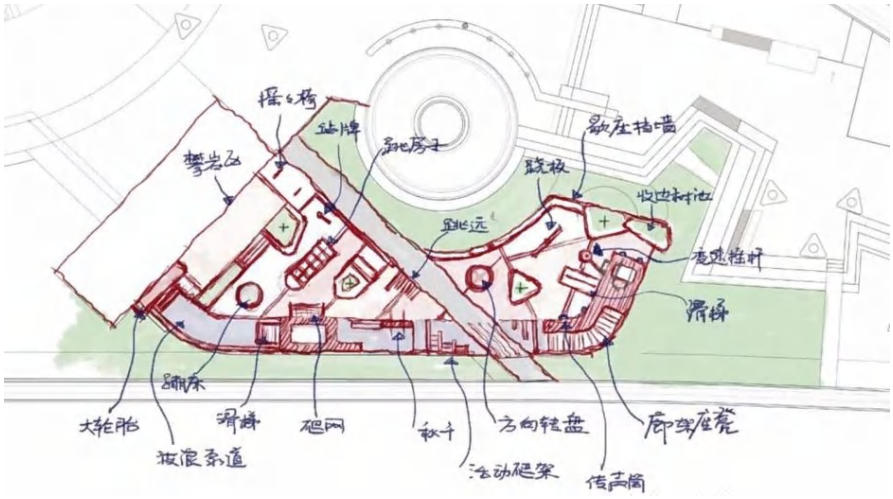


Figure 3-13 Field area by age
(Image source: Baidu)

When designing the facilities, the physical and mental characteristics of different children

were taken into account. The overall difficulty of the facilities was determined by age groups. In the front area, play equipment such as seesaws, slides, pergolas, benches, megaphones, and directional turntables are provided, with a focus on activities suitable for younger children. In the rear area, climbing areas, trampolines, climbing nets, swings, long jump areas, and hopscotch games are set up, catering to all age groups and providing both thrilling experiences and opportunities for parent-child interaction.

Figure 3-14 Facilities of different difficulty levels in the site
(Image source: Baidu)

Secondly, the rich types of activities in each age group also provide parents and children with a variety of autonomous choices, so that children of different genders and temperaments, as well as different types of parents can find their own interest in activity facilities.

Figure 3-15 Various types of activities and facilities in the site
(Image source: Baidu)

（3） Facilities: Focus on facilities that allow parental participation

1. Considering the scale of parent-child sharing

In terms of the scale of space and facilities, the needs for parental interaction are taken into

account. When designing play facilities, the physiological characteristics of both children and parents are considered, such as swings that can be used side by side, educational boards for shared viewing, and slides for joint use. This allows parents to share the facilities with their children, truly achieving a sense of 'parent-child' involvement.

Figure 3-16 Spaces and facilities shared by parents and children
(Image source: Baidu)

2. Considering parents' need for rest

Figure 3-17 Parent rest area with shade
(Image source: Baidu)

In the space design, a rest area and facilities have been added for parents to better care for their children. Additionally, there is a place for older middle-aged parents to recover their energy. The rest area has a canopy to better adapt to environmental changes, providing shade and shelter from the sun or sudden rain, thus facilitating parent-child activities.

3.3.5 **Case study summary**

The old industrial spaces differ from general urban public spaces. Through the summary and generalization of multiple previous cases, it can also be found that in addition to the common design points for creating interactive spaces for parents and children in general urban spaces, the interactive scenes for parents and children in old industrial spaces will also pay special attention to and consider the surrounding business types, activity planning and operation, integration with culture, and diverse groups of parents and children when creating.

Overall, the emphasis of old industrial spaces and general urban public spaces in creating family-friendly environments differs. This mainly includes the following three aspects:

1. Highlighting the industrial cultural characteristics of the space itsel——focus on the integration and utilization of culture

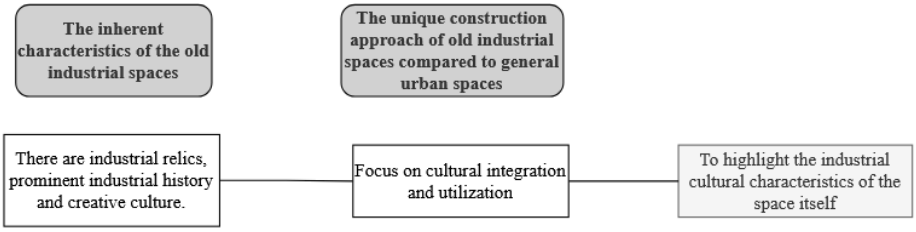


Figure 3-18 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 1
(Image source: self-drawn by the author)

For industrial heritage and creative parks, which are places with a rich industrial history and vibrant creative culture, the design of parent-child spaces should highlight their unique characteristics by fully utilizing the site's industrial and cultural elements. By integrating cultural and historical elements with the space's fun theme lines, these elements can be consistently applied to the design of various venues and specific facilities. Transforming industrial relics in the creative park into fun features and adding new functions can enhance the atmosphere for parent-child activities and improve the overall experience of the space.

2. Taking into account the differentiated needs of the parent-child pair——focus on different types of spaces

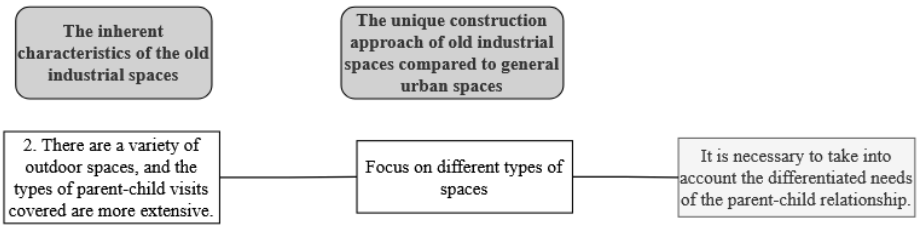


Figure 3-19 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 2
(Image source: self-drawn by the author)

The internal and external spaces of the old industrial park have a wide variety of types, and the coverage of parents and children coming to the park is also relatively broader. There are differences in spatial needs between parents and children, as well as among different types

of parent-child groups. Different spaces within the park need to take into account the diverse needs of different types of parent-child interactions. Children at different ages are in different growth stages, and their cognitive levels and preferred game activities will change. At the same time, their control over their bodies also vary greatly. Therefore, in the layout of different spaces and the design of amusement facilities, it is necessary to create interactive facilities with different difficulty levels based on the main service group of the site. At the same time, the design should take into account the participation of parents in the space, and meet the restorative, socializing, and interactive needs of parents of different ages. According to different parent-child combinations, the layout and design of the space should be targeted to adapt to the psychological differences of diverse parent-child groups.

3. Enhancing the interactive experience of parent-child in the space - Focus on the operation of activities within the park

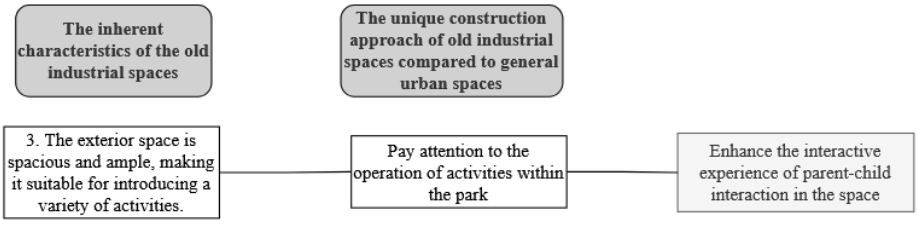


Figure 3- 20 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 3
(Image source: self-drawn by the author)

Unlike typical urban spaces, industrial park spaces are ideal for introducing a wide range of activities and projects to enhance the interactive experience for parents and children, stimulating their creativity. By incorporating creative and participatory experiences, such as DIY workshops, 3D printing zones, collaborative interactive walls, and joint installations, the space can transform into a 'playful installation.' Additionally, temporary events or short-term projects, such as book fairs, camping, and one-day store manager roles, can be organized to keep the space fresh and appealing to parents and children.

4. Pay attention to the surrounding business environment of the venue, and better support and serve the parent-child interaction.

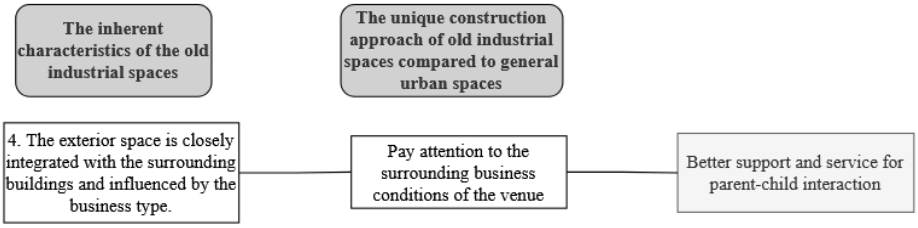


Figure 3-21 The differences between the creation of parent-child scenarios in old industrial spaces and in general urban spaces 4
(Image source: self-drawn by the author)

The external space of the old industrial park is closely integrated with the surrounding factory buildings. Therefore, compared to ordinary urban public spaces, the connection between the site and the surrounding functional businesses is more intimate. According to the on-site research described later, the behavior distribution of parents and children in the park is greatly influenced by the business types. Appropriate surrounding business types can better maintain and serve the interaction between parents and children, prolong the time they stay in the site, and enhance the quality and experience of the interaction.

3.4 **Supplementary Strategies for Creating Parent-Child Scenarios in Old Industrial Spaces**

In Chapter 2, the methods for creating parent-child interaction scenarios in general urban public spaces have been detailedly presented. However, compared to common urban spaces, old industrial spaces have certain particularities, such as prominent industrial cultural elements, presence of industrial relics, and close connections between the space and surrounding buildings and factories. Therefore, when creating parent-child scenarios in old industrial spaces, not only general methods and measures need to be considered, but also some more targeted strategies need to be focused on. This subsection, based on the key insights learned from the case studies in Chapter 2, mainly supplements the strategies for creating parent-child scenarios in old industrial spaces from four aspects: subdividing parent-child customer groups, integrating industrial culture, adding parent-child business types, and planning parent-child activities.

3.4.1 **Segmenting the customer base into parent-child groups**

Most of the existing industrial parks have been renovated and transformed into creative

parks. These renovated creative parks have a variety of external space types, and the coverage of parents and children visiting the park is also relatively wider. Therefore, when creating interactive scenarios for parents and children, it is necessary to further segment the parent-child customer groups. Based on the characteristics of the space and the situation of parents and children visiting the park, determine the functional positioning of the space, clarify the main service target of the space and the interactive behaviors it is designed to support, in order to meet the space needs for different types of parents and children and different types of parent-child interaction activities. Therefore, this section mainly discusses different types of parent-child interactions and the differentiated space needs of different parent-child groups for parent-child scenarios.

3.4.1.1 **Spatial Requirements for Different Parent-Child Interaction Functions**

Different parent-child interaction functions will impose different requirements on the activity spaces of the park. According to the research on parent-child interaction in the second chapter, it mainly includes four types of interaction behaviors: parent-child sports, parent-child leisure, parent-child games, and parent-child cooperation. Therefore, the parent-child space can also be mainly divided into these four functional types.

（1） Family sports space

Dynamic activities such as parent-child sports usually require spacious areas and large activity venues. When creating a parent-child sports scene in the space of an old industrial park, more open spaces and larger squares should be selected for setting up. At the same time, it is necessary to consider the needs of young parents and children engaging in sports together during the interaction process, as well as the need for middle-aged parents to accompany them.

1. Multi-functional and composite sports facilities

Figure 3-22 Wave-shaped facility with composite functions
(Image source: https://www.gooood.cn)

The venues for children's sports activities are typically spacious. When designing these spaces, it is advisable to incorporate multifunctional and integrated sports facilities to enhance the space's utilization.

For instance, in a waterside area with a wavy terrain, an athletic field can be set up where children can run, ride small wheels, and roller skate. Additionally, the protruding sections can serve as resting benches, making the space highly versatile and functional.

2. Combine open space and square setting

Family sports spaces, with their larger and more vibrant areas, are better suited for integration with squares and open spaces. For instance, the skate park in Shenzhen Pingshan Children's Park combines a hard-surfaced square with a dual-color paving, creating a flat and spacious area where children and parents can practice and train. The dynamic curved design not only emphasizes the dynamic feel of movement but also provides a clear reference for activity paths. Additionally, the park makes full use of the shaded areas to create spaces suitable for riding small bicycles, roller skating, and skateboarding. Winding roller skating tracks are laid out in the open spaces, and the original trees are preserved as much as possible, allowing children to enjoy joyful activities in a natural setting.

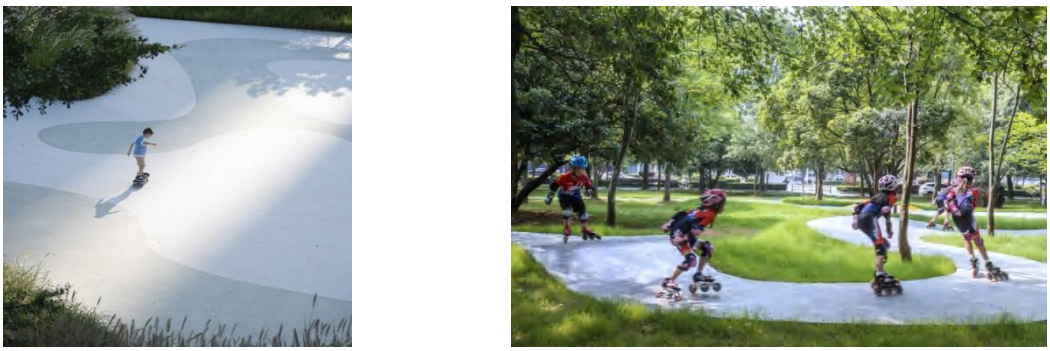


Figure 3-23 Squares and open Spaces are suitable for sports
(Image source: https://www.gooood.cn)

3. Consider the participation and companionship of parents

In particular, parent-child sports venues should focus on the safety of parents and children during sports activities and exercises to prevent injuries in intense activities. Therefore, it is crucial that the space allows for parents to watch and accompany their children.

For example, the parking facilities at the skateboarding venue in Longtang Lake Park in Chongqing can temporarily store items and meet the needs of parents who wish to accompany

and supervise their children, making it convenient for both parents and children to use together, significantly enhancing the interactive experience for family members.

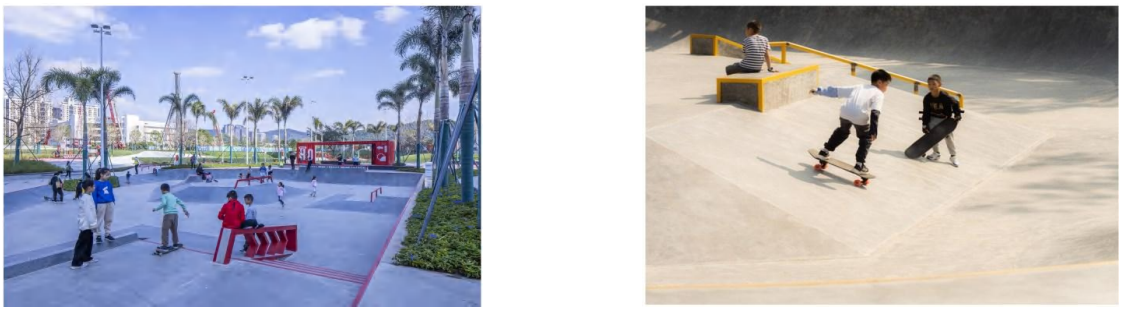


Figure 3- 24 The parking facility provides the function of accompanying care for parents
(Image source: https://www.gooood.cn)

（2） Family leisure space

Parent-child leisure needs a more quiet and immersive space environment and atmosphere, and the quality of the environment is also higher.

1. A variety of rest and stop facilities

Family leisure activities require facilities for rest and relaxation. These facilities can be diverse, including not only formal public seating but also flexible seating, scenic seating, and auxiliary seating. For example, a scenic seating area can be designed as steps to address height differences and can serve as resting spots when needed. Additionally, special seats with scenic or sculptural elements can enhance the environment's beauty and interest. Modular and mobile facilities can also be used, allowing families to adjust according to their needs.

Figure 3-25 A seating landscape combining steps and seats
(Image source: https://www.gooood.cn)

2. Combine green landscape and open green space

Parent-child leisure has high requirements for the beauty of landscape plants and the comfort and suitability of the environment. When setting up leisure sites, it should be considered to combine with green space and green plants, highlight the ecological nature of the

site, so that parents and children have a good spatial feeling and experience.

The Wave Forest in Shanghai's Qiantan Leisure Park features a small number of existing trees. The design retains these trees while partially reshaping the terrain, planting shade-tolerant flowers under the canopy to create a grassy slope garden with undulating waves, providing an ideal spot for family leisure walks. In Chongqing's Longtang Lake Park, a large grassy slope with gentle undulations is set up, offering a space for families to camp, play, and enjoy nature freely.

Figure 3-26 Wave forest with good landscape environment
(Image source: https://www.gooood.cn)

Figure 3-27 Open grass slope with slight undulation
(Image source: https://www.gooood.cn)

3. Create small conversation Spaces

Static leisure activities, such as parent-child conversations, focus on privacy and a sense of security in space. These activities often require a private setting, making them more likely to occur and continue in intimate and comfortable small spaces. The Five Senses Garden at Shanghai Qiantan Leisure Park features large flower borders beside the benches, creating a semi-private space enveloped by vibrant greenery. This setup allows parents and children to enjoy a more relaxed and pleasant environment for leisure interactions, providing a rare moment of tranquility and easing their minds.

Figure 3-28 Semi-private flower space for casual conversation
(Image source: https://www.gooood.cn)

（3） Parent-child play space

Parent-child groups usually need a beautiful environment and an interesting game space. Both parents and children should be taken into account. On the one hand, emotional communication between parents and children can be carried out in an entertaining way; on the other hand, parents' participation in the interaction process can eliminate boredom, relieve fatigue and various pressures when taking care of children.

1. A variety of children's play facilities

A variety of games can be arranged in the children's play space, which can be freely chosen by children and parents to meet the needs of different preferences and personalities of children, and give various opportunities for children's development and growth in many aspects.

Chongqing Longtang Lake Park has placed a variety of children's play facilities on the fun and strange slope, with peculiar shapes and rich functions, such as crawling net, sliding slide, climbing frame, corridor, plum blossom pile, etc., which have attracted a large number of parent-child groups to use. Children can freely choose their favorite facilities.

Figure 3-29 Various game facilities in the field
(Image source: https://www.gooood.cn)

Figure 3-30 Fun landscape wall as a recreational facility
(Image source: https://www.gooood.cn)

In Xiaobao Village, Songzhuang Town, Beijing, a wall has been used to create a play area for children. The wall has many small holes for children to observe the outside world, and there

are entrances for hide-and-seek and hide-and-seek of different sizes. Shouting and singing can be heard through the low-positioned megaphone.

The pattern on the ground at the entrance and exit of the children's play area in Dongjiaotou community can be used for children's play without affecting normal traffic.

Figure 3-31 Playground facilities drawn on the ground
(Image source: https://www.gooood.cn)

2. Being Combined with natural elements and terrain

The playground designed for children focuses on "free play". Rich terrain and bright colors can attract children's attention, and fully develop their balance and sports ability. Natural materials or natural elements such as stone, wood, water and plants can trigger children's sensory feelings and enhance children's cognition of real natural materials.

The playground uses the terrain difference to create a parent-child gathering place. The upward shaping of the terrain forms the site difference, and the curved retaining wall is combined with the characteristics of the site to become a children's gathering area for play, and the petal installation under the tree provides a leisure space for parents to accompany their children.

Figure 3-32 The sliding field relies on the terrain
(Image source: https://www.gooood.cn)

Figure 3-33 The pink beach with natural ecology
(Image source: https://www.gooood.cn)

The pink beach in Shanghai Qiantan Leisure Park uses children's natural affinity to natural elements to guide them to this place. In addition, simple shapes, open space and bright colors help children perceive and understand, while creative fantasy, parent-child interaction and group communication naturally occur in play.

3. Setting up a nearby area for parents to rest and communicate

In particular, children's play areas need to consider the needs of parents for care and communication. At the same time, seating areas should be arranged together with shelter facilities. In addition, rest areas should meet the social needs of parents themselves and pay attention to the characteristics of parents of different ages.

Cloudy Paradise is a specially designed play area for children. In the forest zone, the designers selected areas with sparse trees and integrated them with existing fitness equipment spaces, minimizing damage to the original greenery. The playground features children's favorite cloud trampolines and mini skateboards, and includes Cloudy Pavilion and rest benches for parents to watch over their children and take a break.

Figure 3-34 A shaded parent area near the activity facility
(Photo credit: https://www.gooood.cn)

Figure 3-35 A parent area where parents can accompany and supervise as well as rest and communicate
(Image source: https://www.gooood.cn)

In the entrance and exit landscape renovation of Dongjiaotou Community, a variety of

escort and rest Spaces have been set up, including simple seats and communication Spaces for many people to talk and relax, which provides parents with multiple possibilities to choose from for various activities.

Figure 3-36 A composite activity facility that can be used for both play and rest
(Image source: https://www.gooood.cn)

In addition, the facilities with multiple functions can also provide a place for parents to rest temporarily. The game wooden piles in the Branch Forest Secret Realm children's activity area of Shenzhen Pingshan Children's Park can also be used as seats to meet the needs of parents to rest and care.

（4） Parent-child co-operative space

Parent-child cooperation focuses on the interaction and collaboration between parents and children, and pays attention to learning and growing in play. Therefore, most of its space will have some educational and scientific nature.

1. Popular science and culture devices will be installed at multiple points

Figure 3-37 Popular science and culture devices of different types and forms
(Image source: https://www.gooood.cn)

In the parent-child cooperative space, it is advisable to add educational devices such as knowledge boards and cultural installations. These can help children learn through fun activities, subtly receiving education and acquiring knowledge. For instance, the 'Plant Encyclopedia

Classroom' at Shanghai Jingxin Green Land Pocket Park features interactive educational devices that assist parents and children in learning about plants together. Additionally, integrating historical and cultural elements into these installations, such as by incorporating historical photos and cultural information, can help families better understand the site's cultural history.

2. Design thematic interactive space

For parent-child collaboration, in addition to adding extra educational installations, the space can also incorporate storytelling and scene-based educational formats to create theme spaces suitable for all age groups. For example, the Dali Erhai Ecological Corridor Nature Science Park uses the ecological water cycle of Erhai Lake as its main storyline, creating an educational theme-based parent-child activity setting that combines fun with learning. This approach integrates science education and learning into the design of the space and facilities, allowing parents and children to explore nature together and understand its principles.

Figure 3-38 Space design combined with water cycle theme
(Image source: https://www.gooood.cn)

3. Combine with rich green plant configuration

The part of parent-child activities that integrates with nature focuses on natural cognition and education. Children learn about the world through their senses, and plants can stimulate the 'five senses.' By using signboards, parents and children can learn together, which helps children observe and grow better.

For example, in the nature learning area, a variety of safe plants are planted, each labeled with its name, category, and characteristics. Transparent observation balls are set up to allow close-up views of plant roots and stems, enabling children to appreciate the growth of life and connect with nature through observation and learning.

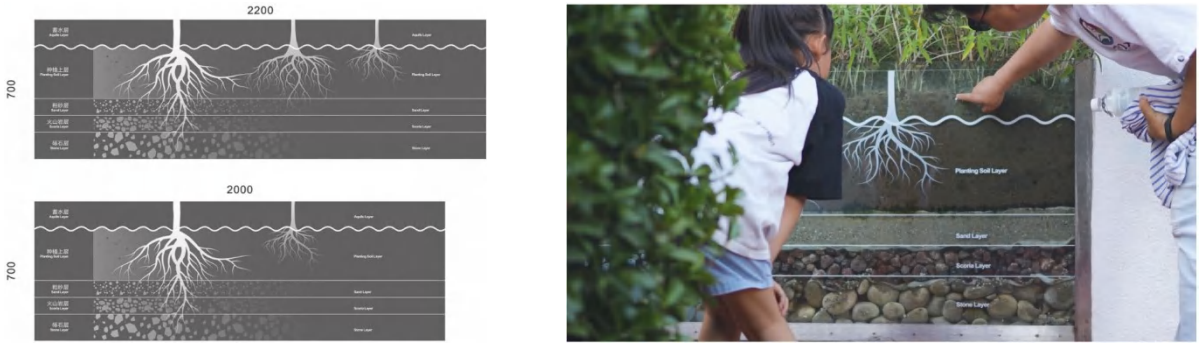


Figure 3-39 Rich green plants combined with natural science
(Image source: https://www.gooood.cn)

4. Organize parent-child study and research activities

Parent-child cooperation emphasizes communication and collaboration between parents and children, or the cooperation and competition among parent-child families. Organizing temporary group activities or setting up innovative projects, such as 3D experience classes and construction camps, can promote social interaction and teamwork among parents and children. This helps young children develop in a decentralized manner and enhances the expressive abilities of school-age children.

3.4.1.2 **Spatial Needs of Different Parent-Child Combinations**

（1） Interacting with infants

The interaction between parents and infants is mainly based on parental care. This kind of parent-child interaction hopes that the site is safe and flat, with a place for strollers, a leisure area with care facilities, and a closer approach to nature and plants.

（2） Interacting with preschoolers

Preschool children aged 3-6 years old tend to ignore danger and have weak body control, so they need parental care. Parents and young children need more intimate contact interaction, which is usually initiated and dominated by parents.

Young parents are typically energetic, creative, and imaginative, hoping to rediscover the innocence and joy of childhood through their interactions with their children. They seek spaces and facilities that allow for creativity and imagination; they can lead their children in games from their own childhood, reminiscing about their youth; and they prefer venues and facilities that facilitate joint play and physical activities. Middle-aged parents, who have experienced a decline in physical strength but are more mature and stable, prefer venues and facilities that are

appropriately challenging, focusing on gentle and soothing activities. They value ample rest areas for relaxation and leisure, placing a high emphasis on the environmental landscape.

（3） Interacting with school-age children

School-age children have reached a certain stage of physical and mental development. They have the initial cognitive ability to the external environment, and at the same time, they are strong in physical and psychological control. The interaction mode between parents and school-age children tends to be a balanced game relationship, and the interaction process is no longer dominated by parents unilaterally.

Young parents, who are physically fit and energetic, can create more spaces in their home design for group games with children, providing them with opportunities to showcase themselves. These activities can be more challenging and innovative. Middle-aged parents, who may have less energy, should interact with energetic school-age children by combining their strengths. For example, they can set up activities that children can complete independently, while parents provide protection and guidance during these activities. Additionally, more intellectual games and places for conversation and rest can be provided, along with spaces for children to play with their peers. It is also important to ensure that the environment is aesthetically pleasing and inviting.

3.4.2 **Integrating industrial culture**

The ways in which the industrial and cultural elements of the venue are integrated with the interactive scenes for parents and children are diverse. They can be integrated throughout the design from multiple aspects such as space themes, facilities, and activities. For example，setting up distinctive scenario themes, integrating cultural elements into facility designs or reusing the existing elements of the venue, and organizing study tours, etc. Below, we will mainly focus on explaining the combination methods of the cultural elements of the park with the scenes for parents and children from the two aspects of space themes and activity facilities.

3.4.2.1 **Set up a distinctive family-oriented theme**

In the parent-child-oriented renovation of the external space of the old industrial park, it is essential to consider the site's industrial history and creative culture. By focusing on visual

and narrative elements, key elements and storylines can be extracted. Through the use of colors and decorations, different themed scenes can be created, and a coherent storyline can be developed. By setting distinctive themes, cultural characteristics can be closely integrated with the design of the site and facilities, creating an excellent environment for parent-child interactive education. This allows children to experience the cultural atmosphere and charm while playing, enhancing the space's appeal and immersion.

For the old industrial renovation spaces, the thematic considerations and element extraction of the family-friendly scenarios can be integrated with the industrial culture of the site and the development direction of the site:

（1） Considering the industrial elements of the site

For the industrial renovation of creative parks, it is essential to fully consider the industrial heritage of the former old factory. By leveraging the unique characteristics of industrial heritage, such as the original functions and historical elements of the old factory, key elements from the industrial legacy can be extracted and utilized. This approach not only protects the heritage but also promotes its value, making the parent-child interactive spaces within the creative park stand out. It enhances the fun, novelty, and industrial cultural atmosphere, satisfying the curiosity of families.

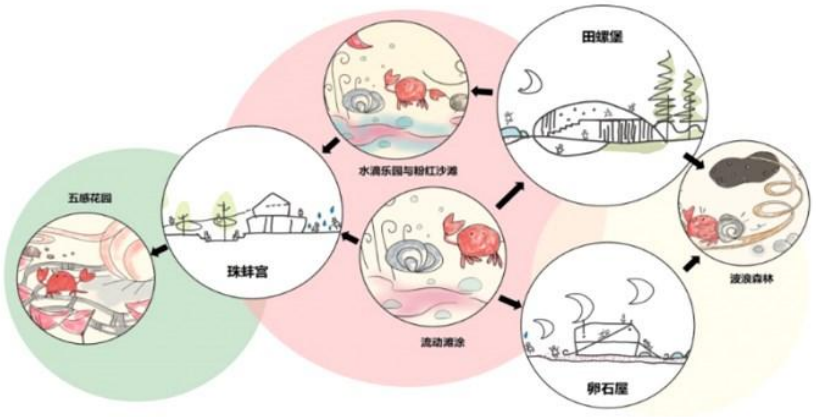


Figure 3-40 Design concept of "Tanwan Island"
(Image source: https://www.gooood.cn)

Shanghai Qiantan Leisure Park, a comprehensive destination for family experiences that integrates architecture and landscape, fully incorporates the site's historical and natural features into its theme IP. The site was originally a riverbank beach, leading the designers to propose

the concept of' Beach Play Island (Figure 3-40). This design draws inspiration from the natural elements of the riverbank, preserving the public's original memories of the old site.

The Haitang River Ecological Park in Sanya deeply explores the cultural content of the site. It extracts and condenses key intangible cultural heritage symbols from the Li ethnic culture of Sanya, and uses the themes of clothing, food, housing and transportation as the main storyline for deepening. Four activity areas are set up: the Li Jiao Park, the Bamboo Weaving Park, the Farming and Food Park and the Tidal Beach Park. Each area is inspired by elements of Li ethnic culture, such as the Li Jiao Park, which starts from the long-standing intangible cultural heritage textile embroidery skills of Li ethnic weaving, and the Farming and Food Park highlights the characteristics of the natural ecosystem and biological communities, etc.

Figure 3-41 The intangible cultural heritage symbols extracted from the Li ethnic culture of Sanya
（Image source：https://www.gooood.cn）

（2） Considering the creative culture of the site

In terms of theme consideration, the industrial types and creative characteristics in the renovated creative park can also be combined. For example, many parks introduce high-tech industries such as 3D printing and AR. When setting the theme, some future technology elements can be added to correspond to the industrial characteristics of the park.

3.4.2.2 **Creating distinctive family-friendly facilities**

When creating family-friendly scenarios in old industrial parks, given the characteristics of industrial relics and industrial culture present in the old industrial spaces, on one hand, some industrial relics within the park can be updated and reused as facilities for family activities; on the other hand, key industrial cultural elements can be extracted and applied to the family facilities within the park.

（1） Reuse industrial relics

Industrial relics carry the historical memory of the industrial age and have important cultural and emotional value. Retaining and reusing these historical elements as carriers of space education and historical inheritance can help parents better understand the past industrial civilization.

Industrial relics, after simple processing or integration with new functions, can be repurposed as facilities for parent-child activities. These relics typically consist of various materials such as metals, steel, wood, and ceramics. After cleaning and processing, these materials can be transformed into display items that create a strong industrial atmosphere, allowing parents and children to experience the unique charm of the industrial era. Displaying industrial relics not only serves as a visual highlight but also combines educational and entertaining elements, guiding children to understand the functions, history, and cultural background of these items through touch, exploration, and reflection. For example, in Xiaohexi Park in Hangzhou, industrial relics have been turned into urban furniture that can be touched and played with, serving as both seating and a large toy for children's hide-and-seek (Figure 3-42).

Figure 3-42 Industrial remnants in Xiaohexi Park become urban furniture
(Image source: Baidu)

（2） Integrate industrial cultural elements

The design of the activity facilities within the park should integrate elements of industrial culture and creativity, such as using 3D printing to create seats and landscape features.

The Guangzhou Shantou Lion Dance Park draws inspiration from the traditional folk culture of Shantou, combining the imagery of lion dance with the design of the facilities. This allows children to experience a rich cultural atmosphere while using the facilities, subtly immersing them in cultural education and appreciation.

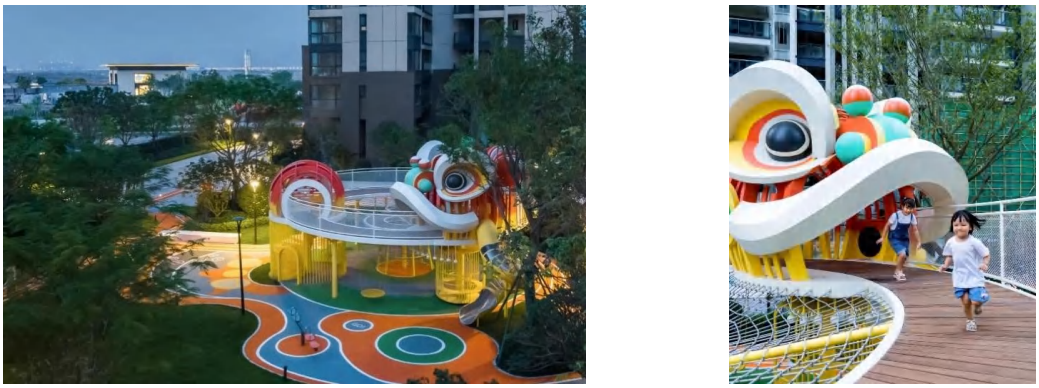


Figure 3-43 Shantou Lion Dance Park
(Image source: https://www.gooood.cn)

For example, in the Haitang River Ecological Park in Sanya, various main elements of the culture related to food, clothing, housing, and transportation were extracted and transformed into theme park equipment that can be experienced and interacted with. The cultural characteristics and activity facilities were closely integrated. For instance, in the Li Embroidery Park area, inspiration was drawn from traditional weaving. The style of the thread spools used for hand-winding and the shape of the fabric drooping during hand-weaving were transformed into different spatial forms and rich climbing-type facilities. In the Bamboo Weaving Park, the Li ethnic bamboo and rattan weaving techniques were incorporated into the surface styles of the activity equipment, combining the bamboo weaving shapes with the corridor-like spatial gameplay. In the Farming and Food Park, the facility forms combined the straw bale elements, and combined children's activity equipment to create a multi-sensory functional place.

Figure 3-44 Amusement facilities that follow the theme storyline of Li ethnic group's intangible cultural heritage
(Image source: self-drawn by the author)

3.4.3 **Combining the parent-child business model**

3.4.3.1 **Increase the availability of parent-child service offerings in close proximity**

Setting up related child-parent-oriented businesses around the child-parent activity area can better serve the child-parent interaction activities, prolong the duration of the child-parent activities, improve the quality of the child-parent interactions, and at the same time, the strong consumption power of the child-parent group can also well drive the development of the park and maintain its long-term operation. The common child-parent-oriented businesses mainly include catering, education and training, and amusement facilities. When the surrounding environment of the site is mainly factory buildings, that is, the stores are relatively close to the site, it is advisable to consider arranging the child-parent favorite commercial types around the site to form a clustering effect; when the site is close to the road and there are few or some distance of stores around, it is advisable to set up some flexible commercial service facilities near the site, such as some commercial stalls, modular small stores, etc.

3.4.3.2 **Store layout in combination with space types**

The types of parent-child interaction can be classified into two major categories: static and dynamic behaviors. Static includes leisure and cooperative types, while dynamic includes sports and game types, etc. Therefore, the overall parent-child interaction space can be divided into two categories: parent-child dynamic activity space and parent-child static activity space. When creating parent-child interaction scenarios, the types of businesses around the venue can be adjusted based on the dynamic or static characteristics of the parent-child space to maintain a harmonious and unified relationship between the two, avoiding interference and impact caused by mixed dynamics. For example, the surrounding areas of the parent-child static activity venue are more suitable for setting up tea rooms, bookstores, and art studios, which are relatively quieter businesses; while the surrounding areas of the parent-child dynamic activity venue are more suitable for laying out pet stores, amusement centers, and dance classrooms, which are relatively noisy businesses.

3.4.4 **Planning parent-child activities**

The organization of activities within the space promotes the occurrence of parent-child interactions. The old industrial space has ample area and flexible and changeable venues, so

when creating parent-child interaction scenarios in the old industrial park space, it is very suitable to plan and hold various parent-child activities in the venue. Based on the perspective of parent-child interaction, the external public space of the industrial renovation park should have more parent-child-related activities, including parent-child natural cognition and parent-child educational cooperation, and at the same time, the forms of the activities can be enriched.

3.4.4.1 **Increase the variety of parent-child activity types**

Firstly, the types of activities can be expanded. The diverse activities in the space can activate the space and enhance the atmosphere of the park. Considering the industrial history and creative culture of the park, as well as the educational interaction needs of parents and children, more outdoor activities that combine education with entertainment should be held. Parent-child activities include many types, such as nature education, self-expression, social cooperation, and so on. Nature education activities are suitable for combining with nature and ecology, such as parent-child planting experiences, which can be carried out in the park's green space, promoting children's natural science education and encouraging them to get close to and interact with nature. Self-expression activities include children's performances and small exhibitions of drawing works, allowing children to gain a sense of achievement in showcasing themselves. Some social and cooperative activities are carried out in a group participation manner, focusing on interaction and collaboration with other parent-child families, and through various game forms, highlighting the importance of teamwork, which is conducive to children's socialization. At the same time, through mutual cooperation between parents and children, trust and security can be established between parents and children.

3.4.4.2 **Expanding the Forms of Parent-Child Activities**

It is also necessary to consider enriching the forms of activities. On one hand, temporary activities involving parents and children, such as parent-child flash markets, can be held to promote parent-child interaction and participation in the space within a short period of time. Consider also adding more long-term interactive experience programs, such as having parents and children participate in the construction of installations, allowing them to have industrial DIY experiences, career experiences, etc. In addition, combined with information technologies like AR and VR and high-tech means, parents and children can have more diverse experiences

during the activities.

3.5 **Operating steps for creating a parent-child interaction scenario in an old industrial park**

The parent-child space requires high safety standards. Before creating a scene for parent-child interaction in an old industrial space, the first step is to select an appropriate space location within the park. Due to the differences in the location and conditions of the space within the park, the compatibility with the creation of the parent-child scene also varies. Therefore, the site that is more suitable for creating the parent-child space should be given priority.

During the integration of industrial spaces and parent-child interaction, it is necessary to respect the characteristics of the site itself, continue the industrial history and culture, and also meet the different needs of parent-child activities, considering the differences in the needs of different types of parents. According to the key points for creating the parent-child interaction space, the following space operation steps are mainly proposed.

3.5.1 **Functional requirements and population positioning**

According to the previous research, different types of parent-child activities and the characteristics of the participants in these activities have varying demands for interactive spaces. Therefore, public spaces in industrial renovation parks designed for parent-child interactions should thoroughly understand the needs of parent-child activities. These spaces should meet the diverse activity needs of visiting parents and children, providing venues and spaces that support various types of parent-child interactions, which often requires a multi-dimensional and integrated function. The primary service population for the space should align with the park's overall development strategy, taking into account the general situation of visiting and nearby parent-child families, and clearly identifying the key parent-child combinations to focus on. By clearly defining the types of family activities and the target audience, the spatial function and user positioning can be established, guiding the specific design of the space.

Therefore, in the specific approach, the first step is to investigate the activity needs and types of parent-child activities. Then, consider the characteristics and existing conditions of the space, to determine what kind of parent-child activities are suitable for the space and what

functional interactive spaces can be created. Next, based on the survey results of the main parent-child combinations within the park, identify the target audience for the interactive space design, i.e., the key parent-child groups that need focused service. Afterward, further refine the design according to the specific characteristics and spatial needs of these parent-child groups. For example, the design of functions, environment, and facilities should all focus on the primary parent-child group type, aiming to create a space that is truly tailored to meet the needs of parent-child interactions, thereby satisfying, attracting, and enhancing the interaction between parents and children.

3.5.2 **Spatial layout and scale adjustment**

According to the previous research, parent-child activities can be broadly categorized into static activities such as leisure and games, and dynamic activities like sports and adventure. From the perspective of parent-child interaction, the scale of public spaces in industrial renovation parks should align with the different forms of parent-child activities, taking into account the varied spatial needs of these activities. The layout and scale of the space should cater to the primary types of parent-child activities. Generally, spaces for dynamic activities require larger, more open areas and a larger scale, whereas spaces for static activities need smaller, more intimate areas and a quieter environment.

Moreover, the spatial needs of different parent-child types and combinations vary. As children grow older, their activity ranges expand, so the sizes of activity areas for different parent-child groups should be differentiated. From the perspective of parent-child interaction, the layout of public spaces in industrial renovation parks should consider the characteristics of the parent-child population they serve. Generally, interactive spaces for older children are larger than those for younger ones.

At present, the challenge of integrating old industrial park space with parent-child activities in terms of spatial layout and scale lies in that the original external space scale of the park is large and not suitable for people, and most of the sites lack subdivision, so the space utilization is insufficient, mainly a whole piece of vacant land. Therefore, in terms of specific practices, the first step is to determine the overall openness and spatial experience of the space

based on its function and the types of parent-child activities it will host, and to control the scale of the space accordingly. Dynamic spaces are more vibrant and open, while static spaces are more serene and intimate. Secondly, by considering the characteristics of the parent-child groups served within the space, age groups should be defined, and the area allocation should be adjusted reasonably to better accommodate different age groups and combinations of parent-child groups.

3.5.3 **Space atmosphere and facilities match**

Based on children's psychological needs for novel and interesting spaces, the atmosphere of the external public spaces in industrial renovation parks should be fun and engaging, offering a rich sensory experience. The materials and colors used should match the dynamic and static nature of parent-child activities, with cool tones for static areas and warm tones for dynamic areas.

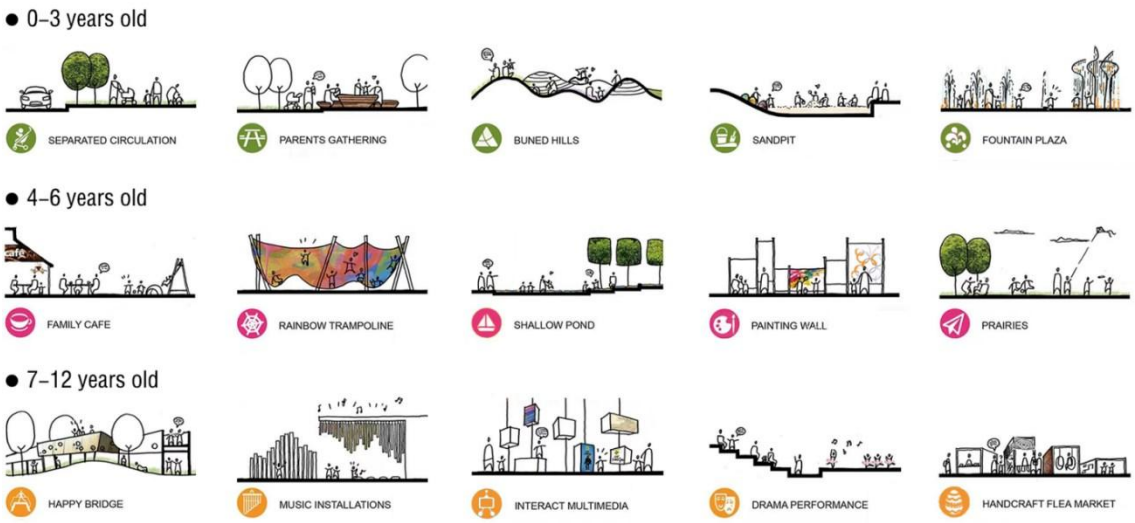


Figure 3-45 Differences in needs of children by age group
(Image source: redrawn by the author)

The physiological dimensions of playmates vary, and the cognitive levels and preferred activities of children at different stages of growth differ significantly. Their ability to control their bodies also varies greatly. From a parent-child interaction perspective, the external public spaces in industrial renovation parks should be designed with shared use for parents and children, accommodating the diverse physical and psychological needs of families. Interactive facilities of varying difficulty levels should be created for children of different age groups, as

shown in Figure 3-45. Additionally, the site should make full use of existing industrial elements to preserve the original industrial cultural atmosphere.

The creation of the atmosphere of the space and the configuration of the activity facilities are the key to stimulate the vitality of the site and gather people. At present, the main challenges in the integration of old industrial space and parent-child activities in terms of atmosphere and facilities are: the space is monotonous and lacks hierarchy, the configuration of signage facilities and activity facilities is insufficient, and how to highlight the remaining industrial elements. Therefore, in terms of specific practices, first, based on the functional needs and target audience of the space, a variety of facilities that can support and serve the activities of parent-child groups should be installed, such as amusement facilities, rest areas, lighting, and signage systems, with dimensions tailored to the physical characteristics of parents and children. Second, by considering the dynamic and static features of activities within the space, appropriate colors, materials, and terrain elements should be used to enhance the atmosphere and experience. Additionally, the industrial cultural characteristics of the space should be integrated into the design of the site and facilities, transforming industrial relics into visual focal points, turning them into small installations and facilities, thereby making the space more distinctive, culturally rich, and engaging.

3.5.4 **Site environment and landscape shaping**

As previously analyzed, different types of parent-child interactions have varying and distinct requirements for the spatial environment. Generally, leisure activities place higher demands on the comfort of the landscape environment and privacy protection. From the perspective of parent-child interaction, in the external public spaces of industrial renovation parks, for static leisure activity areas, a combination of shrubs and trees is used to create a more tranquil and private space. For dynamic activity areas such as running, ground-hugging plants and lawns are selected to ensure unobstructed views and paths, thus creating a more open and inviting space.

When the old industrial space is combined with parent-child activities, the main challenges in site environment quality and landscape shaping are as follows: the public space is closely

connected with the building plant, but most of the abandoned factory interface is closed and weakly connected with the external space. Secondly, the environmental quality of the original site is poor, the landscape ecological environment is lacking and the plants are single.

In terms of specific practices, first, the facade of the factory building that has been repaired and retained is improved by adopting more transparent interface materials or adding interesting elements to enhance the interactivity of the interface, as shown in Figure 3-46 The transparent building facade allows the line of sight to penetrate; secondly, appropriate green landscapes are added according to the spatial activity function to create a comfortable and pleasant interactive space and improve the landscape ecological environment.

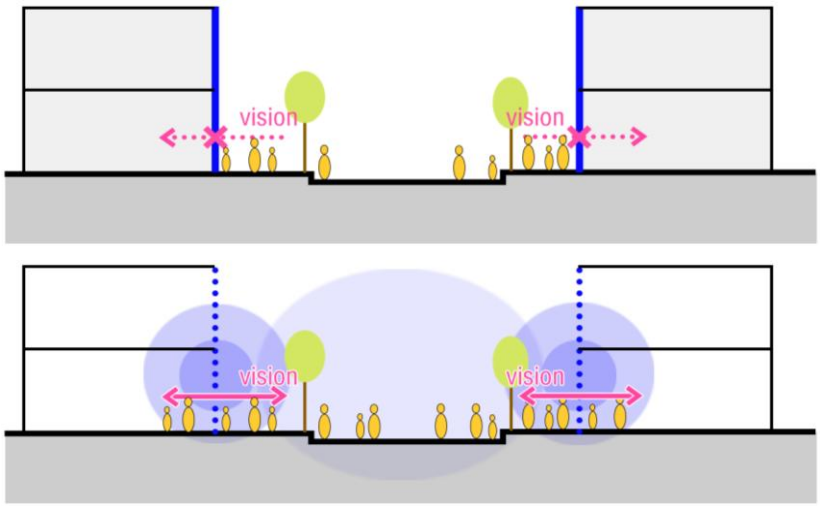


Figure 3-46 The transparent building facade allows the line of sight to penetrate
(Image source: https://www.gooood.cn)

3.6 **Chapter summary**

Based on the systematic research on the creation of parent-child spaces in the previous chapter, combined with the study of the characteristics of old industrial spaces, as well as the accumulation of relevant case experiences and inspirations from both domestic and international sources, this chapter analyzes and summarizes the differences between the creation of parent-child scenarios in old industrial spaces and those in general urban spaces. The main aspects include segmenting target audiences, integrating culture, planning activities, and integrating business models. Corresponding supplementary strategies and operational methods for creating parent-child interaction scenarios in old industrial parks are also proposed.

Charpter Four Field Investigation of the Smart Bay Industrial Renovation and Innovation Park in Baoshan District, Shanghai

This chapter conducts a field investigation of the Smart Bay Industrial Renovation Creative Park in Baoshan District, Shanghai, to understand the current status of public spaces within the park, the behavioral and activity needs of the parent-child groups, as well as the correlations between different types of spaces and the behaviors and activities of the parent-child groups. This lays the foundation for the next chapter, which proposes the steps for updating the external public spaces of the old industrial park and the targeted renovation strategies for different types of spaces from the perspective of parent-child interaction.

4.1 Basic condition evaluation, research methods and contents

4.1.1 Shanghai Wisdom Bay Creative Park has the necessary conditions for family-oriented development

The research site is the Wisdom Bay Creative Park, located at No.6 Yunchuan Road in Baoshan District, Shanghai (Figure 4-1). Covering an area of approximately 133,000 square meters, the park is situated next to the north-south elevated road and is about 500 meters from Hulan Road Station on Subway Line 1. It is also adjacent to the Yunzao River, one of the few waterways in Shanghai capable of accommodating hundred-ton cargo ships. Originally, the park was the warehouse site of the Shanghai Third Woolen Textile Factory, established in the 1930s, where many containers were stored. Now, it has evolved into a multifunctional park, characterized by cultural and technological innovation, and is part of the core development area of the 'No.1 Innovation Belt' in Baoshan District, Shanghai (Figure 4-2).

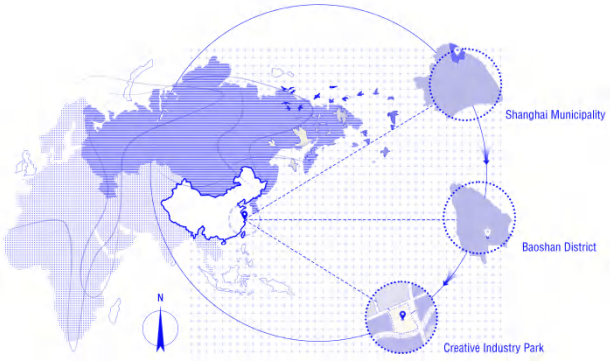


Figure 4-1 Location analysis
(Image source: self-drawn by the author)

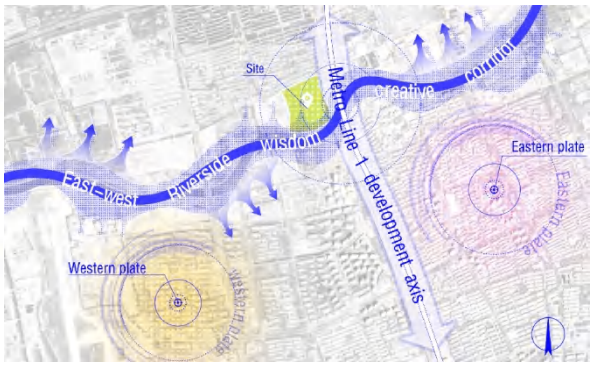


Figure 4-2 Schematic diagram of "No.1 Innovation Belt"
(Image source: self-drawn by the author)

1. Baoshan Wisdom Bay Industrial Old Reform Creative Park has a high reputation and representativeness. Investigating its environmental status can help us understand the key issues that still exist and need attention in public space in the current industrial park inventory renewal.

2. The public spaces of the Wisdom Bay Industrial Old Renovation Creative Park have started to focus on family activities, implementing a range of family-friendly initiatives. These include setting up art docks and other children's play areas within the park, as well as introducing various family-oriented businesses such as science education experiences, parent-child education and training, shopping for families, and family entertainment. This helps to understand the current integration of such park spaces with family activities and their level of development.

3. There are many parent-child groups in the activities in Wisdom Bay Industrial Renovation Creative Park, covering a wide range of parent-child types. The research samples are sufficient and it is easy to obtain and collect survey data, which is conducive to the follow-up development and promotion of this study.

Based on the conditions defined in the second chapter of the previous text for the specific types of industrial parks applicable to the renovation strategies for family-oriented spaces, the basic situation of the former textile factory industrial park in Smart Bay was analyzed and judged according to these standards.

4.1.1.1 **In line with the master plan: An overview of the industrial renovation and creative park in Baoshan District, Shanghai**

（1） Positioning of Shanghai Baoshan Industrial Renovation and Creative Park

Baoshan District, located in northern Shanghai, borders the Yangtze River to the north and the Huangpu River to the east. Historically, it has been a traditional port and steel industry center of Shanghai. In 2014, about 70% of the total area was designated for construction, primarily urban and industrial storage land, with industrial storage land accounting for 43% of the total. In recent years, Baoshan has transformed from a suburban industrial zone into a multifunctional and diverse urban area, becoming an integral part of Shanghai's main urban area.

There are two transformation methods for the old industrial areas in Baoshan: 1. The large-

scale and concentrated industrial base transformation involves industrial iteration and upgrading. Led by the government, this method primarily maintains the original industrial focus while optimizing and adjusting existing industries. 2. The small-scale and dispersed old industrial area transformation focuses on spatial function transformation. This approach aims to enhance urban public services, capitalize on existing projects, and transform these areas into cultural and creative industry parks. This reflects a development path where old industrial areas improve urban public services and integrate with the surrounding areas and the daily lives of city residents[60].

Baoshan aims to complement urban functions and serve the daily lives of city residents by positioning these industrial renovation parks. After the transformation, the parks have become more diverse, focusing on serving the residents of their respective areas, reflecting a strong integration with local communities. They offer a range of lifestyle options, including commercial, entertainment, and leisure activities, thereby revitalizing the old industrial zones[61].

（2） The focus of Baoshan Industrial Renovation Creative Park on parents and children

Baoshan is currently placing significant emphasis on the development of activity spaces for families and children. According to the 2024 Shanghai Statistical Yearbook, by the end of 2023, Baoshan District had a permanent population of 2.2659 million, accounting for 9.1% of the city's total, second only to Pudong New Area and Minhang District. The Municipal Public Security Bureau's survey on the age structure of registered residents in various districts shows that 12.85% of the population in Baoshan are under 17 years old, ranking sixth among all districts in Shanghai. This proportion has been increasing annually over the past five years, as shown in Table 4-1.

Table 4-1 Changes in registered population of Baoshan
(Table source: self-drawn by the author)

Year	2019	2020	2021	2022	2023
Total population (Unit: Ten thousand)	100.67	102.5	105.31	107.06	108.78
Population under 17 years of age (Unit: Ten thousand)	12.52	12.8	13.32	13.63	13.98
Proportion	12.44%	12.49%	12.65%	12.73%	12.85%

4.1.1.2 **Solid foundation for development**

The Wisdom Bay Creative Industry Park is conveniently located near Subway Line 1, with a bus stop just a few hundred meters south of the exit. Within a one-kilometer radius, there are seven bus stops, making transportation to the park very convenient, as shown in Figure 4-3. The park is situated on the north side of Yunzao Creek, adjacent to the river. The areas along both sides of the river are predominantly industrial, and many companies and enterprises have now moved in. Within a five-kilometer radius, there are numerous residential areas and several schools, including primary schools and kindergartens, as illustrated in Figure 4-4.

This indicates that the Wisdom Bay Park enjoys excellent geographical and transportation conditions and a strong foundation among families.

Figure 4-3 Transportation analysis
(Image source: self-drawn by the author)

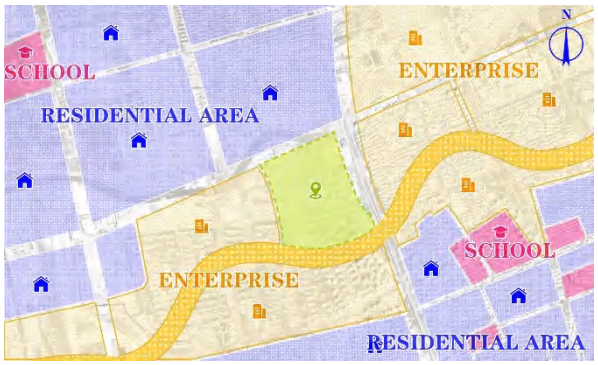


Figure 4-4 Business analysis
(Image source: self-drawn by the author)

4.1.1.3 **The surrounding area lacks facilities**

Around the Smart Bay Industrial Renovation Creative Park, there are large residential areas and many primary and secondary schools and kindergartens. Indoor parent-child activity venues are mainly indoor. Within a radius of 3 kilometers, there are 6 indoor activity Spaces related to parent-child activities, but there are not many outdoor activity venues for parent-child activities and off-campus activities, and sports venues are generally insufficient.

4.1.1.4 **Spatial characteristics compatibility**

Wisdom Bay Industrial Renovation Creative Park covers an area of 130,000 square meters, with many public Spaces inside and outside the park and ample space. The site is large and open, with a variety of space types. Its spatial characteristics can provide sufficient space for rich outdoor activities for parents and children, and meet the possibility of diverse interactions between parents and children.

To sum up, it can be seen that the Sanmao Textile Factory Industrial Park has all the basic

conditions for the transformation of public space from the perspective of parent-child interaction, and its spatial transformation is suitable for the combination with the needs of parent-child interaction.

4.1.2 Research method and research content

4.1.2.1 Research methods

After selecting the research location, the author conducted multiple on-site preliminary surveys at the Wisdom Bay Creative Industry Park to gather detailed information about the park's functional zoning and current conditions. The author also obtained a site plan, which helped clarify the direction and focus of subsequent investigations. Based on the park's layout, several observation points were identified, and an initial assessment of parent-child activities was conducted to determine the optimal time for observations. Subsequently, through behavioral observations and questionnaire surveys, the author will gather data on the behavior and spatial needs of parents and children in the interactive spaces within the creative industry park.

（1） Behavioral observation method

The survey was conducted from May to July 2024, during the hot summer months. After careful consideration, one day each week, weekend, and holiday was selected for observation. The observation times were divided into four periods: 9:00-11:00,11:00-13:00,16:00-18:00, and 18:00-20:00. These times were chosen to observe parent-child activities in the external public space of the Wisdom Bay Creative Park. At the designated observation points within the park, on-site observations were made, notes were taken, and information about parent-child activities was recorded. Interactive behaviors were documented on a behavior observation form, and the spatial distribution of these activities was marked on a floor plan. Behavior was observed every 30 minutes, including the types of user behaviors, time distribution, and spatial distribution in each area.

（2） Questionnaire survey method

The survey was conducted from May to July 2024, on sunny workdays and weekends, distributing questionnaires randomly to parent-child groups at various locations within the park.

The aim was to gather information on the activities and usage needs of parent-child groups in the creative park's external spaces. The questionnaire was completed by parents of different types and by school-age and adolescent children who could read and understand basic concepts. When respondents had questions about the questions, they were provided with objective explanations to ensure the accuracy and authenticity of the responses.

4.1.2.2 **Research content**

The research content of this study will focus on three aspects: the environmental status of the external space of the creative industrial park, the behaviors and activities of parents in the space, and the cognitive needs of parents for the space.

First of all, the site status of the parent-child interactive space in the creative industrial park is investigated on various aspects, including the overall layout of the park, the situation of various types of space, the situation of activities held, etc. The purpose of this research is to analyze the support degree of the external space of the industrial old renovation creative industrial park for parent-child interactive activities.

Secondly, the behaviors and activities of parents and children in the public space of the park were observed and recorded, including the distribution of behaviors and activities by number, time and type. The purpose was to investigate and understand the current activities of parents and children in the creative park space.

Finally, the cognitive needs of parent-child groups for outdoor parent-child interactive space in creative industrial parks were investigated, aiming to understand the views and opinions of parents, as well as their evaluation and requirements for the space. This will help to intuitively obtain the feelings and needs of parents on the space, and provide real and reliable data to help create external parent-child space in industrial old renovation creative industrial parks.

4.2 **Research on parent-child behavior activities in Wisdom Bay Creative Park**

Through multiple site surveys and considering the circumstances of parent-child activities, several observation points within the park were identified, as shown in Figure 4-5. Based on the observations from the preliminary field research, it was found that temperature and weather

conditions significantly impact parent-child activities in the creative park's outdoor spaces. The research was conducted from May to July, during which the weather was hot, with the afternoon being the hottest time of day. Despite a significant number of parent-child visitors coming to the park on weekends and holidays in the afternoon, very few chose to engage in activities outdoors.

Figure 4-5 Schematic diagram of the observation points in the creative park
(Image source: self-drawn by the author)

This survey mainly selected one day in the middle of May to July 2024, including weekends and holidays, and selected four periods from 9:00 to 11:00,11:00 to 13:00,16:00 to 18:00 and 18:00 to 20:00 to observe the parent-child activities in the public space of Wisdom Bay Creative Park.

4.2.1 **Distribution characteristics of activity numbers**

According to the on-site observations at Wisdom Bay Creative Park, families are mainly found in squares, green spaces, key locations, and streets. Outside of meal times, family members are more randomly distributed in the streets. During meal times, their presence is significantly influenced by nearby commercial activities. Families often stop to take photos at key points within the park. When events are held in the square, the number of families tends to be more concentrated.

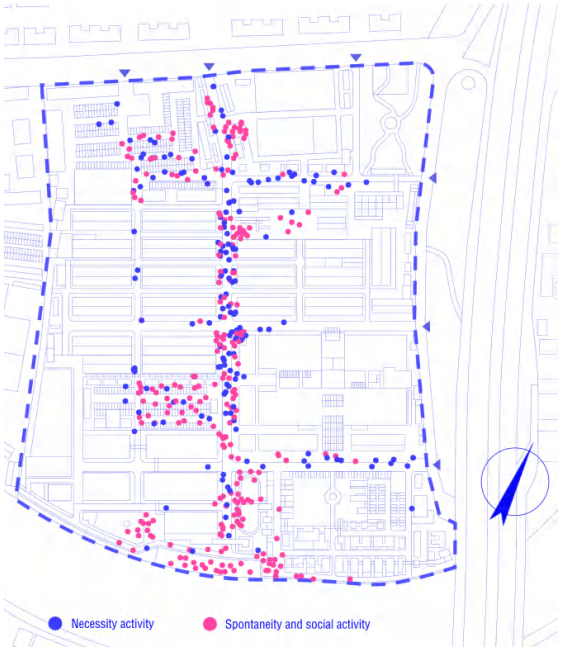


Figure 4-6 Parent-child gathering and distribution map in the park
(Image source: self-drawn by the author)

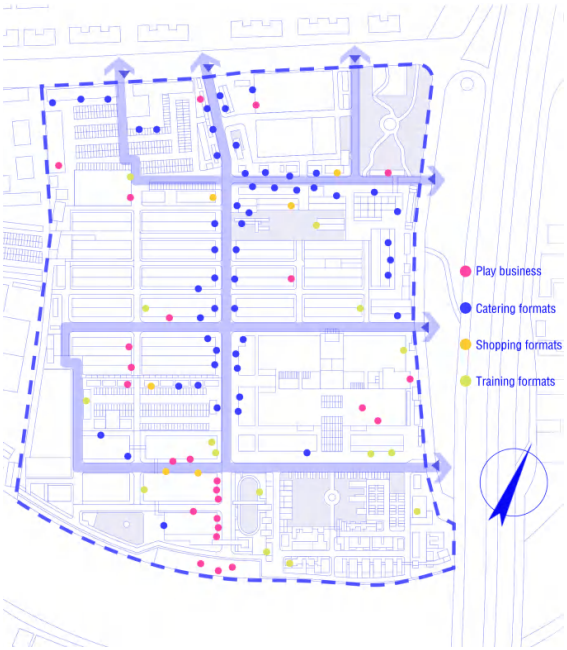


Figure 4-7 Distribution of parent-child business in the park
(Image source: self-drawn by the author)

The business formats related to family activities within the park are mainly categorized into four types: dining, entertainment, shopping, and education and training, as shown in Figure 4-7. Dining establishments are located on both sides of the main roads connecting the entrances and exits, while the other types are scattered throughout the park. By comparing the distribution map of family gatherings within the park, it is evident that families tend to stay and gather in areas with better commercial accessibility, such as transitional zones and pedestrian paths near

dining, entertainment, and training venues. Here, the number of families increases significantly, and their presence becomes more concentrated. In contrast, there are almost no families near office buildings, and even passing activities are rare.

Figure 4-8 Location of activities held in the park
(Image source: self-drawn by the author)

In spaces with higher publicness and greater openness, there are more parent-child groups, and the phenomenon of gathering activities is more pronounced. For instance, in the commercial transition zone, the private commercial outdoor seating areas, enclosed by fences and barriers, have very limited user numbers, whereas the public and open outdoor seating areas attract many parent-child users, leading to more parent-child activities. Additionally, during nighttime or holidays when events are held in the park, the number of parent-child groups in the event area can significantly increase in a short time. The daily or special events at Wisdom Bay Creative Park are mainly held in some square spaces and local street alley spaces, as shown in Figure 4-8.

In summary, the distribution of parent-child groups in the creative park exhibits a pattern of overall dispersion and local concentration, primarily engaging in activities at various squares, green spaces, nodes, and streets. The commercial environment and public accessibility of the surrounding areas are closely linked to the distribution of parent-child groups, influencing their activities within the space. Additionally, events such as performances and cultural activities

held within the park also draw parent-child groups to participate in these activities in designated spaces.

4.2.2 **Activity time distribution characteristics**

（1） Overview

Through a survey of the time parents and children intend to visit the park, and actual statistics on the number of family activities within the park during four different time periods over three days—Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday, and holiday—it was found that the morning and evening hours on weekends and holidays, as well as every day in the afternoon and evening, are the most popular times for parents and children to engage in creative activities at the park (Figure 4-9).

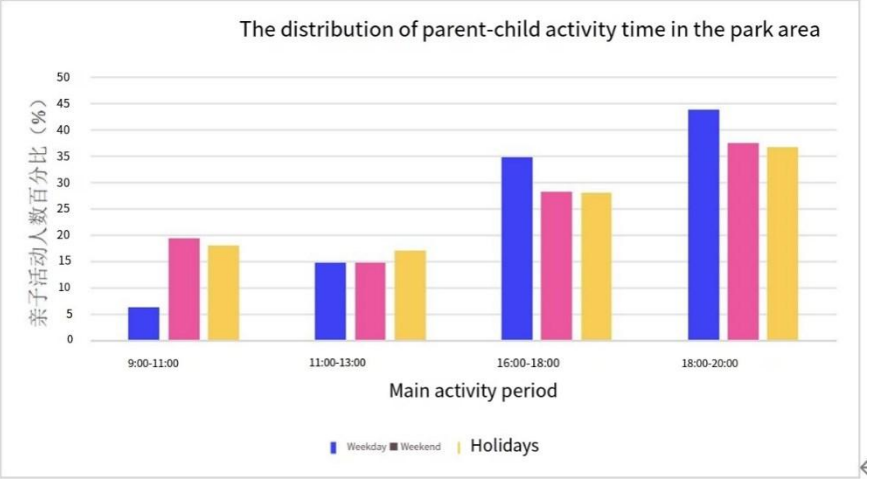


Figure 4-9 Time distribution of parent-child activities in the park
(Chart source: self-drawn by the author)

During weekdays, the majority of family activities occur after 4 PM, with the number of participants increasing gradually across all four time periods. This is because on workdays, parents have to go to work, and older school-age children need to attend classes, limiting their time for family outings. Therefore, the evening and night are the peak times for family interactions at the park during the week. On weekends and holidays, the proportion of family visitors in the park in the morning has significantly increased compared to weekdays, with the number of participants showing a wave-like pattern throughout the day, initially slightly decreasing before rising again.

（2） Activity distribution in different time periods

During the 9:00-11:00 period, there are fewer parent-child activities in the park. Most families visiting the park are traveling alone and engage in essential activities such as passing through, heading to specific locations, attending interest classes, or buying drinks. A few parents and children also engage in leisure activities like strolling, sightseeing, and taking photos, which are mainly found in the street and alley areas. A small number of parents and children linger in the node spaces.

The 11:00-13:00 period mainly covers lunchtime. The number of families in the park increases, with activities primarily taking place in the streets and buildings that are closely connected to commercial areas. In the outdoor spaces, the number of families decreases, but they still engage in essential activities like eating and shopping. However, there are also many family interactions, such as leisure activities like strolling, resting, chatting, and playing games with roadside facilities. After 13:00, due to the hot weather, family activities in the outdoor spaces decrease again. Occasionally, some families wander and play, mostly in the streets and alleys of the Creative Park.

After 4:00 PM, the temperature gradually becomes more comfortable, and parent-child activities become more active. From 4:00 PM to 6:00 PM, the number of parent-child groups in the park starts to increase, and the proportion of interactive activities among parents and children in all park activities also rises, with a wider variety of activities. Many parents and children enjoy sightseeing, taking photos, chatting, and strolling around the park. Additionally, dynamic parent-child interactions, such as playing with roller skates, skateboards, and running, also become more common.

The peak time for family groups visiting the park during the week is 6 PM, which also marks the start of daily activities. From 6:00 PM to 8:00 PM, the number of families increases, and the variety of family activities grows. Many families come together, engaging in both necessary commercial activities and spontaneous social interactions. The types of family activities in the park are becoming more diverse, with family interactions significantly increasing during this period, making them the primary category of family activities. These activities include games between parents and children, leisure activities, sports, and group

activities among families, such as parent-child chats, children playing with friends, and family activities like riding bicycles, skateboarding, and participating in park events. After 8:00 PM, the family groups gradually disperse. (Figure 4-10)

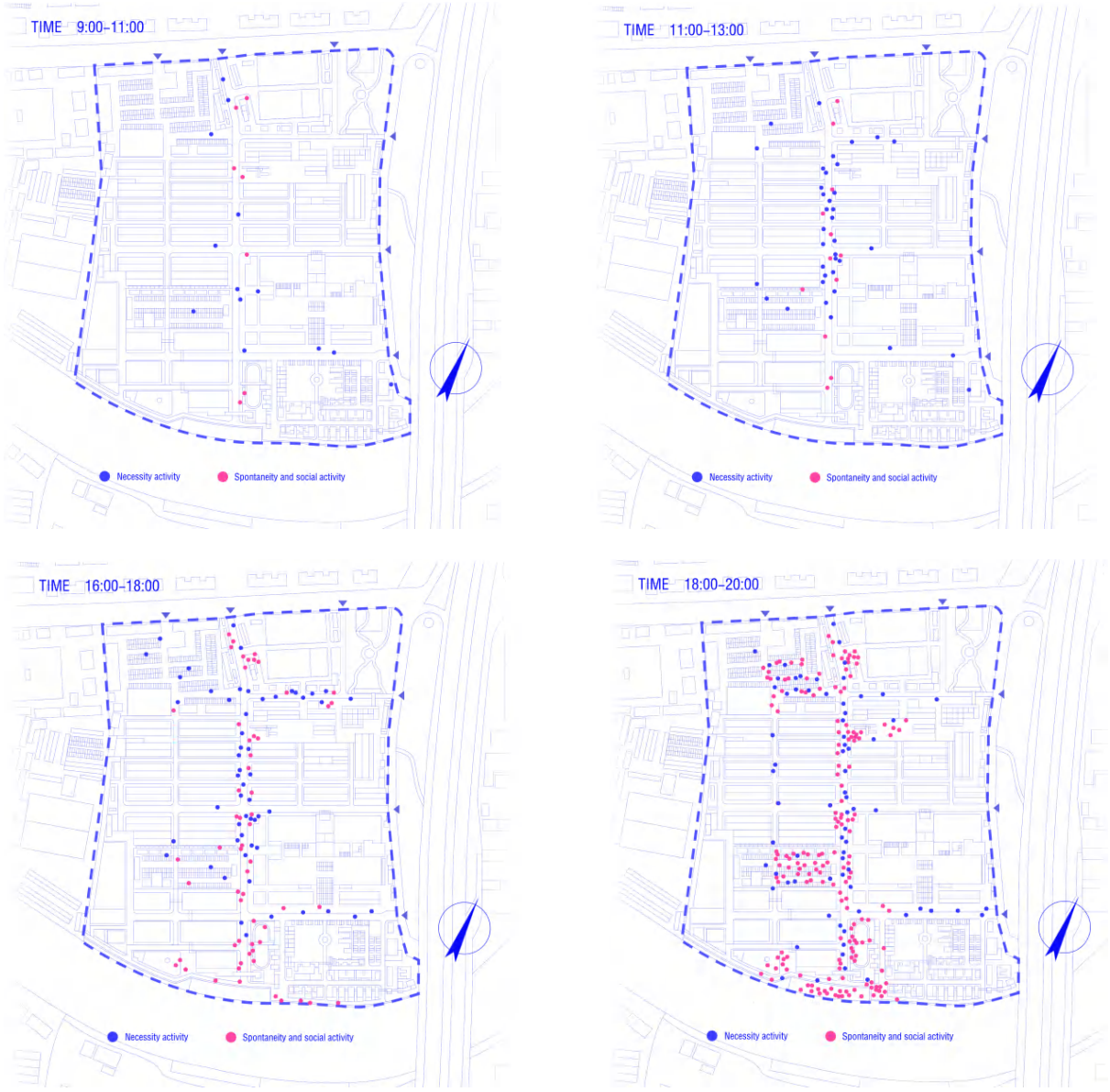


Figure 4-10 Parent-child activities in the creative park space at different times
(Image source: self-drawn by the author)

In summary, the time parents and children spend in the park follows a certain pattern, influenced by work schedules, school schedules, and weather conditions. After evening, more interactions between parents and children, as well as among parent-child groups, occur. During meal times, the activities are mainly necessary. In other times, the proportion of interactive activities between parents and children in the park significantly increases, with a wider variety of activities.

4.2.3 **Distribution characteristics of activity types**

（1） Types of parent-child activities

In his book "Communication and Space," Young-Ger divides people's activities in public spaces into three categories: necessary activities, spontaneous activities, and social activities. Necessary activities are those that people inevitably engage in within a space, characterized by strong purposefulness and minimal influence from the external environment. Spontaneous and social activities, on the other hand, are closely tied to the surrounding environment, especially spontaneous activities, which depend on the individual's will and are therefore closely linked to the quality of the spatial environment.

The activities of parents and children in the public spaces of the creative park can be categorized into two main types: interactive activities and non-interactive activities. The necessary activities, such as dining, passing through, waiting, and shopping, are primarily non-parent-child interactive behaviors. On the other hand, spontaneous and social activities are mainly parent-child interactive behaviors. For specific activity types, see Table 4-2 below.

Table 4-2 Types of parent-child behavior activities
(Table source: self-drawn by the author)

Categorizing behavior	Type of activity	Activity content and characteristics	Behavioral activities in public space
Non-parental interaction	Free movement	Passing, walking through, waiting briefly	Necessary activities
	Catering activities	A feeding behavior that meets the body's functions	
	Shopping in the city	Business-related consumer behaviors, such as buying, selecting, and paying	
parent-children interaction	parent-child game	Interact with game facilities, or play random games without facilities	spontaneous activity Social activities
	Family leisure	Take a walk, chat, take photos and enjoy the scenery in the park	
	Family sports	All kinds of sports, such as cycling, running, skateboarding, skating and skipping rope, are carried out in the park	
	Parent-child cooperation	Emphasize the participation of parents in group gathering activities, such as watching performances and participating in activities	

Observations of parent-child activities in the park reveal a variety of leisure interactions,

such as chatting, resting, sightseeing, and taking photos, as well as sports activities like playing ball, riding small wheels, running, skateboarding, and cycling. Additionally, there are playful interactions between parents and children, such as playing on children's playground equipment and roughhousing. Many families visit the park together, engaging in play and socializing. Children often play with their peers, such as riding bicycles or running together. Parents chat and exchange ideas with other parents. Families also gather to watch performances and participate in educational activities.

Furthermore, the survey revealed that young parents often engage in physical activities and playful games with their children. They also tend to be more involved in parent-child interactions. Middle-aged parents with young children often choose to take their kids to fish ponds for activities like watching fish and enjoying the scenery, which are more peaceful. When it comes to intense physical activities, middle-aged parents with school-age children prefer to watch over their children and play with peers, while chatting and socializing with other parents.

（2） Spatial distribution of activity types

According to the statistics of parent-child activities in the public activity space of the park, as shown in Figure 4-11. The results show that the parent-child activities in the external space of the industrial renovation creative park are mainly non-parent-child interactive passage behaviors and parent-child interactive activities such as parent-child games and leisure activities.

When categorized by spatial type, the most diverse and frequent parent-child activities take place in the street and alley spaces, covering all major types of parent-child activities within the park. Among these, non-parent-child interactive activities are predominant, with pedestrian activities, commercial activities, and dining activities ranking from highest to lowest in terms of frequency. In parent-child interactive activities, most are leisure and interaction behaviors. Based on observations of actual behavior over different time periods, during the day, the street and alley spaces are primarily used for necessary activities such as pedestrian traffic and dining. In the evening and at night, the street and alley areas host daily commercial activities, making this period predominantly characterized by commercial activities, parent-child leisure, and

pedestrian traffic.

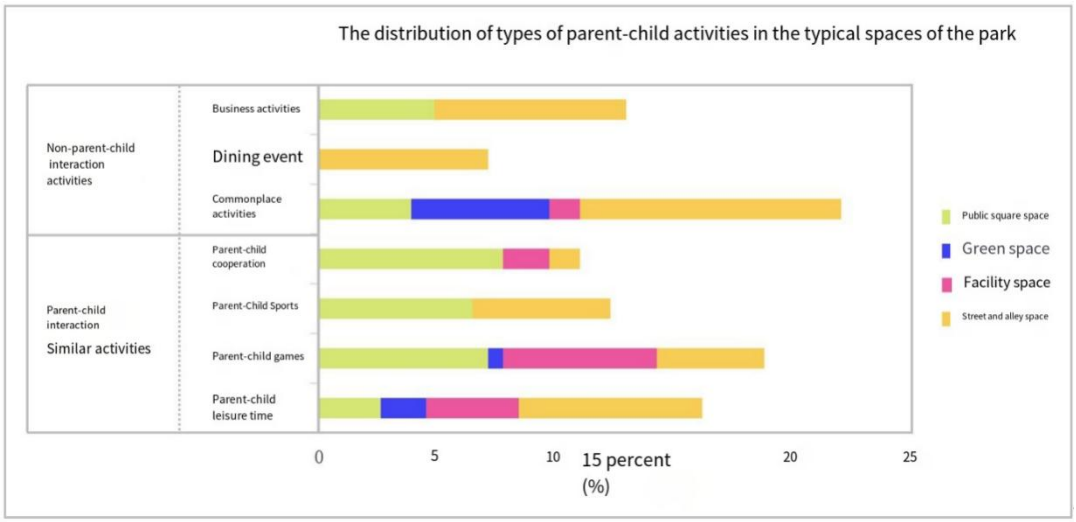


Figure 4-11 Distribution of parent-child activities in typical Spaces in the park
(Chart source: self-drawn by the author)

Secondly, the square space is the type of space where the most parent-child interactive activities take place. It includes parent-child sports, group cooperation, games, and leisure activities. This is because the square space is generally larger and safer, making it ideal for parent-child gatherings and large-scale social activities. The larger the venue, the more suitable it is for dynamic parent-child activities. Additionally, in the evening, the park's square hosts commercial events like trunk fairs and sometimes performance activities, which means that the square space also hosts many commercial activities, and it has the highest number of group cooperation activities among all types of spaces.

Next is the node space, which is primarily used for parent-child games and leisure activities. This type of space is the most popular for parent-child games due to its abundance of activity facilities, scenic features, and creative installations. The space is more engaging and pleasant, making it ideal for curious parents and children to interact with the facilities, play, sightsee, and take photos.

For the green space, the majority of current activities are pedestrian-oriented. This is because some of the public green spaces within the park are currently under renovation, and the existing green areas primarily serve a display function with limited scenic value. Additionally, there is only a stone-paved path, and no other activity areas or facilities are available, which is why most families prefer not to stay here for activities.

From the above, it is evident that there are differences in the types of parent-child activities found in different spatial settings. In street and alley spaces, activities such as pedestrian traffic, commercial activities, dining, and parent-child leisure are more common; in square spaces, activities like parent-child sports, group cooperation, and games are more prevalent; in node spaces, activities such as parent-child games and leisure are more frequent; and in green spaces, pedestrian traffic is more common. Generally, larger venues can accommodate a wider range of activities, and environments that are more comfortable or diverse are more likely to host a variety of activities.

4.2.4 **Brief summary**

Based on the specific research on parent-child activities in Wisdom Bay Creative Park above, the following conclusions can be drawn:

1. Parent-child activities in the park are mainly distributed in the square, green space, nodes and street space, which will be affected by the distribution of business types, spatial openness and whether to hold activities.

2. There is a certain pattern in the time distribution of family activities within the park. More families visit in the evening and late afternoon, while the number of visitors increases in the morning on weekends and holidays. The types of family activities vary throughout the day. Additionally, the duration of family activities in public spaces is influenced by the adequacy of rest facilities, the safety of the venue, the richness of spatial layers, and the suitability of the environmental scale.

3. The types of parent-child activities in the park can be categorized into interactive and non-interactive categories. Interactive activities include leisure, sports, cooperation, and games. The types of parent-child activities vary across different spaces within the park: streets and alleys are often used for passage, commercial, dining, and leisure activities; squares are more suitable for sports, group cooperation, and games; key areas are ideal for games and leisure activities; green spaces are primarily used for passage.

4.3 **Cognitive survey of parent-child space in Wisdom Bay Creative Park**

This survey aims to gather insights into the perceptions and experiences of parents and children regarding the public spaces outside the creative park. The questionnaire covers three main areas: the current state of parent-child interactions, the current status of parent-child activity spaces, and the spatial needs of parents and children. For more details on the questionnaire, please refer to the appendix at the end of the document. A total of 100 questionnaires were distributed, with 88 valid responses collected, resulting in an effective response rate of 88%.

4.3.1 Parent-child structure characteristics in the park

（1） Parent-child composition in the park

The parent-child group in the creative park is mainly composed of middle-aged and young parents and preschool and school-age children aged 3-12.

As shown in the table below, among the 88 respondents, parents who visit the park are predominantly from the post-80s, post-85s, and post-90s generations, accounting for over 80% of the total. In the creative park, most parent-child visitors are young and middle-aged parents. Regarding educational background, the majority have a bachelor's degree, followed by 26% with an associate degree, and over 10% have a master's degree or higher, indicating that the overall educational level of the parents is relatively high. In terms of children's age, those aged 6 to 12 are the primary age group for family outings, making up 50%. Children aged 3 to 6 also make up a significant portion, exceeding 30%, and are considered the secondary main force. Children aged 0 to 3 are less common due to their young age and travel inconvenience. Teenagers aged 12 and above are in their adolescence, where the demand for parent-child interaction decreases, resulting in a lower proportion. Regarding gender, the ratio of girls to boys is roughly equal, with slightly more girls than boys.

Table 4-3 Sample distribution
(Chart source: self-drawn by the author)

Demographic variables	Classify	Number of people	Percentage（%）
Parent age	Born in the 1970s	2	2.27
	75 and over	3	3.41
	Born in the 1980s	12	13.64
	85 and over	26	29.55

Demographic variables	Classify	Number of people	Percentage（%）
	Born in the 1990s	34	38.64
	Post-1995	7	7.95
	other	4	4.55
Parental education	Master degree or above	10	11.36
	undergraduate course	42	47.73
	junior college	23	26.14
	High school/vocational high school	8	9.09
	other	5	5.68
Peer children's age	0-3 years	10	11.36
	3-6 years old	28	31.82
	6-12 years old	44	50.00
	12-18 years old	6	6.82
Gender	boy	35	39.77
	girl	39	44.32
	Boys and girls have them	14	15.91

（2） Parent-child combination

According to the survey, the number of parents in parent-child groups in the park is usually greater than or equal to the number of children. It can be seen that more and more parents have realized the importance of parent-child activities and are willing to accompany their children for more interaction.

As shown in Figure 4-12, the primary mode of family travel to the Creative Park is led by both parents, accounting for more than half of all trips. Additionally, over 20% of families choose to travel with other families, meaning that more than 70% of family groups opt for multiple adults to lead the trip, while less than 30% of families are led by a single parent. Furthermore, over 60% of family trips involve only one child (Figure 4-13).

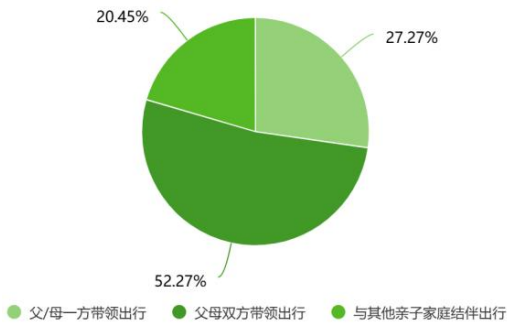


Figure 4-12 Combination mode of parent-child travel

(Image source: self-drawn by the author)

Figure 4-13 Number of children in parent-child combination
(Image source: self-drawn by the author)

4.3.2 The status quo of parent-child interaction

（1） Interaction object

According to the survey results (Figure 4-14), children interact most with their mothers, accounting for over 40%, followed by fathers, who account for nearly 30%. Additionally, children interact most with their peers, with over 20% of interactions involving other children. Only 5% of parent-child groups chose the option that children play more independently, which is mostly seen in families with infants aged 0-3, as younger children find it harder to engage in social activities. Through classification and filtering, it was found that as children grow older, they increasingly prefer playing with their peers (Figure 4-15). For example, school-age children, who are slightly older, have the highest proportion of this choice, while preschool children also enjoy spending time with their peers. Infants, due to their young age, rely more on their parents. Additionally, due to the varying individual preferences among children, there are scattered numbers in other age groups.

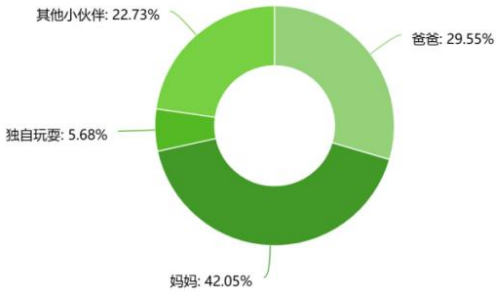


Figure 4-14 Parent-child interaction preference
(Image source: self-drawn by the author)

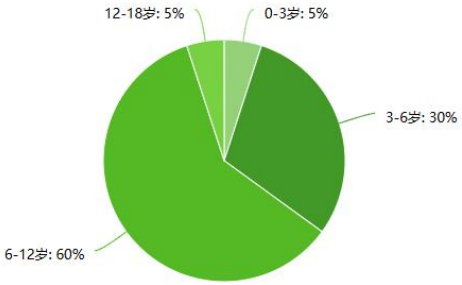


Figure 4-15 Age of children who play with their partners
(Image source: self-drawn by the author)

Over 90% of parent-child families reported that their children play with other children in

the creative garden (Figure 4-16). More than half of these families frequently engage in play, while about 35% occasionally do so. This indicates that most children enjoy interacting with others, with only 6% of parent-child groups reporting that their children never interact with other children. Additionally, most families have a positive attitude towards interacting with other parent-child families, with over half expressing a strong desire to do so. 28.41% of families indicated a relatively high level of interest, meaning that approximately 80% of parent-child groups are very willing to engage in social interactions with other families.

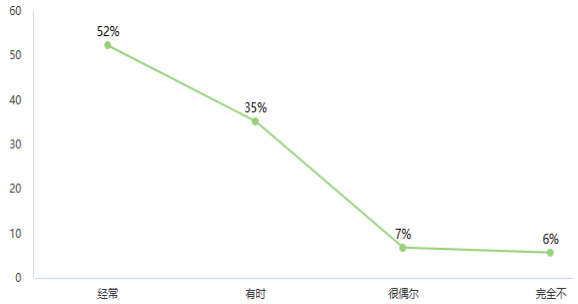


Figure 4-16 Frequency of playing with other children in the creative garden
(Image source: self-drawn by the author)

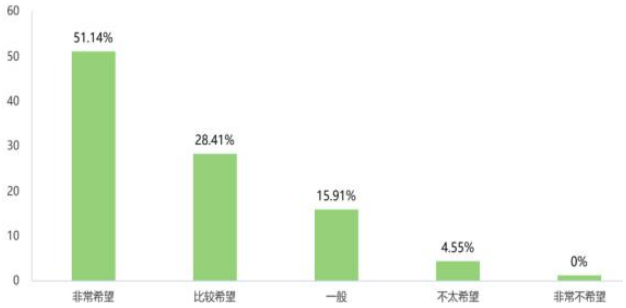


Figure 4-17 Willingness to play with other parent-child families
(Image source: self-drawn by the author)

Overall, children still interact most with their mothers, but the number of interactions between fathers and children has also increased, indicating that both parents are placing more importance on parent-child interaction. Children enjoy interacting with peers, and as they grow older, the proportion of time spent playing with peers increases. In creative gardens, most children engage in activities with other children, and most families are keen to participate in social activities with other families.

（2） Interactive behavior

According to the questionnaire data (Figure 4-18), natural cognition and physical exercise are the most favored activities for parent-child interactions. Following these, cooperative

activities such as learning creative knowledge and participating in cultural events are also popular. Additionally, sightseeing and leisure activities are highly favored by parents and children, and group social activities have also received a significant number of votes. This indicates that the parent-child groups within the Creative Park generally prefer educational research, sports, and leisure activities.

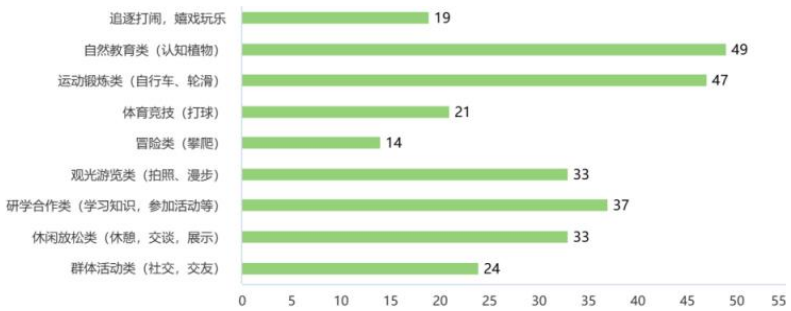


Figure 4-18 Parent-child behavior activity preference in creative garden: multiple choice
(Image source: self-drawn by the author)

Therefore, in the design of the parent-child interactive space in the creative park, it is important to plan more areas and facilities for parent-child educational tours, sports, and leisure activities. Additionally, the design should consider the needs of group use and social interactions among groups, and promote cultural and sports activities that foster cooperation and competition between parents and children.

（3） Interactive places

According to the survey (Figure 4-19), parents and children most frequently engage in activities in the commercial outdoor areas of street spaces. This is due to the abundance of rest benches, which allow parents to take a break, and the proximity to commercial facilities, which makes it more convenient to provide leisure services for families. Additionally, areas with better landscapes are highly attractive to families, especially for young children who enjoy being close to nature. Interesting small installations and creative devices also attract attention, particularly those that spark the curiosity of children. The outdoor play areas are equipped with many play facilities that children love, making them popular spots for family outings. Moreover, the riverside running track offers a wide view, where many families stroll, enjoy the scenery, and exercise.

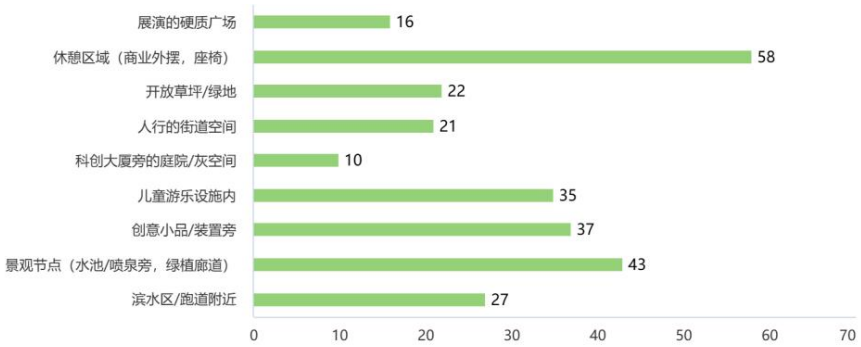


Figure 4-19 Common places for parent-child activities in creative parks: multiple choice questions
(Image source: self-drawn by the author)

4.3.3 The current situation of parent-child interaction space

（1） Duration of interaction in the garden

According to the survey data, the majority of parent-child activities in the creative park last between 1 and 4 hours (Figure 4-20). However, over 70% of these activities last less than an hour in the outdoor area, and those lasting 1 to 2 hours account for less than 20% of the total (Figure 4-21), representing less than half of the total activity time.

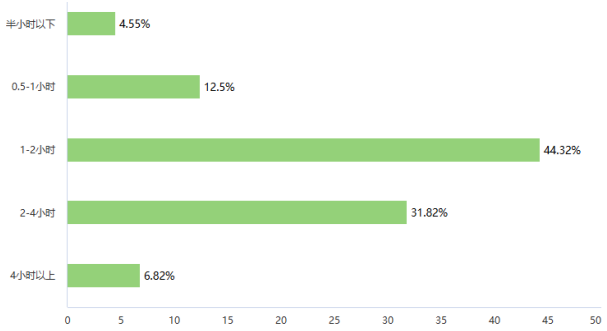


Figure 4-20 Total duration of parent-child activities in the Creative Garden
(Image source: self-drawn by the author)

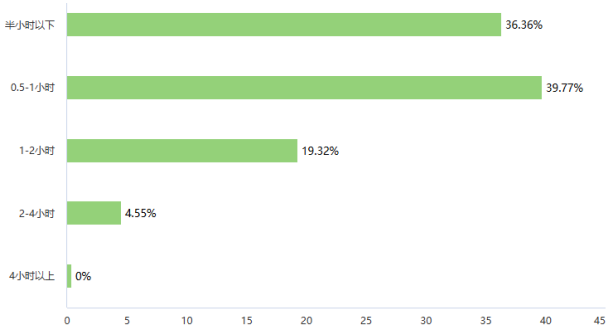


Figure 4-21 Duration of parent-child activities in the external space of the Creative Garden
(Image source: self-drawn by the author)

The difference between the two sets of data shows that the external space of the current industrial renovation creative park is not good enough to support the diverse activities of parents

and children in the park, and its attraction to parents and children needs to be improved.

（2） Current satisfaction

More than 60% of the respondents believe that the current external space of the park is not enough to meet their activity needs with their children, and only more than 10% of parents are satisfied or relatively satisfied with the current situation, as shown in Figure 4-22.

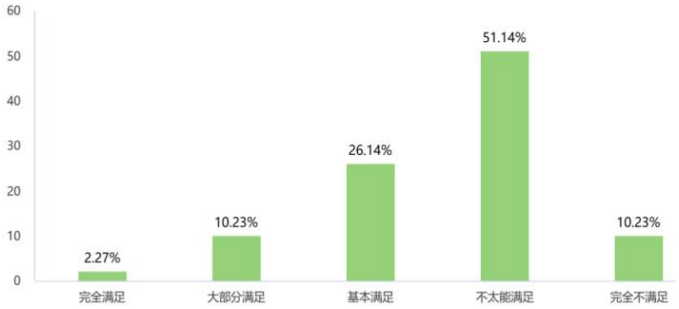


Figure 4-22 Current satisfaction of the external space of the creative park
(Image source: self-drawn by the author)

On the whole, a large part of the parent-child groups are not satisfied with the current situation of the external space of the creative park. It can be seen that the current external space cannot well support the interaction between children and parents, and needs to be adjusted and improved. It should be further optimized and improved.

（3） The problem of interactive space

According to the analysis of the survey results (Figure 4-23), more than half of the parent-child groups believe that the main issue with the external spaces of the current creative park is the lack of venues for parent-child activities. This is due to the low utilization of open spaces such as squares and green areas, which have limited functions and cannot support diverse interactive activities between parents and children. Additionally, the management of the park's spaces needs improvement, as some squares are occupied by commercial outdoor seating, which hinders parent-child activities. Furthermore, over 30% of the parent-child groups feel that the facilities available for parent-child activities are limited, and nearly 30% of the parent-child groups believe that the activity areas lack necessary shelters, which affects their ability to stay and interact. Moreover, a significant number of parent-child groups also believe that the current venue lacks safety measures, making it difficult for parents to participate in activities.

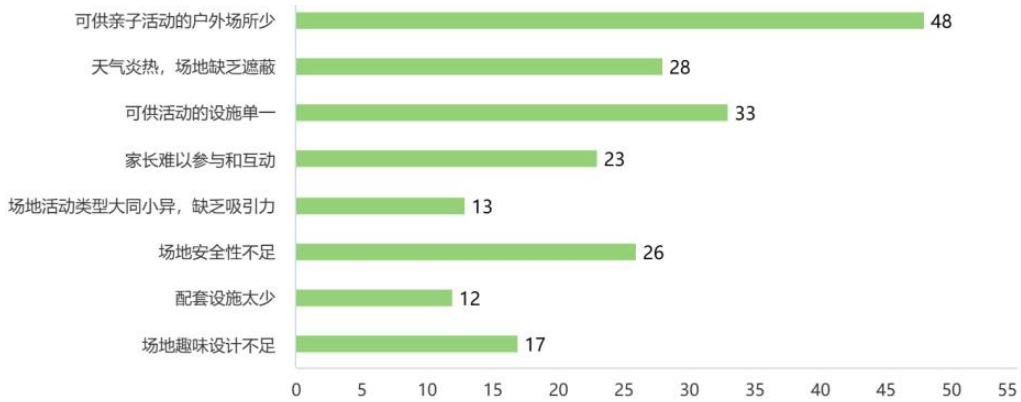


Figure 4-23 Factors affecting the duration of parent-child activities in creative parks: multiple choice questions
(Image source: self-drawn by the author)

It can be seen that the factors affecting the duration of parent-child activities mainly include the single function of space, which cannot support a variety of activities; and the facilities serving parent-child activities are not perfect enough.

（4） Suggestions for improvement

The suitability, diversity and attractiveness of the space are the aspects that parent-child groups think should be improved and optimized most in the interactive space of the creative park. Among them, the safety and comfort of the space account for the highest proportion, followed by the fun and diversity of the space, then the common participation, education and entertainment, and regional characteristics (Figure 4-24).

On the whole, the suitability, attractiveness, diversity, participation, education and creative culture of the space are all aspects that parents pay more attention to. When optimizing the space design, the improvement opinions of the parent-child group should be fully considered.

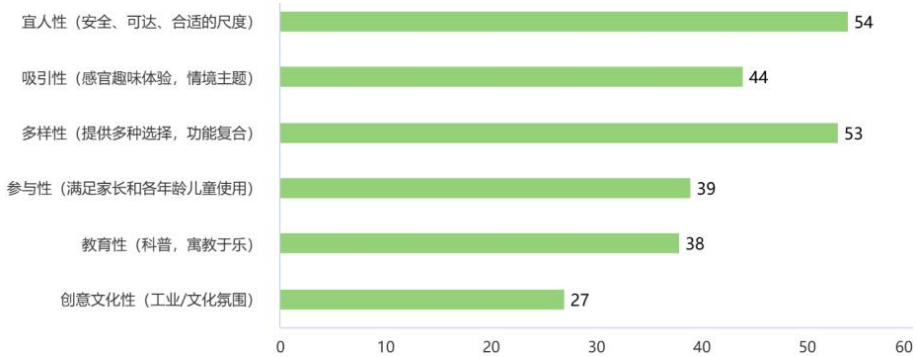


Figure 4-24 Improvements to the external space of the Creative Park: multiple choice questions
(Image source: self-drawn by the author)

4.3.4 **Parent-child space needs in the park**

（1） Purpose of activities in the park

According to the survey, parents and children visit the creative park primarily to learn about related knowledge. They also come to experience the industrial or creative atmosphere and to relax and unwind. Additionally, physical exercise is a significant reason for their visits (Figure 4-25). The survey also found that, in addition to interacting with their children, parents have other travel expectations. Almost all parents have specific needs. The top priority is to interact with family, friends, or other parents, followed by learning about creative culture. Many parents also hope to take a break and clear their minds here (Figure 4-26).

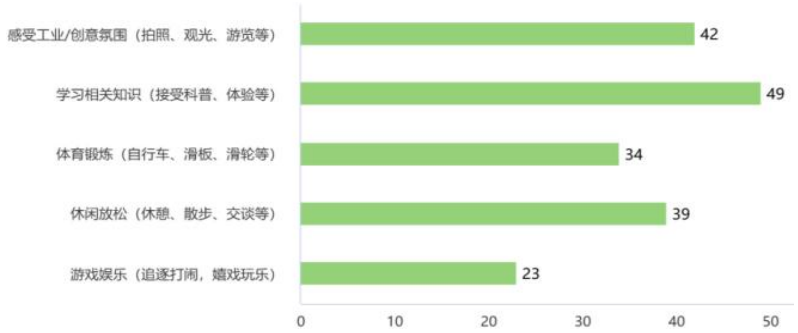


Figure 4-25 Purpose of parents and children to visit the creative park: multiple choice questions
(Image source: self-drawn by the author)

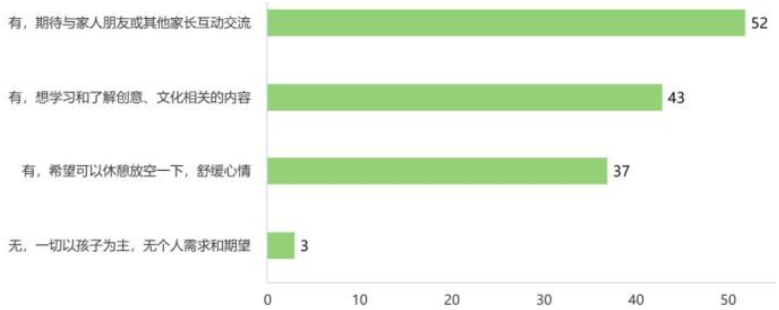


Figure 4-26 Do parents have personal expectations: multiple choice questions
(Image source: self-drawn by the author)

In summary, the design of public spaces in creative parks should emphasize the educational value of the site, highlight its industrial and cultural features, and enhance the comfort of the area. Additionally, while focusing on children, it is also important to consider the needs and expectations of parents, designing interactive spaces and facilities that cater to the physical and mental needs of both children and parents.

（2） Spatial design emphasis

The survey results (Figure 4-27) indicate that all parents agree that the external spaces of

creative parks should be designed to meet the needs of both children and parents. Over 70% of respondents believe that the design of interactive spaces for parent-child activities in creative parks should prioritize the needs of children while also considering those of parents. Approximately 17% of parents think that the design should equally consider the needs of both children and parents. This means that nearly 90% of respondents recognize the importance of carefully considering the needs of parents in the design of parent-child interaction spaces.

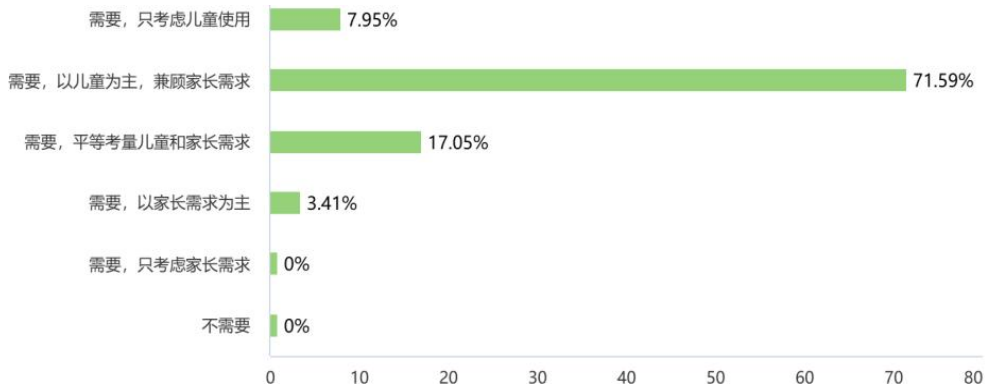


Figure 4-27 Design objects to be considered for the external parent-child space of the creative park (Image source: self-drawn by the author)

At the same time, parents and children prioritize the safety and accessibility of the space. Safety is always the top priority for parent-child interactions. Next, a rich sensory experience is highly appealing to curious and adventurous children and young parents. A pleasant landscape environment can alleviate parents 'mental fatigue and allow children to connect with nature. The space should also feature a variety of children's play facilities, offering different interactive options for children and parents with diverse interests. The venue should incorporate cultural education and study content to meet the current demand for educational and entertaining activities among parent-child groups. Additionally, the space should be suitable for all age groups and foster a creative cultural atmosphere, which has gained significant attention from the parent-child community (Figure 4-28).

Overall, parents in the creative park generally believe that designing parent-child spaces should also meet the needs of parents. It is not enough to focus solely on children's use while ignoring the feelings of the larger number of parents. Therefore, when designing the external parent-child interaction areas of the creative park, priority should be given to children's needs, while also considering the behavioral needs of parents. Additionally, the design should

emphasize safety, sensory experiences, landscape environments, a variety of children's recreational facilities, and educational content to facilitate and enhance interactions between parents and children.

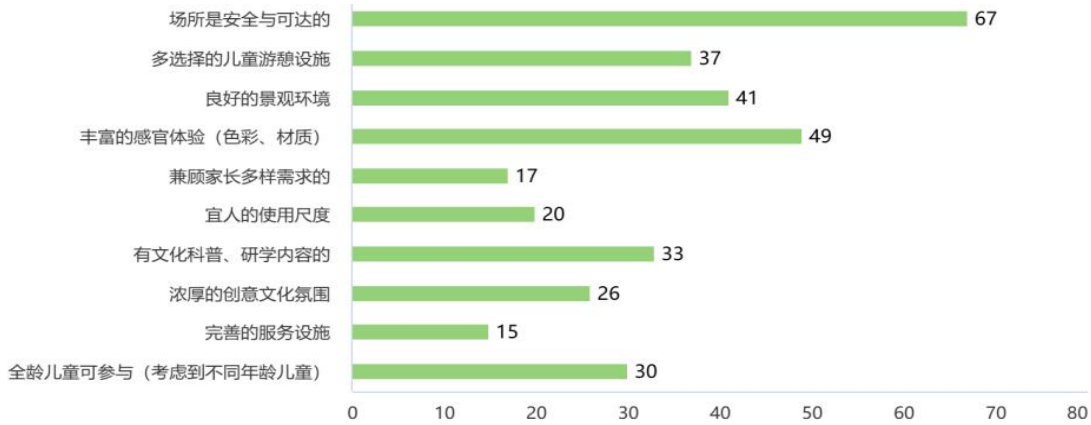


Figure 4-28 Spatial characteristics of parent-child focus
(Image source: self-drawn by the author)

4.3.5 **Brief summary**

Based on the results of the questionnaire survey and random interviews, the following key information is summarized:

1. The parent-child groups in the park mainly consist of middle-aged and young parents along with preschool and school-age children, and the number of parents in these groups is typically greater than or equal to the number of children. Therefore, when considering the spatial needs for parent-child interactions in the park, it is important to focus on the physical, psychological, and behavioral characteristics of middle-aged and young parents and children aged 3-12, as well as the types of interactions. Additionally, attention should be given to the larger group of parents.

2. There is now a greater emphasis on parent-child interaction activities, with fathers becoming more involved in these activities. Children tend to gather with peers and enjoy playing together within the kindergarten. Parent-child families have a strong desire for social interaction. Therefore, when designing parent-child spaces, it is important to consider the diversity of venues to meet various interaction needs. More spaces and facilities should be designed to accommodate and promote group activities among parents and children, ensuring that there are adequate spaces for children to play with their peers and for parents to engage in

collective activities and interactions.

3. There are many problems in the external space of creative parks, such as poor spatial environment, single activity facilities, insufficient safety, difficult for parents to participate, and lack of regional characteristics. Parents generally feel dissatisfied with the current situation of the external public space of creative parks, which needs more attention and attention.

4. Currently, the parent-child community generally believes that the design of parent-child spaces should take into account the needs of parents, not just children. In creative parks, the majority of parents are middle-aged and young adults. They not only wish to care for and accompany their children but also seek to meet their own social and leisure needs through these activities. Therefore, in designing parent-child spaces, it is essential to consider the diverse needs of parents, placing them on an equal footing with those of children.

4.4 Research on the current situation of public space in Wisdom Bay Park

4.4.1 Overall planning and layout of the park

（1） Traffic organization

A field survey of the Shanghai Wisdom Bay Creative Industry Park revealed that within the first three phases, there are six entrances and exits facing the city. Among these, Entrance No.3 only allows vehicles to exit but not enter, while Entrance No.4 only allows vehicles to enter but not exit, as shown in Figure 4-29. The park has four main parking lots. One is located at the northwest corner, adjacent to Entrance No.1, and is shared by both merchants and visitors, though visitors generally use it more. Another is situated in the middle of the park, also for employees and visitors, but this lot often has idle spaces due to its remote location and smaller size. There is another parking lot near Exit No.6, primarily used by park staff. Many maker office buildings surround this area. The three mentioned above are all outdoor parking lots, while there is also an indoor parking lot inside the factory building, which is convenient for nearby residents to use for fitness and sports activities, with nearby gyms and indoor sports venues.

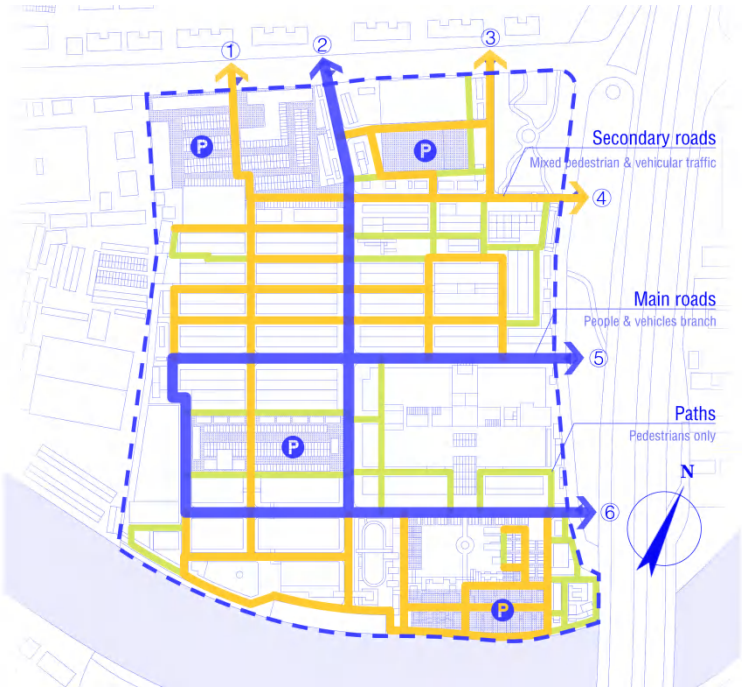


Figure 4-29 Organization of road traffic in the Creative Park
(Image source: self-drawn by the author)

The park features three types of roads: wide two-lane main roads, narrower secondary roads, and pedestrian paths. Overall, the traffic safety within the park is currently poor. Commercial activities along the main roads are particularly problematic, with some areas even forcing pedestrians off the sidewalks. Secondary roads lack clear separation between pedestrians and vehicles, leading to frequent mixed traffic. Additionally, many vehicles park on the sides of the roads, occupying both sides and a significant portion of the road width, forcing pedestrians to walk in the middle of the road and frequently need to yield to passing vehicles, which poses a significant risk. While most pedestrian paths are clearly marked, some areas still see vehicles illegally parking on the roads, obstructing and cutting off these paths, making walking difficult.

（2） Functional layout

Wisdom Bay Creative Park has a clear functional zoning, which is mainly divided into community service, exhibition area, commercial area, education area, office area and leisure area. There are almost no parent-child activities in the office area, but there are more parent-child activities in other areas, especially near the leisure area and commercial area.

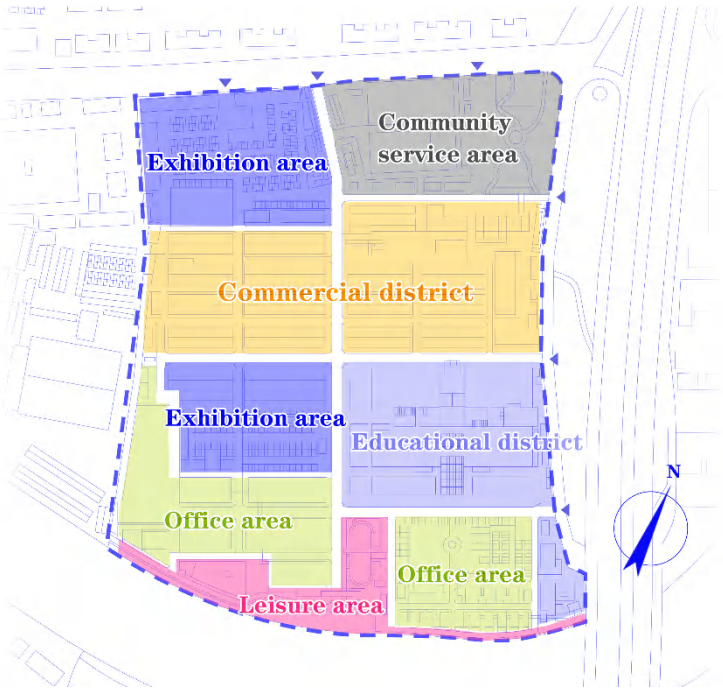


Figure 4-30 Functional layout of creative industrial park
(Image source: self-drawn by the author)

（3） Distribution of business forms

The main business types in the Creative Park include office and commercial sectors, with the commercial sector further divided into dining, shopping, entertainment, and educational training.

Office spaces are mainly located in a large area near Exit 6 in the southeast corner of the park, on the second and third floors of buildings in the southwest, and in buildings along the secondary roads in the middle of the park. The park has a significant number of dining establishments, which are primarily situated near the main roads leading to and from the park, such as the sides of the central main street and the roads connecting Exit 4 and Exit 6. The park also features a variety of family-oriented entertainment, education, and shopping venues, but these areas lack overall planning and are scattered throughout the park, with weak connections between them.

Some family-friendly venues are located in remote areas or mixed with office spaces, making it rare for families to visit specifically. Only the family-friendly venues in the middle of the southern part of the park, on the left side of the main street, are relatively concentrated, creating a better clustering effect that attracts families to engage in activities.

Figure 4-31 Distribution of various formats in the Creative Park
(Image source: self-drawn by the author)

4.4.2 **Classification of external space outside the park**

According to the previous research and field investigation, there are three types of outdoor places where parent-child activities occur frequently: a centralized site specially set up, a surrounding area centered on fun landscapes and devices, and nearby locations distributed along the track.

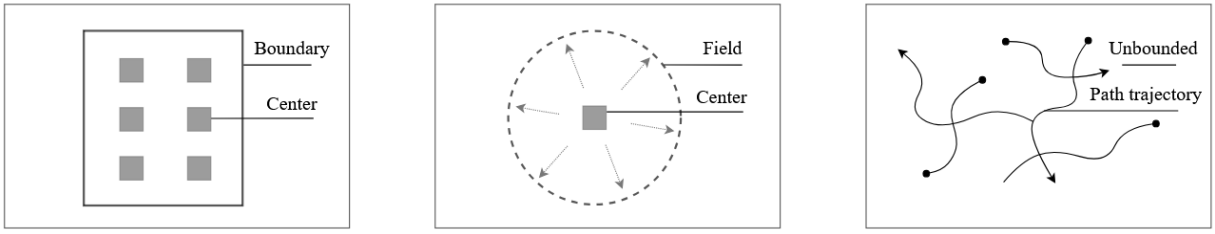


Figure 4-32 Types of outdoor parent-child interaction in creative parks
(Image source: self-drawn by the author)

1. Special centralized activity area: Parent-child activities gather in a planned venue. This type of venue is relatively large and independent, with high safety, including hard and soft paved areas. The parent-child groups are evenly distributed in the space, allowing them to stay for a long time.

2. Activity areas centered around landscapes and installations: Families with a keen

interest in novel things and a strong sense of curiosity are often drawn to the engaging facilities and small features in these spaces. These areas are typically small, point-like spaces where families spend less time than in larger, flat areas. The crowd in these spaces tends to cluster around the central facilities in a centripetal pattern.

3. Adjacent activity areas distributed along the trajectory: Children exhibit spontaneous randomness in their behavior, often pausing briefly near roads or their surroundings while walking with their parents. These areas are closely linked to roads and buildings, forming a linear space. People in these areas typically move along the path or stay close to its sides, with short stays.

The public space in the creative park includes outdoor public space, semi-outdoor public space and indoor public space. This paper mainly focuses on the public space outside the building, namely the outdoor and semi-outdoor public space.

Based on different classification criteria and standards, the public spaces in the park can be categorized into various types of spaces, as detailed in Table 4-4. Currently, there are two primary classification methods: one is based on the constituent elements, such as Cao Wenli and other scholars who categorize these spaces into square, courtyard, street, and garden spaces [58]; the other is based on usage, such as Wang Yingyi and other scholars who classify them into work, social interaction, exhibition, rest, commercial, and living spaces[4]; Deng Xingmei and other scholars categorize the spaces based on visitor behavior into traffic, rest, interactive, and performance spaces[63].

Table 4-4 Types of public spaces in Creative Parks
(Table source: compiled and self-drawn by the author)

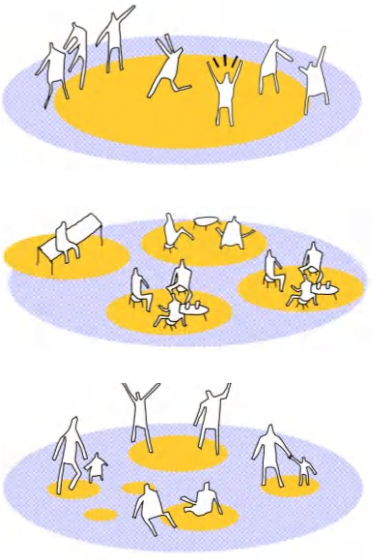
Classification criteria		Space type
The physical space	Spatial element composition	1. Square space, such as theme square, waterfront square; 2. Garden space, such as the external yard surrounded by buildings; 3. Street space, such as various types of roads; 4. Garden space, such as green space, small garden, etc.
	How people use it	1. Work space, such as the space for providing a work platform for residents in the park; 2. Communication space, such as places where people can communicate and interact; 3. Display space, such as exhibition area;

Classification criteria	Space type
	4. Resting space, such as a resting area; 5. Commercial space, such as product sales area; 6. Living space, such as dining area, entertainment area, etc.
	1. Traffic space, such as roads in the garden; 2. Rest space, a place for rest and communication, such as commercial outdoor area; 3. Interactive space, where tourists can actively participate and form an interactive area; 4. Performance space, such as the venue for exhibition and performance.

Combined with the above classification of public space types in the creative park, the scenes of parent-child activities in the creative park are mainly distributed in four kinds of space: square space, green space, node space and street alley space. That is to say, these kinds of space are the key areas for the creation of parent-child space outside the park, as shown in Table 4-5 below.

Table 4-5 Classification of external public spaces in industrial renovation creative parks based on parent-child activities

(Table source: compiled and self-drawn by the author)

Spatial classification	Specific categories	Feature	For example	Diagrammatic sketch
A centralized activity area is specially set up	Square space	The park contains hard public activity areas for leisure, performance and other functions, as well as a separate children's playground.	Performance square, leisure small square, children's activity area	

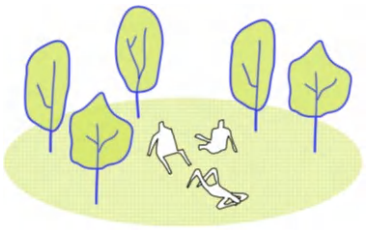
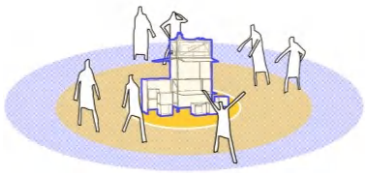
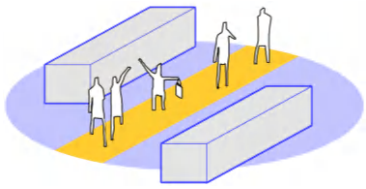
Spatial classification	Specific categories	Feature	For example	Diagrammatic sketch
	Green space	The soft green space in the creative park is dominated by landscape plants.	Public green space, large lawn	
An activity area centered on landscape and facilities	Node space	Small Spaces located at street corners, in front of building portals or around industrial relics within the Creative Park.	Street corners, building entrances and areas around industrial relics	
Nearby active regions along the trajectory distribution	Street space	Car and pedestrian roads and small, scattered random activity points along the street are closely related to the street environment.	All kinds of streets, vacant land beside the street, commercial transition area	

Figure 4-33 Position distribution of type Spaces in the Creative Park
(Image source: self-drawn by the author)

4.4.3 **Square space situation**

The square spaces in the Wisdom Bay Industrial Renovation Creative Park can be categorized into three types: performance squares, leisure squares, and children's play squares. The performance squares are reserved for large-scale cultural events, exhibitions, and other social activities. The leisure squares are designed for users to rest and chat. The play squares feature a variety of children's play facilities, providing a space for children to enjoy their games.

（1） Performance Square

At present, there are two large performance venues S1 and S2 in Wisdom Bay Park. See Figure 4-34 for the specific location.

Figure 4-34 Location map of the performance square in the Creative Park
(Image source: self-drawn by the author)

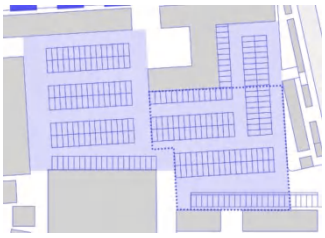
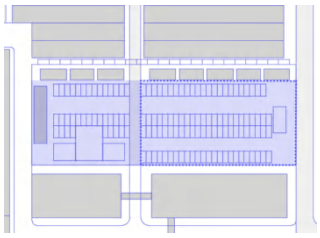
On regular days, the large square is used as a parking lot. Only during major events or performances and exhibitions does the area need to be cleared to create designated activity zones. The S1 venue hosts a weekly car trunk market from Friday to Sunday. The S2 venue only hosts large-scale performances on special dates, attracting many families when there are shows.

The venue, apart from the parking spaces on the ground, lacks any facilities or greenery, mainly consisting of large open areas. Vehicles are scattered throughout the two spaces. Due to

the ample and spacious area, the parking lot has a consistently high vacancy rate, leaving the large open areas largely unused. Occasionally, some families choose to exercise here, but due to the frequent passage of vehicles and the lack of activity facilities, their stays are usually short.

In general, the performance square has the problems of insufficient space utilization and monotonous space. As a public space with abundant area in the park, it should support more diverse activities for parents and children. However, the current function is relatively single, and there is no performance or other activities in the space, which makes it difficult to provide safe places for parents and children.

Table 4-6 Square space —— Performance square
(Table source: self-drawn by the author)

Name/Serial number		S1	S2
Photograph			
Schematic plan			
Size		The overall size is larger, about 6500 square meters (the activity site is 3000 square meters).	About 4000 square meters (2500 square meters of activity space).
Scale sense D/H		Very wide	Broad
Ambient environment		Located near the entrance on the north side of the park, it is one of the main parking Spaces in the park. The site is surrounded by commercial buildings 2-3 stories high, catering and education training. There is a large flow of traffic in the space.	The site is divided into two lanes, surrounded by offices converted from factories and ground-floor businesses, and some small container businesses for catering and handicrafts on the north side. There is less traffic in the space.
Landscape design	Floor paving	Cement	Cement
	Plant	Hardly any	Not have

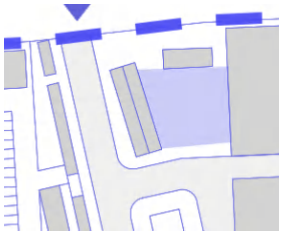
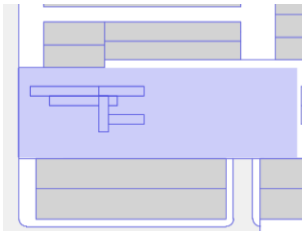
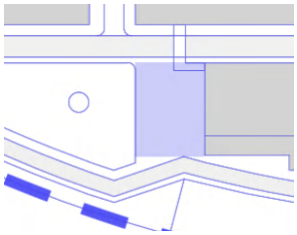
Name/Serial number		S1	S2
	greening		
Function implementation	Facilities for activities	Not have	Not have
	Crowd activity	It is mainly used for parking, so there are many parent-child activities such as passing by. Occasionally, there will be short-term parent-child stay activities. In the evening of weekends, commercial activities will be carried out in the area, and the flow of people will be large.	It is mainly used for parking and parent-child activities. During special activities, such as exhibitions and performances, there are more parent-child gathering activities in the space.
Safety		There are often vehicles passing through the site	There are vehicles in the site, but not very often
The right type of activity		Sports and exercise	
The right type of parent-child relationship		Ages 5 and over	Preschool children, school-age children

（2） Leisure Square

At present, there are five leisure squares in the park. According to the relationship between the site and the surrounding environment, they can be divided into inward-facing squares and outward-facing squares. The surroundings of inward-facing squares are dominated by buildings, while the outward-facing small squares are closely connected with the streets.

Table 4-7 Square space —— Inward-looking leisure small square

(Table source: self-drawn by the author)

Name/Serial number	S3	S4	S5
Photograph			
Schematic plan			
Size	About 400 square	About 1,300 square	About 400 square

Name/Serial number		S3	S4	S5
		meters	meters	meters
Scale sense D/H		It's a little depressing	same as	It's more open
Ambient environment		Located near the north entrance, but the site is more hidden. There are restaurants and toy stores around.	On the west side of the site is a Starbucks assembled from containers, surrounded by children's clothing stores and some non-food businesses.	There are some restaurants on the east side, and the other three sides are very open. There is a small green space on the west side, and the south side is near the waterfront running track.
Landscape design	Floor paving	ground tile	ground tile	ground tile
	Plant greening	Two trees	not have	There are some trees arranged in arrays in the site
Function implementation	Facilities for activities	Commercial outdoor seating	Enclosed commercial outdoor seating	Privatize commercial outdoor seating
	Crowd activity	It is often occupied by outdoor dining chairs, and occasionally parents and children play here.	There used to be parent-child chats, skating and so on. Since commercial outdoor activities occupy the site, fewer parents and children come to the event.	Usually, parents and children interact near green space and small nests. When small activities are held in the space, parents and children will gather here to watch performances.
Safety		High security	High security	High security
Appropriate activity types		Leisure and entertainment, chatting and socializing		
The right type of parent-child relationship		It is a family for all ages, but it is more attractive to middle-aged parents and preschool children		

S3 small square is blocked by the buildings on the west side and is relatively hidden. The space of the small square lacks design. There are no other facilities except commercial outdoor seats, and only parents and children will stop here for a short rest when dining.

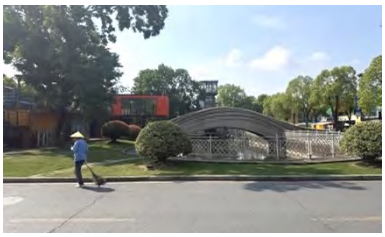
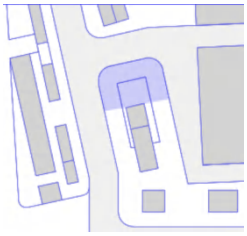
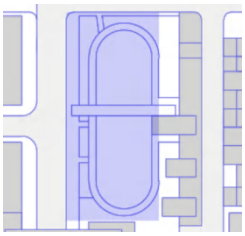
There is a Starbucks coffee shop transformed from a container in the S4 small square. Some commercial seats are placed at the entrance. In the middle of the square, there was an

empty space before, where many parents and children played sports, such as skating and skipping rope. Later, it was completely occupied by the outdoor seating of nearby restaurants and surrounded by a partition, making it difficult for parents and children to continue their activities here.

The S5 Small Square, situated near the river, boasts a spacious area with rows of trees, making it a slightly better environment compared to the other two venues. However, the open space can make parents and children who come here for a break feel less secure, leading to shorter stays. Additionally, this area occasionally hosts events such as small performances and exhibitions.

Table 4-8 Square space —— Outward-oriented leisure small square

(Table source: self-drawn by the author)

Name/Serial number		**S6**	**S7**
Photograph			
Schematic plan			
Size		About 200 square meters	About 1,300 square meters
Scale sense D/H		open	It's more open
Ambient environment		The location is prominent, with two lanes on the northwest side, a restaurant near the south side, and resting seats on the east side of the site.	On the main road, part of the view is blocked by commercial facilities with flower boxes placed close to the left, and on the right is a two-story container office building.
Landscape design	Floor paving	ground tile	The stone road, part of the pond is paved with wooden boards
	Plant greening	not have	More vegetation
Function implementation	Facilities for	Fountain with lights, two seats	3D printed bridge, a small fish pond

Name/Serial number		S6	S7
	activities		
	Crowd activity	There are many activities such as sightseeing, taking photos and resting for parents and children. Especially at night, there are more parents and children gathered here.	During the day, more parents and children enjoy watching fish by the pond. At night, the venue is not well lit, so most parents and children stay and play on or near the 3D bridge.
Safety		Adjacent to multiple lanes, there are certain safety risks	High security
Appropriate activity types		Take pictures and take a short rest	
The right type of parent-child relationship		It is attractive to young children	It is more attractive to young children and middle-aged parents

The S6, located by the roadside, is a hard-surfaced open space centered around a fountain. The area offers excellent views and high spatial openness, complemented by fountains and resting benches, making it a popular spot for families to enjoy the scenery and take photos. In the evening, the fountain features performances with lights and water jets, enhancing its appeal and interactivity. Parents often bring their young children or preschoolers to gather and watch, and due to the flat terrain, families with strollers also tend to linger here for leisure.

The 3D-printed bridge at S7 Square is particularly appealing to school-age children, with young children occasionally being pulled or carried by their parents to enjoy the view or play on the bridge. The water feature, integrated with the bridge, attracts toddlers who can watch fish while being supervised by their parents. However, due to the lack of lighting, there are few families staying by the pond at night. The square has two resting benches on the west side, but they are not used by families because the western area is entirely blocked by the garden's flower box commercial facilities.

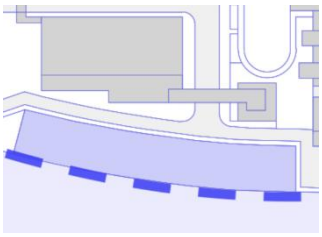
Overall, the leisure squares within Wisdom Bay Park are currently facing issues such as being occupied by privately-owned commercial seats, leading to poor spatial experience, a lack of scenic beauty, and a shortage of recreational facilities. In contrast, the S6 and S7 squares near the road have a relatively better environment and are equipped with some rest benches. The other three areas, apart from scattered trees, lack other greenery and are not well-designed for human comfort. Besides the privately-owned commercial outdoor seating, there is a lack of public rest and activity facilities suitable for family activities. While the park has many leisure

squares, mostly located on or near major roads, these squares could serve as places for families to rest, enjoy the scenery, and chat. However, due to the lack of good venue design, some of these squares currently lack vitality.

（3） Children's playground

The only outdoor children's playground in the park, S6, is located next to the river and offers a wide view of the river.

Table 4-9 Square space —— children's play area
(Table source: self-drawn by the author)

Name/Serial number		S6
Photograph and floor plan		 
Size		About 1,300 square meters.
Space perception		Messy, crowded and cramped
Ambient environment		The south side is the riverside, and the other three sides are enclosed by higher retaining walls facing the main street.
Landscape design	Floor paving	Ordinary hard tiles
	Plant greening	Not have
Function implementation	Facilities for activities	There are a large number of paid children's power play facilities in the space, but no rest facilities
	Crowd activity	The playground opens and starts to charge after 6 PM. In the evening and at night, there are more parent-child groups in the area to interact with each other, mainly playing games and playing amusement facilities in the playground. The playground is not open in other periods, so there are no parent-child activities in the playground.
Safety		The safety is generally, the site is crowded, lack of zoning, easy to collide
Appropriate activity types		Game interaction
The right type of parent-child relationship		Young children, preschool children, school-age children

The venue is equipped with numerous children's play facilities (Figure 4-35), which attract many parents to gather and play with their kids in the evening. The facilities are primarily mechanical, with limited variety, making them less appealing to older school-age children. The

layout of the venue is very cramped and crowded, with no greenery or plant life. Play equipment is haphazardly placed without proper zoning, and there is a lack of areas for parents to rest and wait. Most parents have to stand by the river while waiting, occasionally looking at the scenery to pass the time (Figure 4-36). Additionally, some of the smaller facilities require parents to watch from the sidelines (Figure 4-37), making it difficult for them to engage in interactive activities.

Figure 4-35 Power play facilities Figure 4-36 Parents wait to watch Figure 4-37 Parents stand by the river

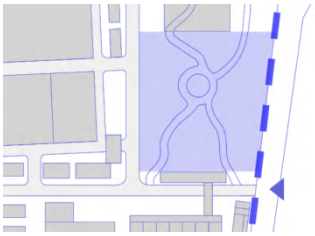
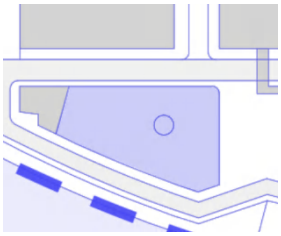
(Image source: self-portrait by the author)

4.4.4 **Green space situation**

The large public green space G1 of the park is located near the entrances and exits 3 and 4, and the green space G2 is located in the southwest corner of the park.

Table 4-10 Green space —— Public green space

(Table source: self-drawn by the author)

Name/Serial number	**G1**	**G2**
Photograph		
Schematic plan		
Size	About 3,500 square meters.	About 700 square meters
Scale sense	Broad	It's more open
Ambient environment	Located in the northeast corner of the park, near two exits to the north	There is a leisure square on the east side of the site, and the other three

Name/Serial number		G1	G2
		and east.	sides are adjacent to the road.
Landscape design	Floor paving	There is a gravel path for walking in the green space	Lawn
	Plant greening	It is dominated by large lawns with a few trees.	It is dominated by lawns and has many trees.
Function implementation	Facilities for activities	There are only a few tree-shaped ornaments and no other facilities.	A 3D nest with a few ornaments
	Crowd activity	Most of the activities in the space are through and passing. Occasionally, parents and children walk leisurely on the green path.	During the day, some parents and children play here for leisure, but at night, there are fewer parents and children coming here.
Safety		Safe	Safe
Appropriate activity types		Nature education, leisure walking, running and jumping	
The right type of parent-child relationship		All ages parent	All ages parent

The G1 Green Space in the park is currently undergoing renovation. The current layout and functions of the green space are quite limited, with a lack of spatial depth, which makes it less appealing for family activities. To enter from Exit 4, visitors are blocked by a long row of commercial buildings on the south side of the green space, making it difficult to see or reach the green space. The two connecting paths are both remote and narrow, significantly impacting the overall accessibility of the green space in terms of both visual and spatial experience.

The G2, 3D Nest Node is designed with a small house and a green space, where the green area is a plain lawn without special treatment. The house is primarily for viewing, with minimal interactivity. Additionally, the lighting at night is poor, leading to fewer families and children engaging in activities here. Occasionally, school-age children can be seen playing near the small house.

At present, almost all the green space in the park is only used for display function, which is single-function and fails to fully highlight and utilize its natural and ecological advantages. It also fails to well adapt to the needs of parent-child nature education and activities close to nature. Although there are many spatial resources, there are few behaviors that can be supported, and the spatial vitality is insufficient.

4.4.5 **Node space situation**

The node spaces within the industrial renovation creative park are mainly located at road corners, in front of building entrances, or around industrial relics. These spaces are relatively cramped, and families tend to spend less time there. The park features five main node spaces: F1, F2, F3, F4, and F5, as shown in Figure 4-38.

Figure 4-38 Location map of node space in creative park
(Image source: self-drawn by the author)

Table 4-11 Node space —— a small node located in front of the building portal

(Table source: self-drawn by the author)

Name/Serial number		**F1**	**F2**	**F3**
Photograph				
Ambient environment		Located at the entrance of a restaurant, near the corner of the street.	It's right in front of the store.	It's right in front of the store.
The width of the road adjacent to the passage		1.5 meters	4 meters	2 meters
Floor paving		Sync the tiles	Sync the tiles	Portal floor tiles
Function implementation	Facilities for activities	A big screen and a few resting seats	An industrial-style installation	Older game consoles
	Crowd	When the big screen is	Parents and children	Passing parents are

Name/Serial number	F1	F2	F3
activity	shown, there are more parents and children in this activity, most of whom take a rest to watch movies and play games.	passing by here and spending money in the store will stop	attracted

Nodes F1, F2 and F3 are located in front of the building portal, and the node space environment, facilities and shops are closely connected. The passage space outside node F1 is relatively narrow, and when parents and children are active in the node space, it will affect the passing parents and children beside it.

Table 4-12 Node space —— Other types of small nodes
(Table source: self-drawn by the author)

Name/Serial number		F4	F5
Photograph			
The width of the road adjacent to the passage		One meter	2-3 meters from the nearest retaining wall
Ambient environment		Located at the corner of a major road.	It is a music classroom renovated from a container. The west side is an art wharf and the south side is close to Yunzao River.
Floor paving		Sync the tiles	cement
Function implementation	Facilities for activities	A robotic device	On the south side there is a wooden board for rest and several seats.
	Crowd activity	Passing parents and children will stop briefly, and some will take photos with the facilities	The venue is used by more people at night, and many parents and children gather here to interact with each other. The main sports are running, cycling and so on.

The F5 node, centered around a converted music classroom from a container, offers more spaciousness compared to other nodes that are adjacent to buildings and streets. A wooden board for leisure is placed on the south side, equipped with several benches for parents and children to rest. Due to its proximity to the riverside scenic running track, parents often sit on the wooden

board to chat, while several school-age children gather nearby, cycling in short circles.

4.4.6 **Street space conditions**

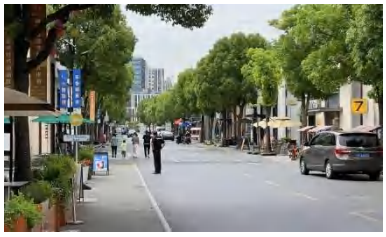
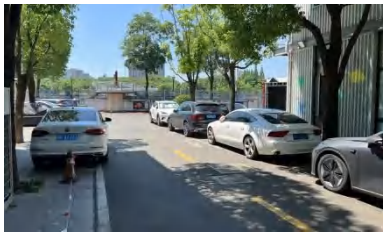
The street space in the park mainly includes different types of roads and street ancillary areas.

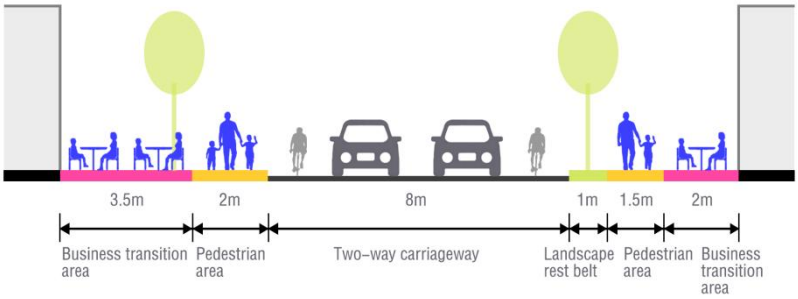
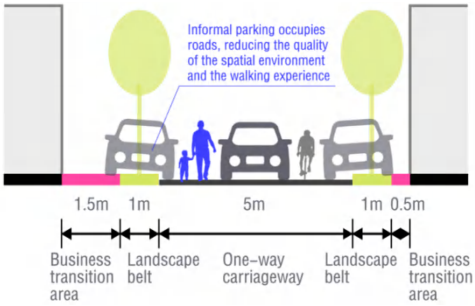
（1） All kinds of roads

There are four main types of roads in the park: the main road with separate traffic for people and cars, the secondary road with mixed traffic for people and cars, the pedestrian path between buildings in the walking area and the riverside landscape road. See Table 4-11 for details. Among them, the parent-child groups are especially active in the streets with separate traffic for people and cars and the riverside landscape road.

Table 4-13 Street space —— various types of roads

(Table source: self-drawn by the author)

Name/Serial number	**Main road**	**Minor road**	**Only pedestrian roads**	**Binjiang landscape road**
Photograph	 Main roads		 Secondary roads	
	 Only pedestrian roads		 Riverside landscape roads	
Mode of transportation	Separate people and cars	People and cars mix	Only the People's Bank	People and cars mix
Road width	18 metres (two lanes)	9 m (single lane)	Five meters	5m (single lane, running track 1m wide)

Bisect	 main road  minor road			
Floor paving	Cement	Cement	The floor shall be consistent with the site	Plastic, cement
Service facility	Only street lights	Occasionally street lights	Not have	Street lights, runway, landscape platform
Plant greening	There are trees on both sides	There are street trees	Not have	Not have
Crowd activity	During the day, it is mainly for walking and strolling, with occasional parents riding skateboards and playing on small wheels. At night, there are more commercial activities here.	Few parents and children walk on the road during the day, while more parents and children walk or stroll on the road in the evening and at night.	During the day, more parents walk on the walking paths in the walking area.	In the evening and evening, there are a large number of parent-child groups here for sports and leisure activities.

The main road in the park, which separates pedestrian and vehicular traffic, connects the park's internal roads with the city's main thoroughfares. Most of the roadside is lined with restaurants, and the road is 18 meters wide. Along both sides of the road, numerous commercial facilities are set up, such as flower stands and art boxes. These facilities occupy the space, making the pedestrian walkway narrow and obstructing it, which affects the smooth and

continuous walking experience for families. As a result, families have to walk on the vehicle lanes, increasing the risk. Additionally, there is a severe lack of public rest areas and play spaces along the roadside, and the overall environment is poor, negatively impacting the family's spatial experience.

The secondary road within the park, where pedestrians and vehicles share the space, handles most of the traffic routes. The road is primarily lined with non-food establishments, with a total width of 9 meters, all single-lane roads without dedicated sidewalks. The road is heavily used by both pedestrians and vehicles, and there are numerous informal parking spots on either side. The conflict between pedestrian and vehicle traffic forces families to constantly avoid vehicles, making the overall space quite dangerous.

The pedestrian-only paths in the Wisdom Bay Park are located between the factory buildings in the walking area. Some of them are combined with the square and use unified ground paving, which has no special distinction from the surrounding site. The road directionality and identifiability are not high, and occasionally vehicles are parked randomly and block the pedestrian path.

The riverside scenic path features a sports track and a scenic platform along the river. The track is divided into two sections by the retaining wall of the art pier, with no rest areas or benches around it. The western side of the scenic platform is rather plain and lacks appeal to families. In the evening, many families come here for activities such as cycling, skateboarding, chatting, and sightseeing. During the day, the area is primarily used for running and enjoying the scenery.

（2） Street ancillary space

The street's ancillary space includes a commercial transition zone between the sidewalk and buildings, as well as a linear landscape area featuring roadside trees. This area is located near the path that families must take within the park and is closely connected to surrounding buildings. Currently, the commercial transition zone and the linear landscape area are filled with various commercial facilities, such as outdoor seating for shops, commercial flower carts, and roadside billboards. In the evening, the flower cart stalls in the tree-lined landscape area

start selling handicrafts, attracting many families to stop briefly on the roadside for shopping activities. Since the commercial outdoor seating areas and some billboards are privately owned by the respective shops, during non-dining hours, only a few families use the outdoor seating areas, mostly parents and children who come here to eat and chat.

Moreover, in the street's ancillary spaces, apart from privately-owned commercial outdoor seating areas, there is a lack of public rest areas and facilities. Unconsumed families cannot rest on commercial seats and instead have to sit on the steps or curbs outside stores to chat and rest, while watching their children play nearby. After organizing the commercial outdoor seating areas in various shops within the park, it was found that they can be mainly divided into two forms: fully private and semi-public. For more details on the types, distribution, and usage of these commercial outdoor seating areas, see Table 4-14 below.

Table 4-14 Types of commercial outdoor space in street and alley space —— ancillary space (Table source: self-drawn by the author)

Name/Serial number	**1**	**2**	**3**	**4**
Photograph	 1		 2	
	 3		 4	
Public decency	Full privatization		It is semi-public and mainly belongs to shops	
Position	On both sides of the main street	On both sides of secondary streets	On both sides of the main street	On both sides of the main street
Ambient environment	It is closely connected with the shop itself and completely	It is closely connected with the shop itself and completely	The entrance of the adjacent large shops mainly serves the shops, but is not	Usually placed in the cramped area of the transitional space, it will occupy

Name/Serial number	1	2	3	4
	belongs to the shop.	belongs to the shop.	limited to the use of shop consumers.	part of the sidewalk and have a certain connection with the shop, but the sense of limitation is not strong.
Type of business	catering	Non-catering	Catering (main dining establishments)	Catering (beverages, snack bars)
Plant greening	Once in a while	Once in a while	Not have	Not have
Facilities for activities	Commercial outdoor seating with a fixed fence to limit the scope, with a large number of seats.	The seats are limited by fences or panels, and the number of seats is small; occasionally there are some recreational facilities.	Several seats, a table and a big parasol.	Portable and flexible commercial outdoor seating, often camping chairs, small stools.
Characteristics of crowd activity	It is only for parents and children who eat in shops, and catering activities are mainly necessary.	It is only for parents and children who consume in shops, and non-catering activities are mainly leisure games.	The use of the restaurant is mainly for parents and children who consume and eat in shops, while the use of the restaurant is mainly for leisure activities such as staying, chatting and playing games during non-meal time.	More parents and children rest, chat and communicate here at night, while fewer use it during the day.

As shown in the table above, there are many fully privatized commercial outdoor seating areas within the park, and they are widely distributed. Most of these areas are enclosed by barriers to restrict their open and shared use, thereby preventing non-consumers from using them. In contrast, semi-public commercial outdoor seating areas can accommodate some public activities for families, making them a more ideal model compared to fully privatized seating areas.

4.4.7 **Activities held in the park**

Public activities in the external space of the Wisdom Bay Creative Park are primarily commercial, such as car trunk markets every weekend evening, commercial performances on special days, flower car parades in the streets, and flower box sales. According to the monthly activity schedule within the park, as shown in Figure 4-39, there are many activities, but most family-friendly events are limited to indoor venues. The indoor spaces restrict the types of public activities that can be organized and conducted, leading to a relatively homogeneous range of activities, with a primary focus on children. Overall, the planning and operation of these activities underutilize the outdoor space, failing to fully stimulate its vitality and hindering the creation of a parent-child interaction and educational atmosphere in the external area.

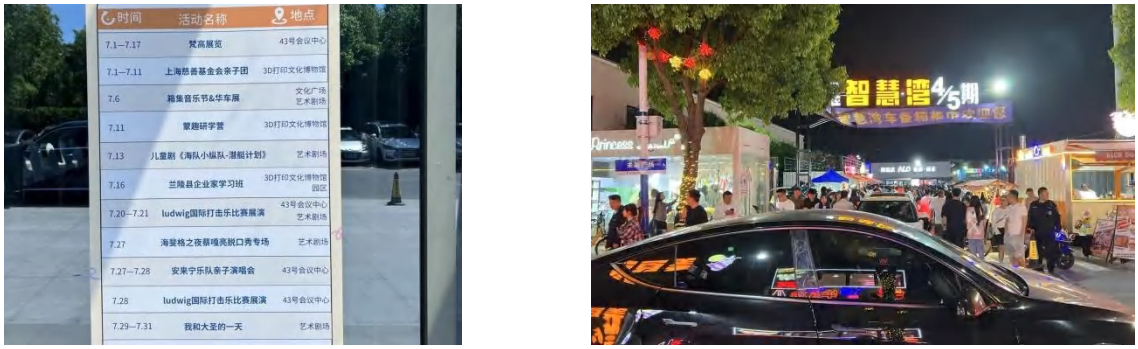


Figure 4-39 Activity table and activity holding situation in the park
(Image source: self-portrait by the author)

4.5 **Research summary**

4.5.1 **The current situation of the space in the garden**

Based on the on-site research within the park, the current issues are summarized as follows:

（1） The function is single, and there are insufficient places for various parent-child activities

Through the preliminary investigation of the activity needs of parents and children in the park, it was found that parents and children hope to carry out various activities within the park, including natural cognition, physical exercise, study tours, and cooperation, etc. As there are large and small square spaces distributed within the park, which are the most abundant and planar aggregated areas of the park's spatial resources, the square spaces play a crucial role in meeting and supporting the diverse activities of parents and children. They need to undertake the most diverse types of activities such as sports, leisure, and games. However, the square

spaces within the park are insufficiently utilized. Most of them are empty areas, and there are no activity facilities in the spaces. Such space areas make it difficult to create new interaction possibilities for parents and children. On the one hand, a large amount of space is in an idle and wasted state, not being fully utilized. On the other hand, it leaves parents who want to exercise and relax in the space with no way to do so, as there is no place to move around.

Currently, the green space within the park, apart from some trees and lawns, has almost no other facilities. It currently serves only as a display area, lacking natural interactivity. This limits the space's ability to fully utilize its natural educational and cognitive benefits and fails to support parent-child activities. As a result, parent-child groups can only engage in necessary activities like passing through, making it difficult for them to have meaningful interactions. The park's street spaces are designed primarily for traffic, with no areas or functions for parent-child activities or public rest, leading to some parents having to sit on steps while children play on the walkways.

（2） The landscape environment is monotonous and has a weak attraction to parents and children

Through the current situation investigation of the spaces within the Wisdom Bay Park, it was found that the overall environment of the public spaces is poor at present. There is a tendency towards homogeneity, lack of uniqueness, and no good visual or situational experience of the landscape. Many areas have a shortage of landscape plants or have very monotonous types of greenery. For example, in some small squares, only a few trees are simply placed, and the green areas only have large areas of un-designed grass and some randomly planted trees. The existing several node spaces located in the streets and alleys currently also need to further enhance their own characteristics in terms of the environment.

There is no special distinction in the paving of the space. The public space in the garden is mainly paved with hard materials, and often the same style and material are used for many squares. The lack of variation in the space is difficult to provide rich spatial feelings, and the attraction to parents and children is weak.

The current venue lacks depth and comfort, which negatively impacts the user experience. For example, when families want to rest, chat, or socialize in the space, the lack of suitable

small-scale areas for activities directly affects their time spent there. The game square, specifically designed for children, is cramped and disorganized, with a large number of play facilities haphazardly placed. The venue lacks proper zoning, making the overall space feel very crowded and uncomfortable. Apart from those playing, few people tend to linger here.

（3） The facilities are not perfect, which affects the use of differentiated activities between parents and children

Public service facilities in the existing industrial park are scarce. Most of the existing benches are commercial seats from nearby shops, which limits the space for parent-child activities in some leisure squares. There is a lack of public rest areas for parents to take breaks and relax. Many young children need their parents to watch over them while playing, but the current venue lacks areas and facilities for parents to observe and rest. Additionally, the park's shading, lighting, and signage for parent-child activities need improvement. Parents often visit the park after dusk, so good lighting is essential to ensure their safety. Moreover, the lack of sun and rain shelters can affect the behavior and activities of parents and children in outdoor areas.

Furthermore, the existing amusement facilities in the park are relatively limited and primarily serve children, making it difficult for parents to participate in the games. Parents can only act as observers, which negatively impacts the development of positive and healthy parent-child interactions. Additionally, the design and form of the activity facilities are monotonous, lacking the park's unique features, which can easily lead to a loss of interest among parents and children.

（4） Event planning and operation need to be improved

Currently, most activities in the park are held indoors, with a limited variety of outdoor activities, primarily commercial events. Previous research has shown that hosting activities in the space can influence the behavior and interaction of parents and children, thereby enhancing the space's activity level. The park should introduce more diverse activities and projects to increase parental participation and enrich the types of activities, making them more appealing to families.

Table 4-15 Correlation analysis between spatial problems and parent-child behavior needs

(Table source: self-drawn by the author)

Space problem	Space-behavior association	The need for space for parent-child interaction	Specific strategy content
The function of the site is single (the square is idle and lacks compound utilization; the green space only has the function of viewing and display; the street is only passable, difficult to stay)	Lack of support for parent-child activities and unsatisfactory use	Parents hope to carry out activities such as natural cognition, sports exercise and study cooperation in the park. They need more space to accommodate various activity needs. Square —— sports, group activities; green space —— nature education, leisure; street —— traffic and rest activities.	The space with diversified and complex functions meets the diverse activity needs of parents and children, providing rich choices.
Space facilities (the functional facilities serving parent-child activities need to be improved, the lack of public rest seats, and the types of amusement facilities are homogeneous and difficult for parents to share)		Children of different ages have different preferences for amusement facilities. The facility needs to be used by both parties. Supporting other service facilities: shelter facilities, night lighting facilities, signage system, etc.	Adjust the scale of facilities and enrich them Facility type, industrial and cultural elements integrated into the design of facilities.
Space environment (single landscape type; homogeneous environment, lack of variation)	The environment for suitable parent-child activities is not available, and the attraction is weak	Parents focus on the beauty and comfort of the environment; children focus on the fun and novelty of the environment; parents and children pursue rich sensory experience	Add landscape elements to improve the quality of the environment, create a pleasant space scale, add interesting elements, set up parent-child themes and story lines, and enhance the situational experience
Event planning (insufficient outdoor activities, single type of activities, etc.)	There is a lack of atmosphere for parent-child activities.	Good educational research atmosphere Immersive parent-child interaction experience	Organize a variety of activities and enrich the forms of activities.

4.5.2 **The Relationship Between Indoor Spaces and Parent-Child Interaction**

The parent-child activities in the park are mainly distributed across four major types of spaces, and each type of space can be further subdivided. However, not all spaces in the park are suitable for hosting a large number of parent-child activities. Different spaces need to undertake different main functions. Some are more suitable for supporting diverse parent-child interaction behaviors, such as the performance square and leisure square in the open space area, which have ample space and high safety, and can mainly accommodate parent-child interaction activities. While the street and alley spaces are responsible for the majority of people's activities such as passage, consumption, and eating, their safety is not as good as the former, and mainly focus on ensuring and guaranteeing necessary activities of the population. Occasionally, consideration can be given to adding parent-child interaction scenarios. The table below specifically clarifies the relationship between the renewal of external spaces and the creation of parent-child interaction scenarios, and analyzes the renovation priorities of different spaces in the park based on the perspective of parent-child interaction.

Table 4-16 Analysis of spatial transformation in park types
（Chart source: self-drawn by the author）

Types of outdoor activity spaces	Corresponding to the type of the park area	smaller categories	Direction of Space Renovation	Suitable activity functions
A specially designated centralized activity area	Square space	Performance Square	Take on the majority of parent-child interaction activities and provide the necessary physical venues.	Physical exercise, sports competition
		Introverted Leisure Square		Parent-child relaxation, social interaction
		Extraverted Leisure Square		Parent-child leisure sightseeing
		Children's Play Square		Multi-aged parent-child games (children's cognition, preschool exploration, school-age adventure)
	Green space	Green Space		Nature education, plant recognition, leisure running and jumping
Activity areas centered around	Node space	Street Corner	Depending on the situation, consider adding	Leisure games
		Building Entrance		Supplementary leisure games

Types of outdoor activity spaces	Corresponding to the type of the park area	smaller categories	Direction of Space Renovation	Suitable activity functions
landscapes/ facilities		Surrounding Industrial Remnants	supplementary activity scenarios for parent-child interaction.	Popular science display, leisure cooperation
The adjacent active areas distributed along the trajectory	Street and alley space	Separate Pedestrian and Vehicle Roads	Take on the majority of parent-child interaction activities and provide the necessary physical venues.	Satisfy passage, appropriate rest game points can be set
		Mixed Pedestrian and Vehicle Roads		Ensure safe passage
		Pedestrian Path		Can add rest and display areas
		Bridgewater Scenic Path		Suitable for physical exercise
		Commercial Transition Area		Consider providing more possibilities for parent-child leisure games

4.5.3 Type spaces are associated with parent-child behaviors

Different types of spaces have their own unique characteristics, and the types of interactive activities they are suitable for also vary. Based on the types of space environments and the characteristics of parent-child behavior activities discovered through field research, the space traits can be associated with parent-child behaviors. Please refer to the table below for details.

Table 4-17 The correlation between the characteristics of the type space and the parent-child function and population
(Table source: self-drawn by the author)

The typological space	Sub-type	Space characteristics	Current space activities	Suitable activity functions	Suitable for the activity group
Square space	Performance square	Big and open	Pass by, occasionally stopping and moving	Exercise, sports	3-6; 6-12; over 12
	Inward leisure square	Smaller, quieter	Take a short break to chat	Parent-child rest, social interaction	All ages

The typological space	Sub-type	Space characteristics	Current space activities	Suitable activity functions	Suitable for the activity group
	Outward leisure square	Smaller, more open	Stop and look	Family leisure sightseeing	All ages
	Children's play square	Relatively independent	Games for single age group children	Multi-age parent-child games (cognitive development for young children, exploration for preschoolers, adventure for school-age children)	0-3；3-6；6-12
Green area space	Green area	Open	Passing by	Nature education, plant cognition, leisure running and jumping	All ages
Panel point space	At the corner of the street	The safety is generally good	Parking	Casual games	Over 6 years of age
	In front of the building gate	More secure	Have a rest	Add casual games	0-3；3-6
	Focus on industrial heritage	Industrial, fun	Have a rest	Science popularization and leisure cooperation	Over 6 years old
The streets space	Separate roads for people and cars	It's safer	Traffic, business activities	To meet the requirements of traffic, appropriate rest stops should be set up	Over 6 years old
	A road for both people and cars	Unsafe	Going through	Ensure safe passage	/
	A pedestrian path	Safer	Going through	Add rest and display	3-6；6-12
	Binjiang landscape road	The safety is generally discontinuous	Running, passing by	Exercise training	6-12

The typological space	Sub-type	Space characteristics	Current space activities	Suitable activity functions	Suitable for the activity group
	Commercial transition zone	Put more commercial seats on display	Food and beverage	Provide more possibilities for parent-child leisure games	0-3；3-6

4.6 **Chapter summary**

This chapter first evaluates the situation of Shanghai Wisdom Bay Creative Park based on the park standards for creating a family-friendly environment listed in the previous research. It is found that the park has the conditions for creating a space for family interaction. Subsequently, through methods such as questionnaire interviews and behavioral observations, a specific investigation was conducted on the current external space of the Wisdom Bay Industrial Redevelopment Creative Park, as well as the family behavior activities and family interaction needs within the park. The connections between different types of spaces in the park and family behaviors were summarized. This provides a basis for the design practice of creating the external family space of Wisdom Bay Industrial Redevelopment Creative Park in the next chapter.

Charpter Five A strategy for updating the external public space of an old industrial park based on parent-child interaction

In the previous chapter, we gained a detailed understanding of the situation in the Wisdom Bay Park, analyzed the characteristics of different types of spaces within the park and their compatibility with parent-child activities, and summarized the connections between different types of spaces in the park and parent-child behaviors and needs. Different types of spaces have distinct features and are suitable for different types of parent-child interaction behaviors. Therefore, this chapter mainly focuses on two major aspects: detailed suggestions for creating parent-child interaction scenarios in each type of space within the park and specific design plans for selected space areas.

5.1 **Design goal**

The external parent-child space in the industrial renovation creative park serves current parents and children visiting the park, as well as potential future visitors. The park aims to foster more diverse interactive activities among parents and families through the creation of a parent-child space, thereby better supporting children's growth and development, enhancing emotional connections between parents and children, and strengthening science education for families.

Therefore, the key points of space design are as follows:

1. Create outdoor places suitable for various parent-child activities to promote parent-child interaction and improve parent-child relationship.

2. Inherit and highlight the industrial history and creative characteristics of the park, and strengthen the publicity of the park culture.

3. The park's characteristics are integrated into the design of parent-child space, strengthening science education and responding to the call for parent-child education.

5.2 **Priority of Creating Parent-Child Scenarios in the Park Area**

According to previous research, different spaces within the park vary in terms of their safety levels and main functions, resulting in differences in their compatibility with the creation

of parent-child scenarios. Therefore, it is necessary to first identify which spaces within the park are the key areas for creating parent-child scenarios. Public square and green space areas are spacious, have high safety, and have strong spatial plasticity, making them better able to accommodate and flexibly adapt to most and diverse parent-child interaction activities; node spaces, although smaller in area compared to the former, are still suitable for undertaking some less intense parent-child activities and can play a good supplementary role in parent-child activity scenarios. In contrast, street and alley spaces are mainly for necessary activities such as passing and shopping, and the space is more confined, with limited safety, making them unsuitable for prolonged stays. Therefore, an inclusive design approach is preferred, with the primary goal of ensuring smooth road accessibility. Where conditions permit, additional areas for parent-child activities can be considered.

The priority levels for creating parent-child scenarios in the Shanghai Smart Bay Creative Park can be clearly seen in Figure 5-1:

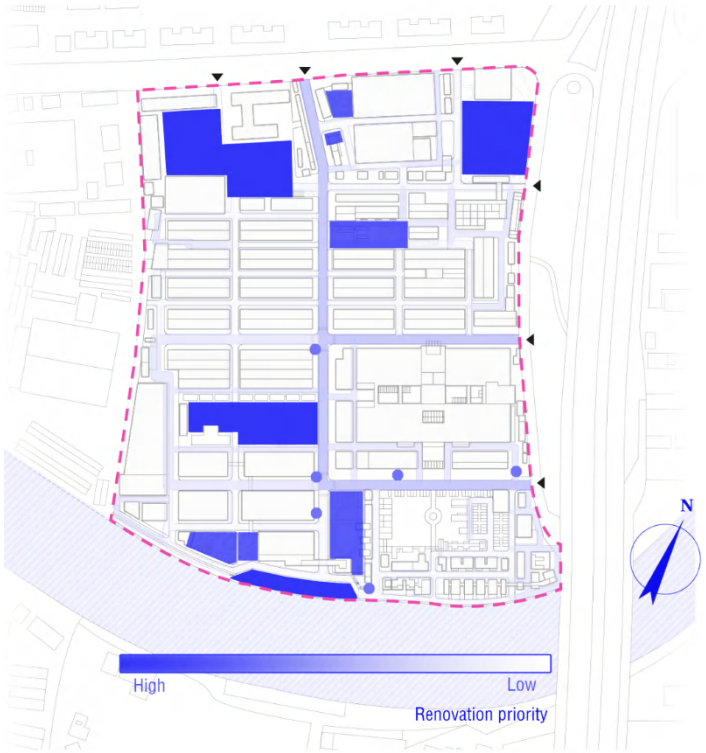


Figure 5-1 The priority for creating family-friendly scenarios in the park area
(Image source: self-drawn by the author)

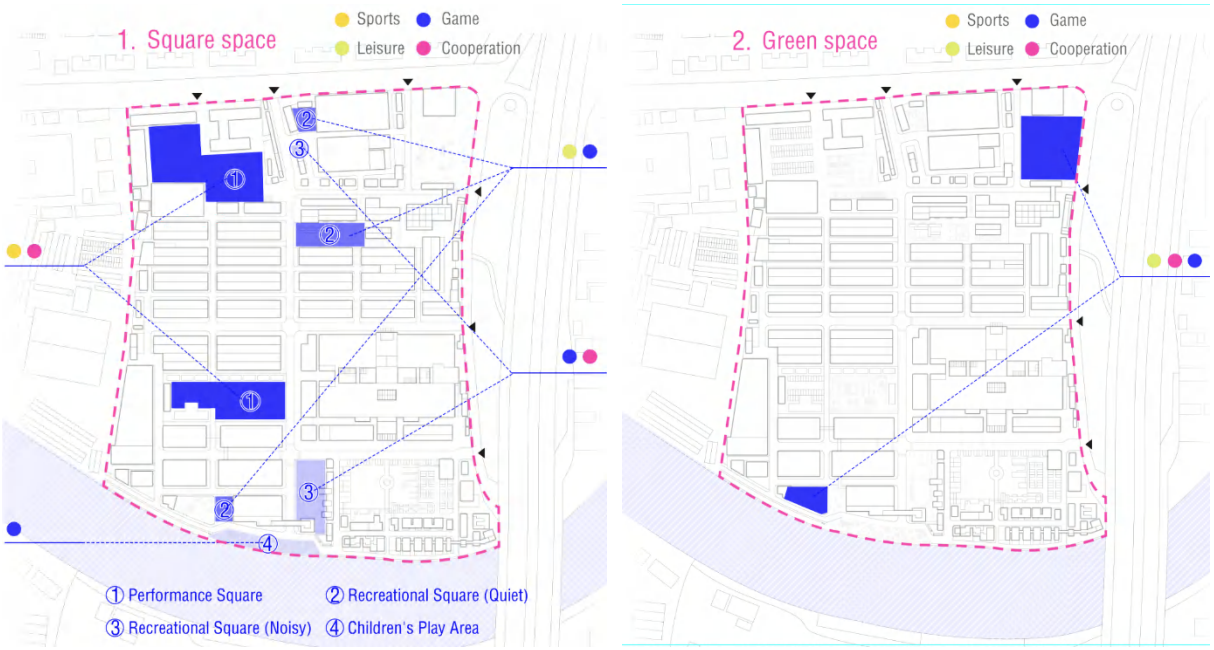
For the external public spaces with higher priority within the park, when undergoing renovation, priority is given to integrating them with interactive scenarios for parents and

children. While for the spaces with lower priority, more consideration is given to inclusive design during the renovation process.

5.3 Compatibility of different spaces with parent-child scenarios

The internal and external space types of the Wisdom Bay Creative Park are very diverse. In the previous section, it was explained that the different types of spaces within the park have varying capacities and support levels for parent-child interactive activities, and the types of spaces that are suitable to be prioritized when creating parent-child scenarios in the Wisdom Bay Park were determined.

In addition, due to the differences in their own characteristics and conditions, different types of spaces are also more suitable for different parent-child interactive activities. For the square space, the performance square has the largest area and is more flexible in use, making it suitable for hosting most parent-child activities, especially dynamic activities such as parent-child sports; the leisure square has higher safety, and its spatial characteristics vary depending on the surrounding environment. The leisure square near less roads has a more peaceful and quiet overall atmosphere, which is particularly suitable for more static leisure activities between parents and children; the children's play square serves children of different age groups and mainly provides places for entertainment and games.



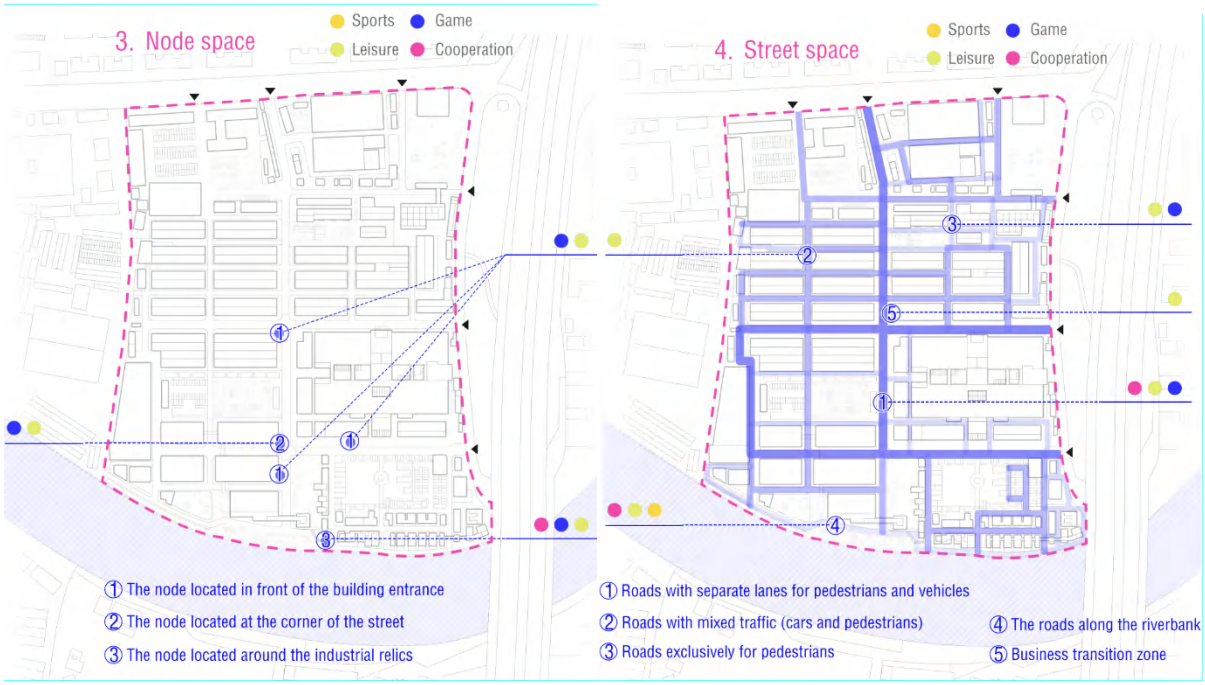


Figure 5-2 Different types of spaces are suitable for different types of parent-child interactions (Image source: self-drawn by the author)

5.4 Suggestions for Design of Various Spaces within the Park

Based on the types of outdoor family activity spaces, the main types of spaces for family activities in the industrial renovation creative park include four categories: square spaces, green space areas, node spaces, and street alley spaces. Among them, square spaces can be further divided into performance squares, leisure squares (intensive and extroverted types), and children's play squares. Node spaces, based on their locations, mainly include street corners, building entrances, and areas surrounding industrial remnants. Street alley spaces include various types of roads and commercial transition areas.

The different types of spaces within the park have distinct directions for renovation and transformation based on family interaction behaviors. Spaces with ample area, such as squares and green spaces, should mainly be responsible for hosting the majority of family interaction activities. Node spaces can provide supplementary elements for creating family interaction scenarios as needed. Street alley spaces focus on ensuring traffic safety and are more inclined towards inclusive design.

5.4.1 Creation of a Parent-Child Activity Scene in the Square Space

5.4.1.1 Performance square

The performance square has ample space, offering a significant scale advantage over other public areas within the park. It is ideal for hosting dynamic and group activities for families. By aligning with the time patterns of family activities in the park, the performance square can be better utilized to accommodate more family activities. From 6 PM to 6 AM on weekdays, the square serves as a parking lot; from 6 PM to 6 AM on weekends and holidays, it is open for family sports and exercise activities.

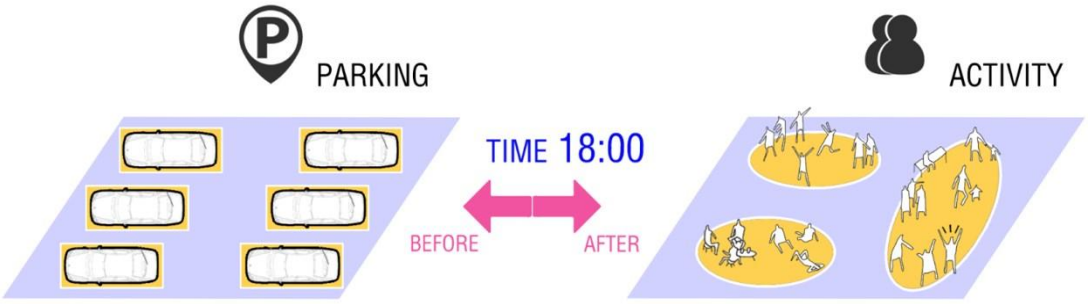


Figure 5-3 Time-sharing conversion of site functions within a week
(Image source: self-drawn by the author)

Sports facilities, such as basketball courts and badminton courts, can be built in the venue for older children to provide opportunities for school-age children who love sports to compete and collaborate with friends and parents. This helps them improve their physical fitness and showcase their abilities through sports activities. Considering that mothers and middle-aged parents may have less stamina, it is advisable to set up some leisure and social areas where parents can adjust their state during sports activities. Social interactions can also help alleviate the stress of work and life. For younger children, smaller sports areas, such as short running tracks and areas for roller skating, can be arranged in the venue. Seating for parents to watch and interact with their children nearby can facilitate emotional connections between young children and their parents.

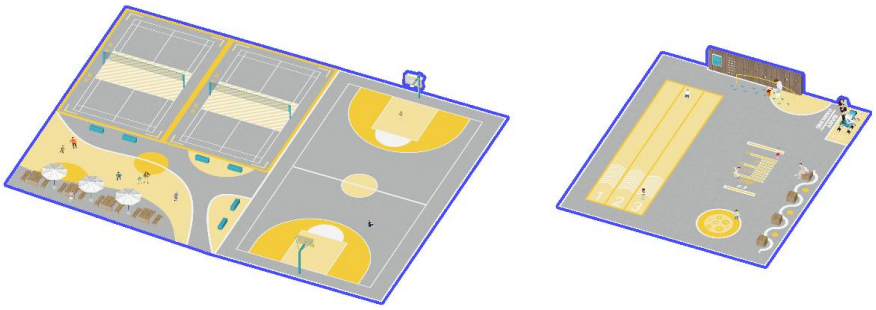


Figure 5-4 Sports venues for children of different ages
(Image source: self-drawn by the author)

By combining flexible furniture with fixed objects, the space for group activities

maximizes children's participation and play[68]. The facilities in the performance square should be not only safe but also flexible and adaptable, using non-fixed facilities whenever possible to provide more flexible options for parent-child activities. Mobile furniture allows children to easily rearrange the space to meet their needs and enhance their interaction with the environment. For example, when the venue is used for parent-child sports, lighter, more mobile seating can be provided, allowing parents and children to freely adjust their distance from others, meeting their diverse social needs. Additionally, the ability to change, adjust, and control parts of the environment according to evolving and new needs can enhance children's enjoyment, initiative, self-control, and autonomy[69]. Furthermore, multifunctional facilities can be utilized to support a variety of parent-child activities in different scenarios, enhancing the venue's appeal to children, as shown in Figure 5- 5.

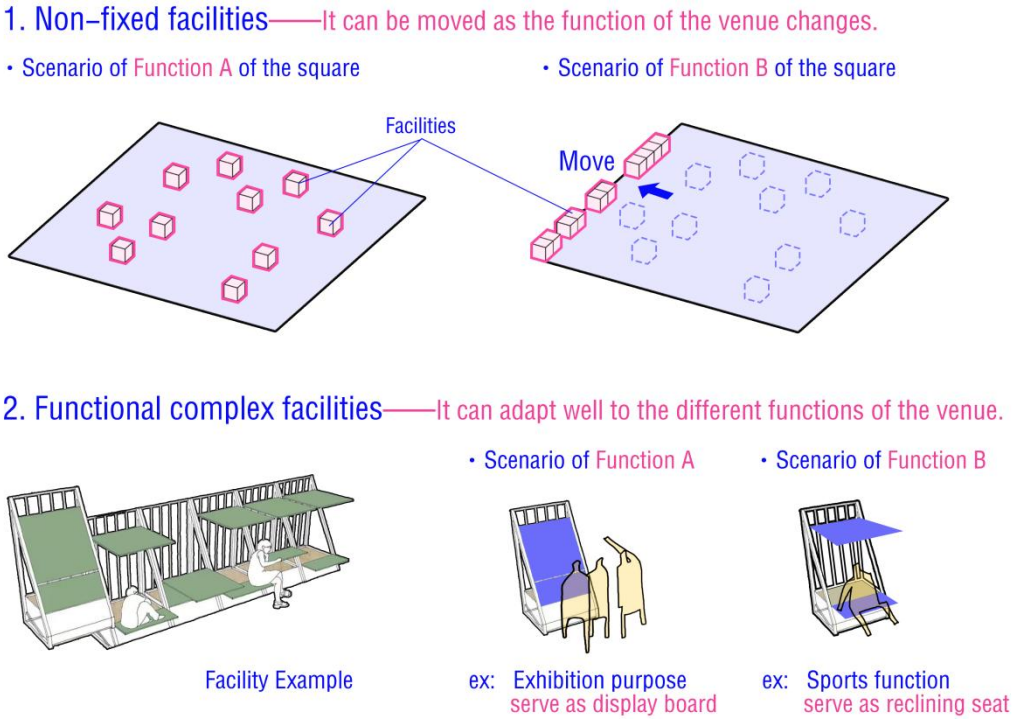
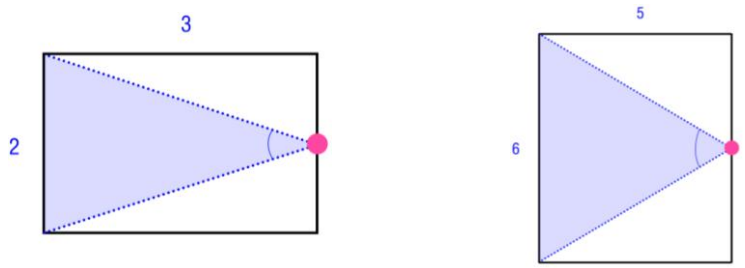


Figure 5- 5 Schematic diagram of flexible and variable public facilities
(Image source: self-drawn by the author)

In terms of the spatial environment, the ground-to-surface ratio for dynamic activities like parent-child sports can be set between 2:3 and 5:6. This ensures that parents and children have a clear line of sight and a good sense of space. The sports field can be designed with different colored silicone PU paving to define areas, preventing conflicts between various types of parent-child activities, enhancing safety, and allowing for more relaxed interactions.

Additionally, using vibrant warm colors can boost the enthusiasm for parent-child sports. In the parent rest area, low landscape plants that do not obstruct the view can be added to help parents relax.



Horizontal Angle 40° horizontal Angle 60°

Figure 5-6 Base plane ratio of the activity site
(Image source: self-drawn by the author)

Figure 5-7 Schematic diagram of laying area and nearby rest area
(Image source: self-drawn by the author)

Furthermore, it is advisable to host regular exhibitions in the performance square, such as displays of industrial history and promotions of creative culture. These activities can enhance the cultural atmosphere of the space, promote knowledge sharing for children and parents, and achieve a blend of education and entertainment. Additionally, more temporary activities related to parent-child sports, such as frisbee tournaments and parent-child sports meets, can be organized in the spacious area. These activities can foster collaboration between parents and children, building trust and a sense of security. When designing these activities, the focus should be on the psychological needs of both parents and children, emphasizing the importance of teamwork and helping children develop a competitive spirit and team spirit from a young age.

5.4.1.2 **Leisure square**

The leisure squares in different environmental positions in the park have different spatial characteristics, which are mainly divided into: 1. The leisure squares with closer integration with surrounding buildings and inward-oriented space; 2. The leisure squares with closer connection with nearby roads and outward-oriented space, as shown in Figure 6-6.

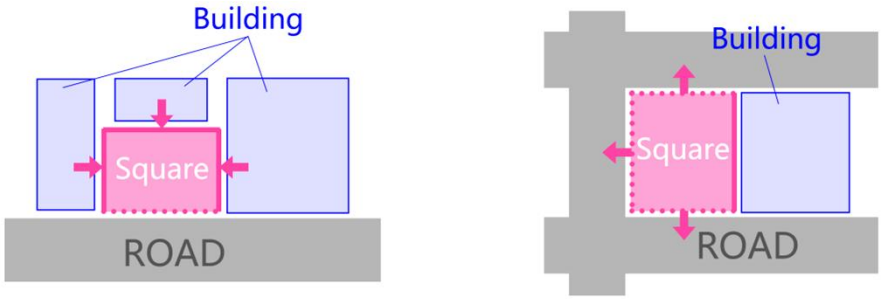


Figure 5- 8 Schematic diagram of two types of leisure squares
(Image source: self-drawn by the author)

（1） An introverted leisure square

Indoor leisure squares are often occupied by the outdoor stalls of nearby shops. To ensure the public nature of the space and to better facilitate parent-child activities, the expansion of commercial outdoor areas should be limited to 15%.

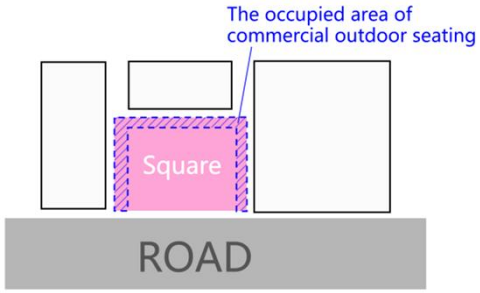


Figure 5-9 Schematic diagram of the proportion of peripheral commercial extension
(Image source: self-drawn by the author)

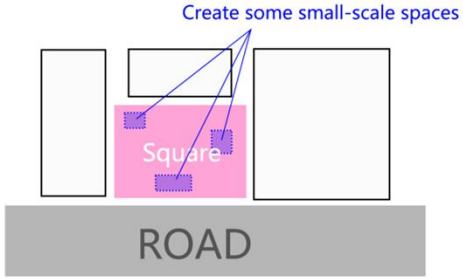


Figure 5-10 Creating some small scale space in the square
(Image source: self-drawn by the author)

These indoor leisure squares are much smaller than performance squares and offer a quieter environment, making them ideal for parent-child activities such as resting, chatting,

socializing, and playing.

Landscape elements such as trees, shrubs, and scenic walls can be utilized to create small-scale rest and social spaces that partially obstruct paths or lines of sight. This provides a private space for parent-child conversations, protecting the privacy of both parents and children, allowing them to interact in a more comfortable and secure environment. Additionally, quieter and more independent interaction areas can be provided to meet the psychological need for personal space among older children. Based on the park's characteristics, these areas can be transformed from shipping containers and integrated with educational reading functions, such as creative picture books that tell stories about industrial progress, to meet the learning and thinking needs of school-age children. In some areas, ground-cover plants can be used to create relatively open spaces that facilitate chatting and socializing among different families, ensuring a comfortable social distance and helping parents relax while interacting with others.

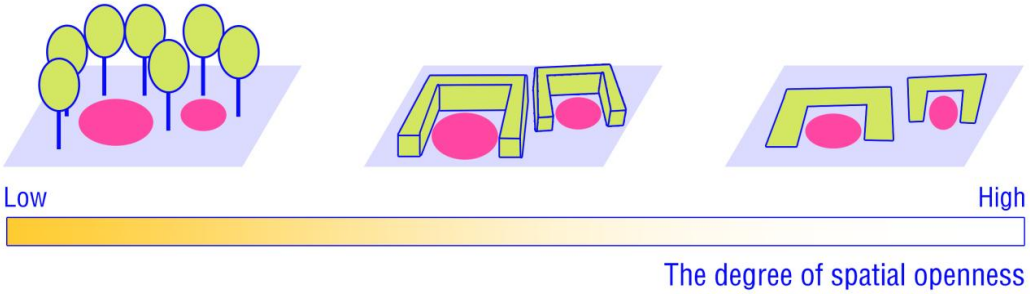


Figure 5- 11 Influence of different plant combinations on openness
(Image source: self-drawn by the author)

Figure 5- 12 Schematic diagram of personal space and local open areas
(Image source: self-drawn by the author)

In addition, more interesting seat forms can be used in a more open space. For example, the rest function of the seat can be combined with play to meet children's lively and playful nature.

Figure 5- 13 Functional composite fun curved seat
(Image source: self-drawn by the author)

（2） Outward-looking leisure square

Some outward-oriented leisure squares are surrounded by a cluster of commercial facilities. It is necessary to control the placement of roadside facilities to avoid obstructing the entrances and internal views of the square, thereby enhancing the comfort of activities for families. When designing landscapes and facilities, a certain passage area should be reserved at the edge of the site to ensure the safety of families walking nearby. Compared to inward-oriented squares, these open squares offer greater accessibility and openness, but they are not as quiet. They are ideal for creating functional nodes for family sightseeing and rest.

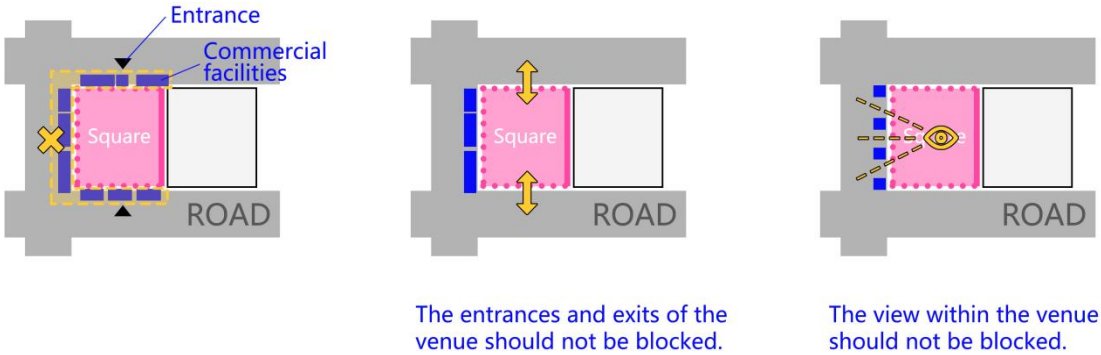


Figure 5-14 Controlling the surrounding commercial facilities

(Image source: self-drawn by the author)

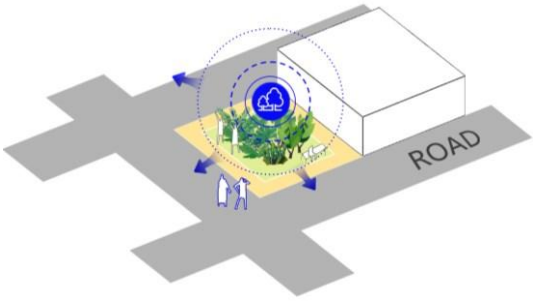


Figure 5-15 Creating a parent-child viewing and leisure node
(Image source: self-drawn by the author)

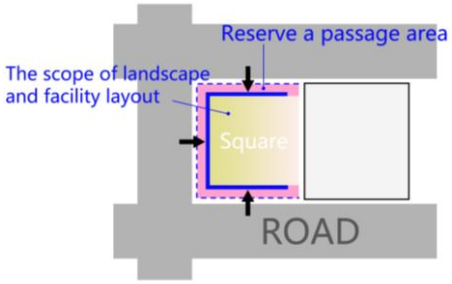


Figure 5-16 Schematic diagram of the edge passage area of the sit
(Image source: self-drawn by the author)

It is advisable to incorporate a variety of green landscape elements in the venue, such as flowering and foliage plants, fountains, and other combinations, to create a more diverse sensory experience for families. This will provide a pleasant environment that helps parents relax and relieve stress. Local areas should be equipped with educational signs and simple, easy-to-understand images to promote children's plant recognition education (Figure 5-17).

Figure 5-17 Local cooperation popular science sign
(Image source: self-drawn by the author)

Creative and innovative installations or small features, such as those transformed from

industrial relics, can enhance the space's appeal and satisfy the strong curiosity and desire to explore among family members. Additionally, the square should include seating areas designed for rest and relaxation, featuring creative designs like 3D-printed seats, to facilitate relaxation, rest, and conversation between family members.

5.4.1.3 **Children's play square**

Children's game square should increase the game functions that can be used by children of different ages. Plants and facilities can be used to separate the main use areas of different ages, so as to avoid the potential safety risks caused by mixed activities between older children and young children. Play and sports facilities should be set up according to age, as shown in Figure 5-18.

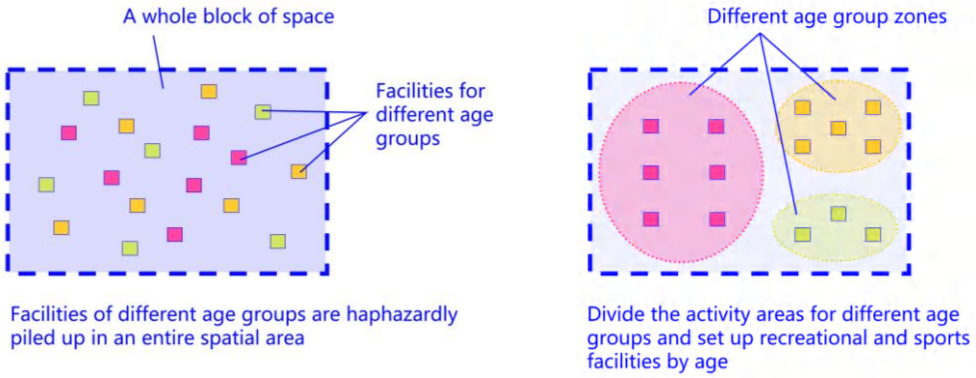


Figure 5-18 Schematic diagram of site age zoning
(Image source: self-drawn by the author)

Parents should be present throughout the time when young children are in activities. A parent rest and supervision area, with a clear line of sight and an appropriate distance from play facilities, should be set up in the activity area for young children.

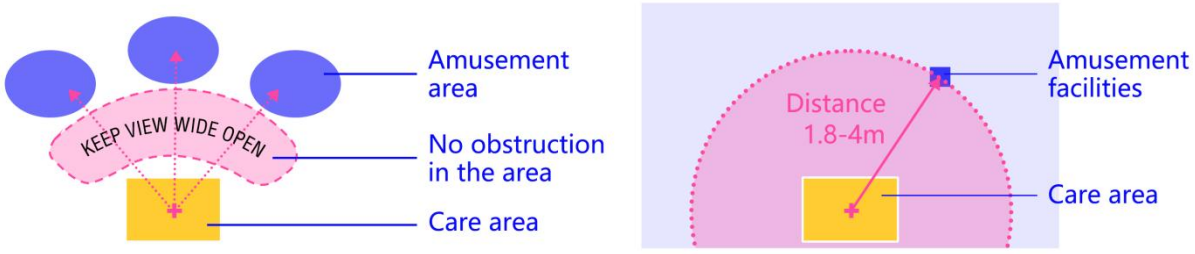


Figure 5-19 Schematic of site selection requirements for care areas
(Image source: self-drawn by the author)

The distance is typically between 1.8 to 4 meters, allowing parents to respond quickly if there is any danger to the children while not disrupting the parent-child interaction. Additionally, shading facilities should be integrated to adapt to changes in the external environment, such as

by placing them on the roof or under large umbrellas, ensuring that parents and children have a place to take shelter during intense sunlight or heavy rain. For families with infants, a designated area for stroller parking should be provided.

For children under 3 years old, the area can be designed with creative mazes, small obstacles, and color recognition activities, closely adjacent to the parent rest area, to enhance their sensory development.

Figure 5-20 Schematic diagram of cognitive area facilities for young children
(Image source: self-drawn by the author)

For preschoolers aged 3-6, the play area can include pipes, small hills, and simple climbing nets, which are easy for children to explore and complete tasks, providing a sense of achievement.

Figure 5-21 Schematic diagram of exploration area facilities for children aged 3-6
(Image source: self-drawn by the author)

For school-age children aged 6-12, who have better physical control, the park's characteristic containers can be used for stacking and transformation, creating more challenging combination play facilities that cater to their adventurous and thrill-seeking nature.

Figure 5-22 Schematic diagram of facilities in the expansion area for ages 6-12
(Image source: self-drawn by the author)

The game square for children should be equipped with fences, barriers, or greenery to clearly define the boundaries and prevent children from running out of the area and getting into danger. The ground should be creatively and safely decorated with materials like elastic plastic, which are slip-resistant and soft, effectively preventing falls and injuries, ensuring the safety of children. Additionally, the ground layout and activity facilities can incorporate the park's theme colors, using bright colors and fun patterns to enhance the appeal of the play area, making it more appealing to children.

5.4.2 **Green space parent-child activity scene creation**

Children are naturally close to nature, and the green space in the park has prominent natural ecological characteristics. It is advisable to give full play to the diverse possibilities of green space, which can be combined with landscape elements, interesting installations and terrain changes, so as to provide a multi-functional composite space for parent-child leisure viewing, nature education and social communication, so that parents and children can get close to nature and promote emotional communication.

Figure 5-23 Schematic diagram of multi-functional green space
(Image source: self-drawn by the author)

An open and sunny lawn can be created to allow children to run, jump, and chase freely. Gathering and playing on the grass with peers can enhance children's social skills. Additionally, a small stage can be constructed using more eco-friendly materials like wood, in conjunction with the flat lawn, to facilitate temporary activities such as family camping, children's performances, and graffiti exhibitions. This helps meet children's needs for self-expression, giving them a sense of achievement and value, and also promotes social interactions among parents and others.

Figure 5-24 Open sunny lawn
(Image source: self-drawn by the author)

The undulating terrain can be used to create dynamic hills, which combine static rest functions with dynamic exploration and sports functions. Combined with colorful fun pipeline amusement facilities, children's curiosity and desire to explore are fully satisfied.

Figure 5-25 Using terrain and facilities to create a hill
(Image source: self-drawn by the author)

Children primarily understand the world through their senses, connecting with a natural environment rich in water, plants, flowers, and natural materials through sight, touch, and smell[70]. This connection to nature encourages exploration and engaging activities[71]. The garden should feature green spaces with distinct seasonal changes, safe and beautiful local vegetation. By combining different types of plants, it can stimulate the 'five senses,' providing a natural environment that is comfortable and pleasant for families, rich in sensory experiences. This helps children grow and better understand the outside world, while also allowing parents to relax in a beautiful natural setting. It is advisable to include some educational signs to enhance children's natural cognitive education.

Figure 5-26 Schematic diagram of "five senses stimulation" of plants
(Image source: self-drawn by the author)

The activity facilities in the green space can adopt more natural and ecological materials,

such as wood, and some park iconic elements can be added to the green space, such as transforming industrial containers with park characteristics into rest and service facilities to enhance the fun industrial experience for parents and children.

Green space has ample space and natural advantages, so it is suitable for temporary activities such as parent-child nature education, such as planting experience, pet party, picking and tasting, and camping in nature. It encourages communication and cooperation between parents and children and between parent-child families, which can enhance the cohesion of parent-child families and help children's decentralized development and improve their social and communication skills.

Figure 5-27 Hosting a camping night talk
(Image source: self-drawn by the author)

5.4.3 **Node space parent-child activity scene creation**

The node space located in the street is to supplement the functions of parent-child games and leisure by adding facilities, devices, small pieces and other elements into the idle and potential space. Based on its different locations, it can be roughly divided into three types: in front of the portal, at the corner of the street and around the industrial relics.

According to the previous investigation of the existing nodes in the park, when selecting the location of the node space in front of the portal and at the corner of the street, the needs of normal passage and interaction of parent-child groups in the adjacent area should be taken into account to ensure the safety of parent-child activities:

1. When selecting or designing the node space in front of the building portal, the spatial facilities should be more than 50cm away from the entrance and exit of the shop, and the adjacent pedestrian space should have a passage width of more than 2 meters to ensure the needs of parents and children to pass by and enter and leave the shop normally.

2. When the node space is set at the corner of the street, the radius of the street corner should be at least 2 meters more than the facility on the basis of the facility. Moreover, the facilities in the street corner space should be placed as close as possible to the building corner and wall to reduce the impact on the passage of parents and children on one side.

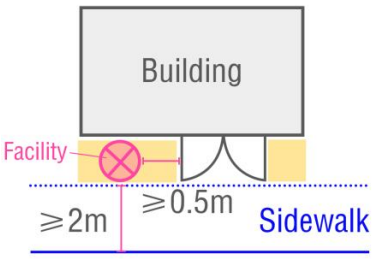


Figure 5-28 Nodes in front of the building portal

(Image source: self-drawn by the author)

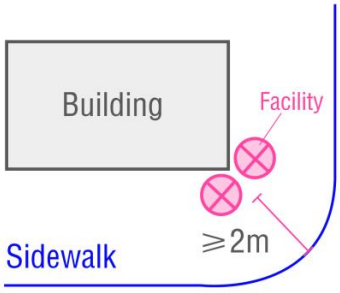


Figure 5-29 Nodes at street corners

(Image source: self-drawn by the author)

When placing parent-child facilities at the center of the selected space, it is possible to combine leisure parking facilities to provide a place for parents and children to stay for a short time, or add mobile, adjustable urban furniture or interactive devices to enhance the interaction between people and scenery, so as to promote cooperation and experience between parents and children.

When creating parent-child node space around industrial relics, it can be combined with parent-child education, leisure, games and other needs. It can also combine parent-child science popularization devices or rest and parking facilities to provide a fun space environment for parents and children to learn and have fun.

5.4.4 Creation of parent-child activity scenes in street space

When creating spaces for parent-child activities in street and alleyways, it is crucial to prioritize the safety of parent-child passage. When there is no physical barrier between the lane and the children's play area, the risk of injuries to children is higher[72]. To mitigate this, pedestrian lanes should be designated and conflicts between the road network and pedestrian

paths should be minimized[73]. It is essential to ensure that the sidewalks remain clear and to balance the needs of pedestrians and vehicles.

5.4.4.1 **A street where people and cars go their separate ways**

The total width of the pedestrian and vehicle-separated roads in the park is ample, allowing for the adjustment of the proportions in different areas to create more space for family activities. The width of the sidewalks should be maintained at over 2.5 meters to accommodate various family combinations and enhance walking comfort. Additionally, safer and smoother paving materials are used, with barrier-free design considerations to meet the needs of parents pushing strollers.

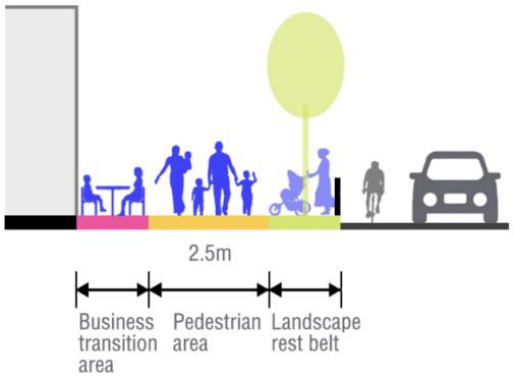


Figure 5-30 Keep a passage distance of 2.5 meters
(Photo credit: self-painted by the author)

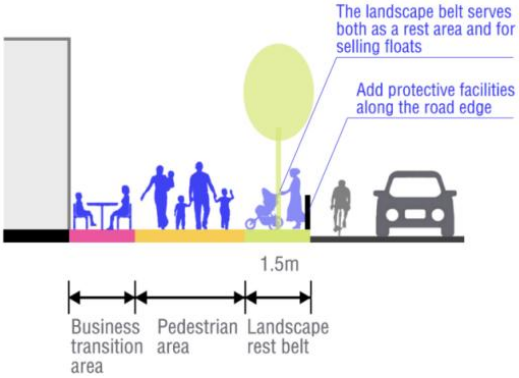


Figure 5-31 Minimum width of landscape belt with rest seats
(Photo credit: self-painted by the author)

The green landscape zone can integrate various functions, such as parent-child games, rest areas, and commercial sales, to meet the diverse needs of family entertainment, leisure, and consumption. Public rest facilities for parents should be added in the landscape zone, considering that families with young children need to park their strollers nearby when using rest seats. The width of the landscape zone with rest facilities should be at least 1.5 meters. In

some areas, the landscape function zone can be expanded by adding parent-child game spaces along the street, which can accommodate spontaneous activities of children on the move. The ground paving can use different colors and patterns from the pedestrian paths to enhance guidance for parents and children. Protective facilities should be installed on the side of the road, which can be combined with industrial creativity promotional boards and knowledge popularization columns, as shown in Figure 5-32, ensuring the safety of parent-child games while also providing educational value.

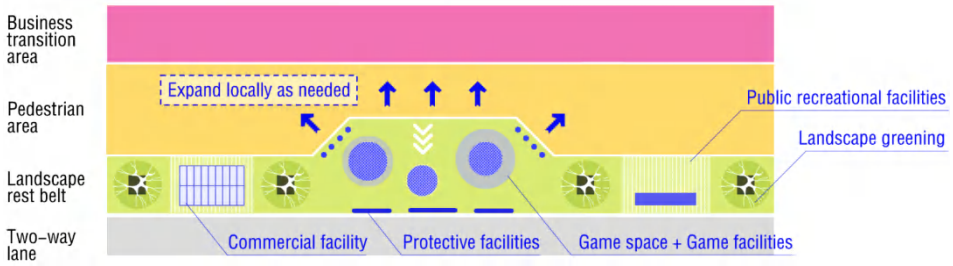


Figure 5-32 Schematic diagram of landscape zone function
(Photo credit: Author's own drawing)

Figure 5-33 Schematic diagram of the scene of the street side playground
(Photo credit: Author's own drawing)

In addition, it is advisable to plant tall evergreen trees with high branching points in the roadside landscape belt, and combine flowering shrubs in some parts to form seasonal changes of plants and improve the richness and pleasantness of the regional environment.

5.4.4.2 **A road where people and cars travel together**

The total width of roads where pedestrians and vehicles share the road is limited. To enhance the convenience for families, consider enhancing the time-sharing use of space. It is advisable to designate pedestrian paths on the ground that are easy for families to navigate,

establishing family-friendly walking zones along the route to improve the continuity and smoothness of family walking within the park, ensuring the safety of family members. Using brightly colored ground markings and engaging directional signs can visually attract children, helping families identify different street environments, creating a colorful and fun walking area, and also reminding nearby vehicles to be more tolerant and courteous to families with children.

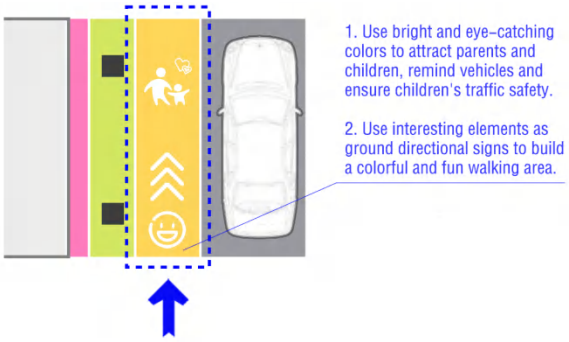
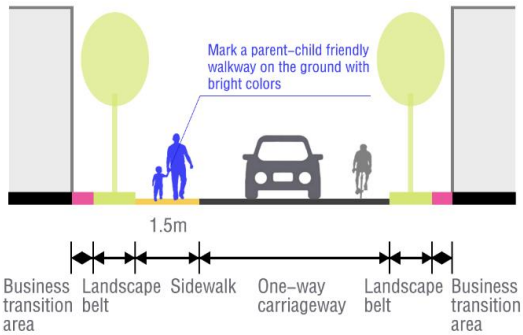


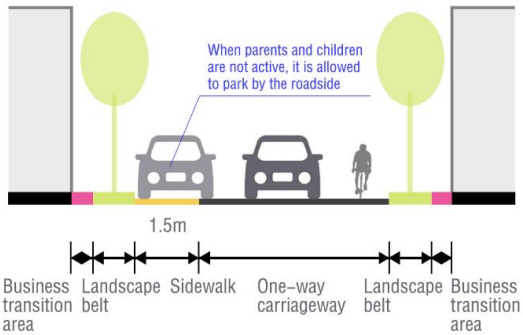
Figure 5-34 Bright and interesting ground signs
(Photo credit: self-painted by the author)

Figure 5-35 Adding parent-friendly walking paths
(Photo credit: self-painted by the author)

Based on the time patterns of family activities and traffic flow in the park, the road functions are adjusted to create time-sharing shared streets, better accommodating and coordinating the needs of pedestrian and vehicular traffic. Family activities tend to be more active after dusk, significantly increasing the demand for street use. At this time, the ground pedestrian paths should be reserved for families to walk and engage in activities. Before 6 PM, the frequency of family use of public spaces is low, so vehicles can temporarily occupy the newly established pedestrian paths for parking during the day, as shown in Figure 5-36.



1) Shared street time-sharing strategy —— evening



2) Shared street time-sharing strategy —— day

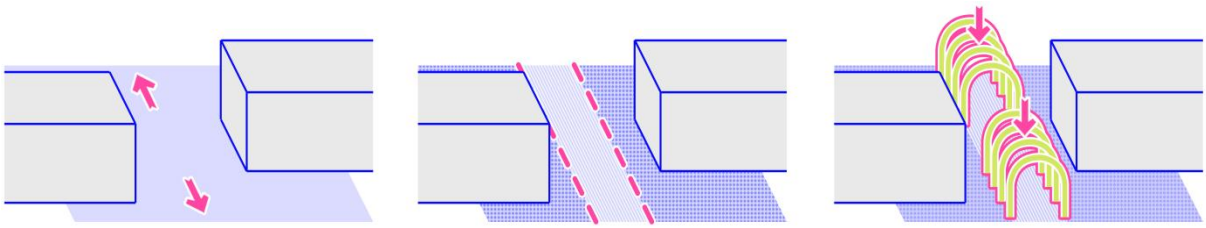
Figure 5-36 Time-sharing strategy for secondary roads
(Photo credit: Author's own drawing)

In addition, it is advisable to plant tall evergreen trees with high branching points in the roadside landscape belt to increase the visibility of green. Create a comfortable and pleasant

walking environment and enhance the experience of parent-child walking.

5.4.4.3 **A path for pedestrians**

The pedestrian path, situated within the park's walking area, offers a high level of spatial safety and is ideal for family activities. Consider adding a linear landscape corridor to provide a fun and relaxing walking experience for families. The corridor can incorporate flexible wall installations, allowing children to freely engage in hands-on activities, thereby gaining satisfaction and a sense of achievement. Additionally, incorporating exhibition boards and educational signs can create more engaging spaces for family visitors, enhancing cultural promotion. See the Figure 5-37 below.



1) Hidden pedestrian paths in the walking area
2) Distinguish and limit road space
3) Add interesting functions by combining green corridors
Figure 5-37 Spatial measures of pedestrian walkway in walking area
(Photo credit: Author's own drawing)

Figure 5-38 Scene effect of pedestrian path combined with green corridor
(Photo credit: Author's own drawing)

5.4.4.4 **Binjiang landscape road**

In order to ensure the accessibility and continuity of parent-child activities, the riverside landscape road area of the park should be connected between the east and west sections to

establish a continuous and smooth riverside belt.

The riverside landscape road, with its public and recreational nature, can be developed into a multifunctional area for family sports, sightseeing, and relaxation by integrating appropriate facilities. Along the riverside running track or in nearby open areas, landscape sculptures or signs related to running can be installed to encourage children to stay active. Children have a natural affinity for water, so rest and viewing platforms can be set up along the riverbank. In these scenic areas, more natural and eco-friendly materials, such as wooden boards, can be used to enhance the space's appeal to children and create a natural atmosphere.

5.4.4.5 **Commercial transition zone**

For the transitional areas of food service establishments, it is advisable to adopt more open commercial outdoor seating options, such as semi-public and flexible seating, to enhance the space's multifunctionality and provide a place for families to rest and relax. For privately-owned commercial outdoor seating, a time-sharing strategy can be implemented, aligning with the regular family activities within the park. During meal times, these seats can serve families dining at commercial establishments, while in other times, they can be used by all family groups for leisure and play, as shown in Figure 5-39.

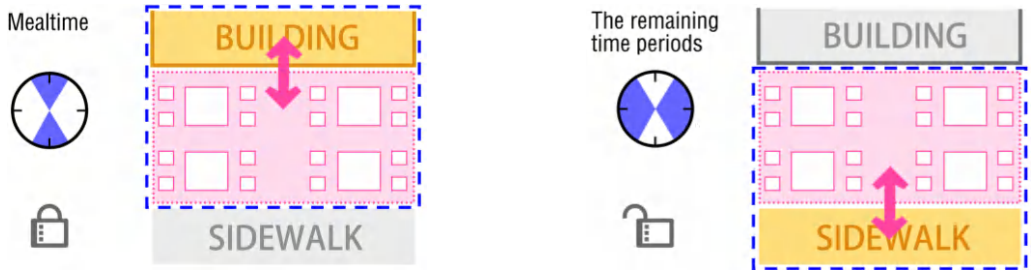


Figure 5-39 Schematic diagram of time-sharing opening of swivel seats
(Photo credit: Author's own drawing)

The commercial areas along the secondary route are primarily non-catering. Outside the shops, transitional zones can be equipped with rest benches or activity facilities for parents and children to play while waiting inside. The partitions and greenery used to separate these areas should be designed with children's sitting heights in mind, typically not exceeding 70cm. Higher barriers can obstruct the view of parents and children and make the space feel cramped and dull. If necessary, vertical partitions that allow some visibility should be used to enhance the fun and comfort of the children's space.

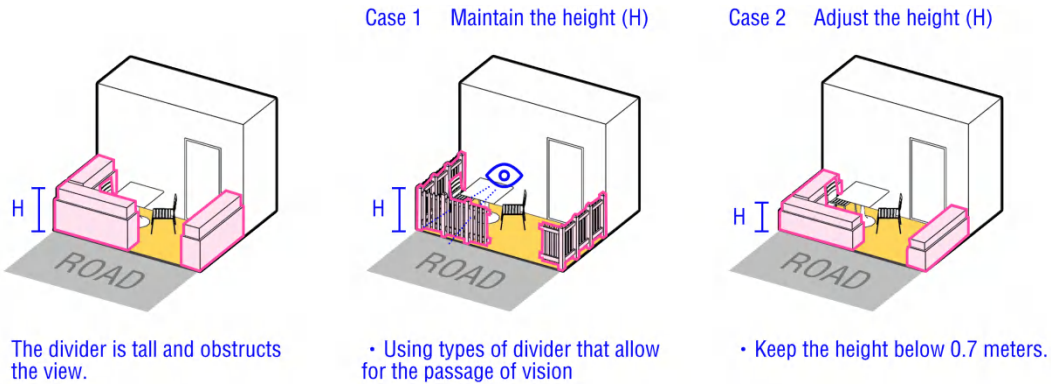


Figure 5-40 Schematic diagram of control of commercial overhang partition
(Photo credit: Author's own drawing)

The combination of commercial transition space and factory buildings in the park is relatively close. The building interface adjacent to the commercial transition area should be kept as transparent as possible to allow the interaction of sight lines.

5.5 Specific design for creating parent-child scenarios in the park

5.5.1 Selection of the design scope

Based on the overall design guidelines for various types of external spaces within Shanghai Smart Bay Park proposed in the previous section, this subsection selects specific space areas within the park and conducts more specific and detailed design practices. In combination with the previous research, public squares and green spaces are the key places for creating the parent-child scenarios in the old industrial park. Therefore, the specific design in this subsection mainly takes these two types of spaces within the park as examples.

Figure 5-41 The main activity routes for parents and children in the park
(Image credit: Author's own drawing)

According to the field research in Chapter 4, it was found that the main activities and routes of parent-child activities in the park include the main street, the horizontal roads connecting it with the two entrances and exits, and the roads along the river. See Figure 5-41. Therefore, it was ultimately decided to select multiple squares and green spaces adjacent to the main flow paths of people to jointly construct the parent-child space network framework within Smart Bay Park.

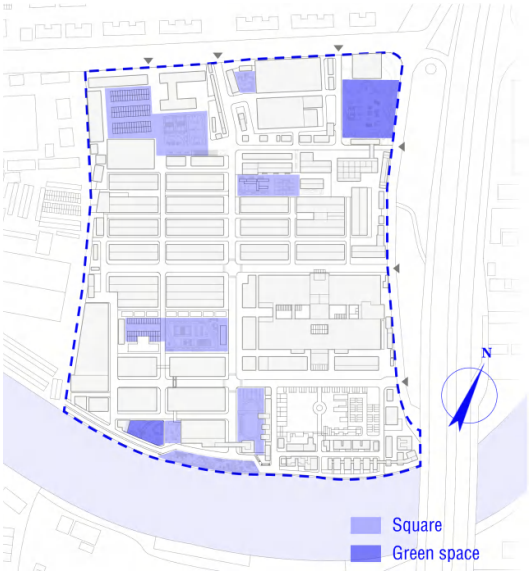


Figure 5-42 The main designed areas that have been selected for construction
(Image credit: Author's own drawing)

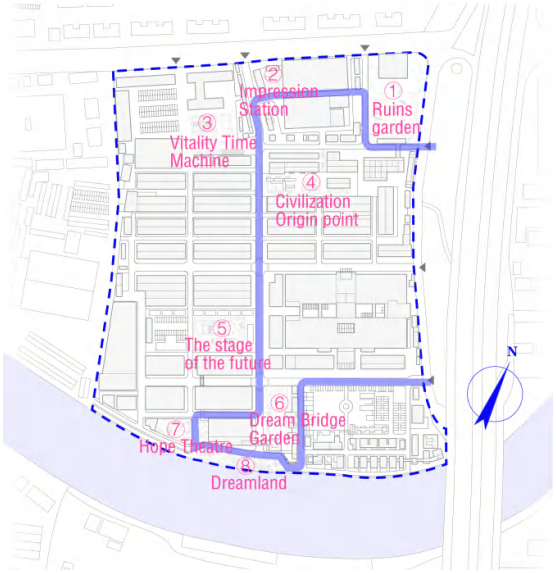


Figure 5-43 Key nodes and flow lines within the garden
(Image credit: Author's own drawing)

The design makes use of the planar spaces such as the square and green areas within the

park to set up a series of key nodes in the thematic storyline, including the Ruins Garden, the Impression Station, the Vitality Time Machine, the Origin of Civilization Point, the Future Stage, the Dream Bridge Garden, the Hope Theatre, and the Fantasy Dream Park. These are combined with the main routes to reasonably organize the family activity routes.

5.5.2 **Spatial Positioning and Theme**

5.5.2.1 **Spatial Function Positioning**

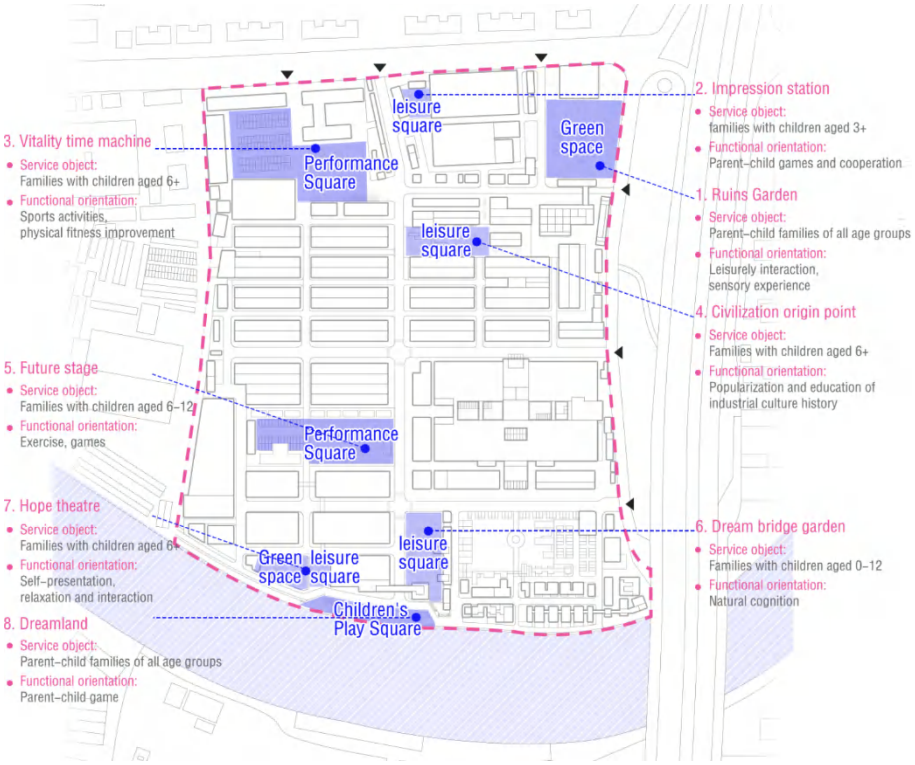


Figure 5-44 Detailed diagram of the spatial function positioning for the design
(Image credit: Author's own drawing)

5.5.2.2 **Parent-Child Space Theme**

A unified family-friendly themed scenario can enhance the overall coherence and atmosphere of the family-friendly spaces within the park, strengthening the family's perception of the space. Generally, the historical culture of the creative park is explored, combined with its creative features and the interests of families to establish an appropriate space theme and scenario story.

Based on the actual situation of the Wisdom Bay Creative Park, considering the former of the Wisdom Bay Park——an industrial storage base filled with containers, as well as its future development direction——a science popularization demonstration area for high-tech (such as 3D technology, AR technology, etc.), it was decided to use the "Time Journey" theme storyline

to connect the family activity areas within the park, telling the story of the little travelers traveling back to the past of the park and then shuttle to the future during their journey.

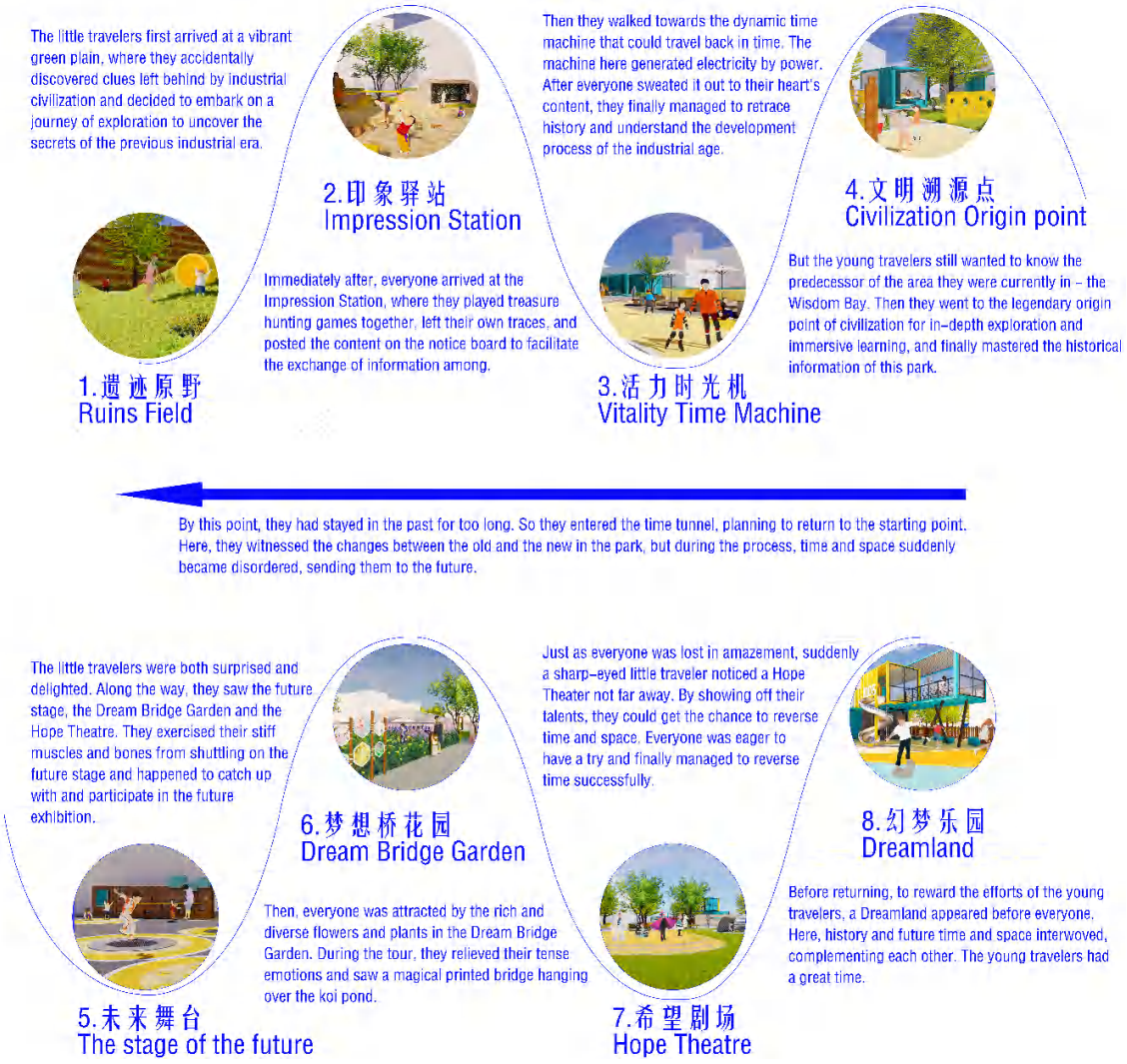


Figure 5-45 Space theme and storyline
(Image credit: Author's own drawing)

The little travelers first arrived at a vibrant green field, accidentally discovering clues left by industrial civilization and deciding to embark on a quest to trace the trail, exploring the secrets of the previous industrial era.

Then they went to the Impression Station, where they played a treasure hunt game together, leaving their marks and posting the content on the notice board to facilitate communication of intelligence among passing time travelers.

Next, they headed towards the dynamic time machine that could transport them to the past. The machines here relied on power generation, and after sweating profusely, they finally succeeded in reverting to history and learned about the development process of the industrial

era.

However, the little travelers still wanted to know the predecessor of their current area - Wisdom Bay. Then they went to the legendary point of tracing the origin of civilization for in-depth exploration and immersive learning, and finally mastered the historical information of this park.

At this point, they had stayed in the past for too long, so they entered the time tunnel and intended to return to the starting point. Here, they saw the new and old changes of the park, but during the process, time suddenly became disordered, and they were sent to the future.

The little travelers were both surprised and delighted. Along the way, they saw the future stage, the Dream Bridge Garden, and the Hope Theater. They stretched their stiff muscles by moving around at the future stage and happened to attend the future exhibition.

Then they were attracted by the rich and diverse flower and plant species in the Dream Bridge Garden. During the tour, they relieved their tense emotions and saw a magical printed bridge on the koi pond.

Just as they were immersed in their amazement, suddenly a sharp-eyed little traveler noticed a Hope Theater not far away. By showcasing their talents, one could obtain the opportunity to reverse time. Everyone was eager to try, and finally, they successfully reversed the time.

Before returning, to reward the efforts of the little travelers, a Dreamland of Illusions appeared in front of them. Here, history and future time spaces intertwined and complemented each other. The little travelers had a great time playing.

5.5.3 **Master plan**

This plan is designed with square and green space types as the main elements, including performance square, leisure square, children's play square, green space, etc. Among them, the locations of the Heritage Field and Hope Theatre are green spaces; the locations of the Impression Station, the Origin of Civilization Point, and the Dream Bridge Garden are leisure squares; the locations of the Vitality Time Machine and the Future Stage are performance squares; and the location of the Dreamland Amusement Park is the children's play square.

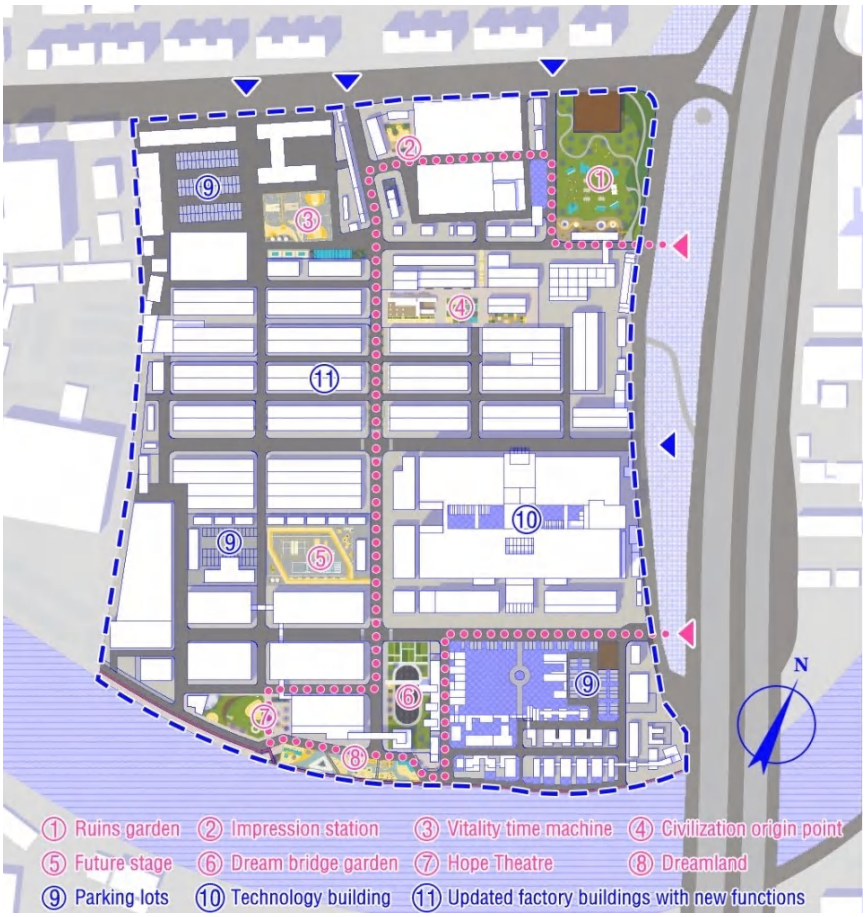


Figure 5-46 Master plan
(Image credit: Author's own drawing)

Figure 5-47 Axonometric drawings of each node within the garden
(Image credit: Author's own drawing)

The following is a brief introduction to the design of each parent-child node in the Wisdom Bay Park:

（1） Ruins Garden

The Ruins Wilderness is located in the northeastern corner of the park, adjacent to two entrances. It was originally a large undeveloped green space. In the design, it was positioned for use by parents and children of all ages, with the main function being an activity venue for parents and children to relax and interact, as well as to enhance sensory experiences. Currently, the site consists of four main areas: climbing mountains, lawn parties, forest leisure, and sensory walking trails.

Figure 5-48 plan of Ruins Garden
(Image credit: Author's own drawing)

In “Tramp over hill and dale” area, considering the ecological characteristics of the green space, micro-topography design is carried out, forming small hills that are combined with activity pipelines, providing a space for curious parents and children to freely run and jointly explore;

The grassy hill party area is created by combining a large area of flat grass with facilities renovated from containers, providing a space for parents and children to have collective gatherings and participate in activities. Here, various natural-related parent-child activities are often held, such as outdoor camping, planting and picking experiences, pet gatherings, creative farm owners, etc. The brightly colored containers, after renovation, become facilities for parent-child activities, adding fun and industrial cultural atmosphere to the space. It mainly provides

support for parent-child activities in the space, and its functions can be changed according to the needs of different activities held in the venue, such as commercial sales, rest areas, discussion zones, etc.

The shaded recreation area connects a series of rest and communication spaces with shelter facilities through bright ground color bands. These spaces vary in size and can be flexibly chosen by parents and children according to their social interaction needs, such as small spaces are suitable for interaction between parents and children, providing a larger space for social interaction among parent-child families.

The sensory walking path area creates a space that can provide rich experiences for parents and children by combining various types of landscape plants. Parents can obtain sensory experiences of the five senses here, relax their bodies and minds, and help children's perception grow, as well as strengthening parent-child natural education.

（2） Impression Station

The Impression Station is located on the north side of the park, adjacent to the north entrance. Originally, it was an introverted leisure square that had occupied space due to the outdoor seating of surrounding shops. In the design, it was positioned to mainly serve the parent-child group with children aged 3-12, and its main function was to be an activity venue for promoting parent-child cooperation. Currently, the site includes two main areas: treasure hunt in the sandbox and drawing the first impression.

Figure 5-49 Plan of Impression Station
(Image credit: Author's own drawing)

The treasure hunt area is composed of a large sand pit combined with a raised tree-side rest and care area along the street. The sand pit is equipped with various facilities for parents and children to rest and play, allowing both parents and children to participate in the activities of the space. The ground of the tree-side rest area has been raised locally, which not only ensures that parents who rest and care here have a wider view and can better watch over the children playing, but also serves as a boundary and barrier to prevent children from running out of the sand pit area due to excessive focus on the game, thus avoiding danger.

The initial impression area is formed by a curvilinear composite activity facility to enclose a fun space for parents and children to draw and cooperate. The facilities ingeniously connect and integrate the green landscape with the tabletop used for activities, enhancing the interesting variations of the space and increasing its aesthetic appeal. Two sizes of movable seats have been adopted to facilitate flexible adjustment according to the needs during parent-child activities, increasing the freedom of space use. Within the area, a display board is set up for posting and exhibiting the results of the cooperation between parents and children, which is beneficial for children to gain a sense of achievement.

（3） Vitality Time Machine

The "Vitality Time Machine" is located in the northwest corner of the park, close to the north entrance. Originally, it was an area with low space utilization. During weekend evenings, it would host a commercial event called "Car Trunk Market". On weekdays, it was merely used as a parking lot and a performance square. In the design, it is positioned as a main venue serving families with children aged 6 and above, with the main functions being sports activities for parents and children and quality development programs. Currently, the site consists of two main areas: the 6+ sports field and the industrial exhibition hall. From 18:00 on weekdays, the site is used as a parking lot, while from 18:00 on weekdays, on weekends and during holidays, it is used as an activity venue for sports activities.

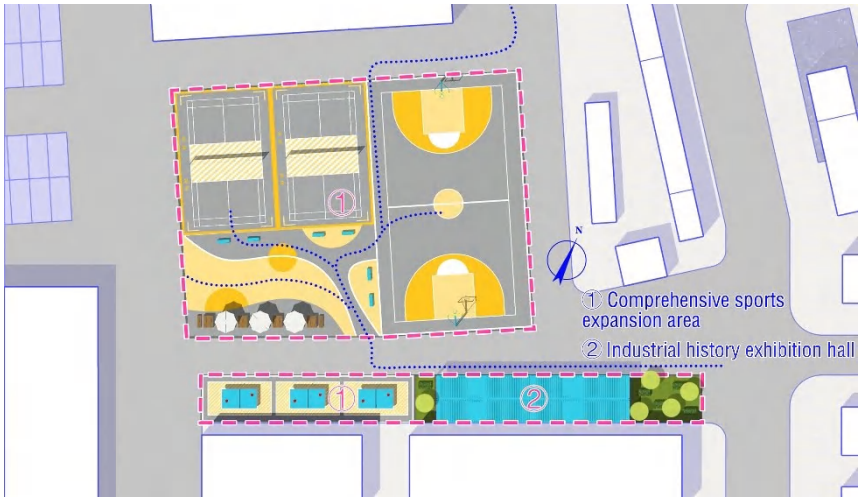


Figure 5- 50 Plan of Vitality Time Machine
(Image credit: Author's own drawing)

The 6+ Sports Field Area includes basketball courts, badminton courts, table tennis courts, roller skating areas and rest areas. The rest and care areas for each court are all set adjacent to the courts, using non-fixed rest facilities, which facilitate the transformation of functions during the time-sharing use of the courts. The Industrial exhibition hall is transformed and utilized from multiple containers. The interior showcases the domestic industrialization process, helping parents and children understand industrial culture and enhancing educational and scientific popularization.

（4） Civilization Origin Point

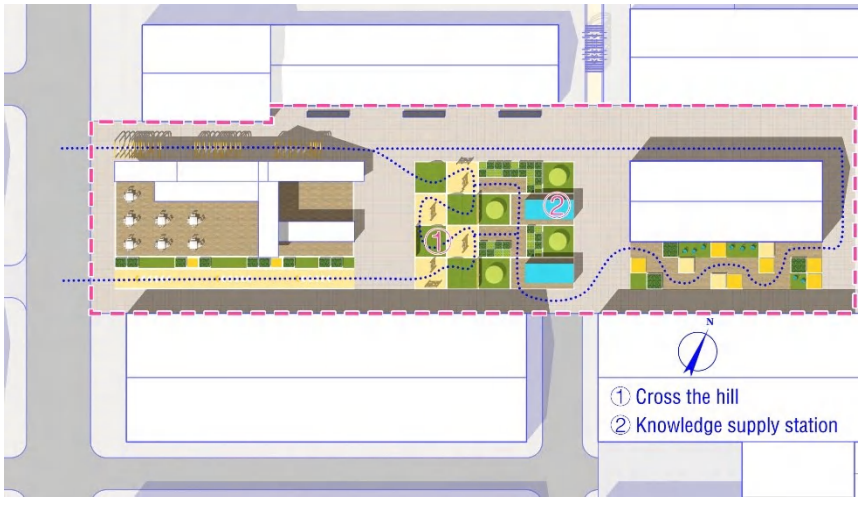


Figure 5-51 Plan of Civilization Origin Point
(Image credit: Author's own drawing)

The origin point of civilization is located in the northern part of the park. Originally, it was a large inward-oriented leisure square with Starbucks commercial facilities and a 3-story factory

commercial building, mainly engaged in family-related business. In the design, it was positioned as a service area for families with children over 6 years old, with the main functions being scientific popularization education and family leisure activities. The current site includes two main areas: “cross the hill” and the knowledge supply station.

“Cross the hill” area, a fun and undulating wave-shaped green landscape terrain design is combined with science exhibition boards in the yellow square area, providing a space for parents and children to learn through play and have fun; The knowledge supply station area is created by using industrial containers from the park to form small learning spaces. Combined with diverse landscape plants, it provides a quiet, comfortable and relatively independent educational environment for parents and children. In the container spaces, tables, chairs and books are provided to facilitate parents and children to understand the history of the park as an industrial storage base.

（5） Future Stage

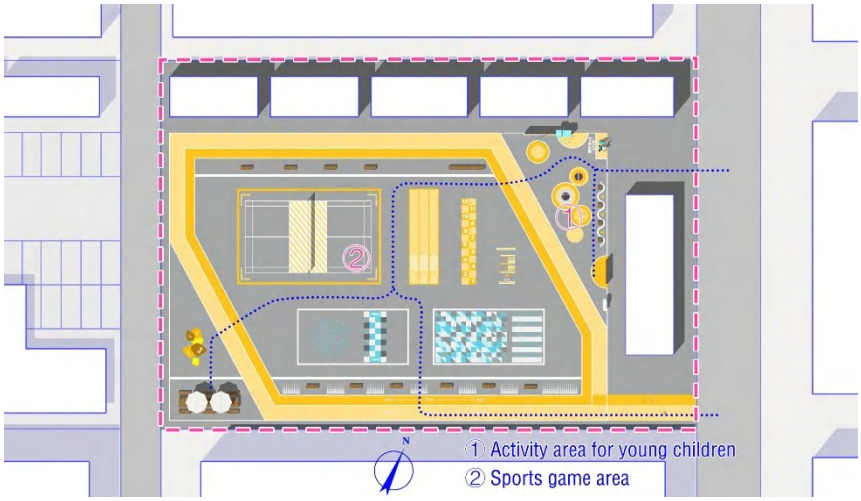


Figure 5-52 Plan of Future Stage
(Image credit: Author's own drawing)

The Future Stage is located in the southern part of the central area of the park. Originally, it was a performance square. On special occasions, performances are held there. Usually, it serves as a parking lot. In the design, it is positioned mainly for families with children aged 0-12, and its main function is an activity venue for parent-child sports and games. Currently, the site includes two main areas: a sports area for children aged 3-12 and an activity area for children aged 0-3. When there are no special activities in the venue, it is used as a parking lot

before 6 p.m. on weekdays, and it is used as a sports activity venue from 6 p.m. on weekdays, weekends, and holidays throughout the day.

The sports game area is divided into different activity zones by color blocks on the ground. Besides the usual sports venues, it also includes circular running tracks and bicycle lanes, which are convenient for younger children to ride small-wheel bikes and learn to ride bicycles. Care seats have been added near the activity areas to ensure that parents can protect their children promptly during the activities. At the same time, a larger area for parent-child games has been set up on one side of the field. In the activity area for children aged 0-3, there are facilities such as areas for parking baby strollers, toddler walking walls, and children's cognitive walls. Since children lack independent behavioral abilities, parent-child interaction is led by parents. Therefore, this area has many facilities to provide convenience for parents, allowing them to interact and contact with their children closely and promoting the parent-child relationship.

（6） Dream Bridge Garden

The Dream Bridge Garden is located on the south side of the park. Originally, it was a simple and outward-oriented recreational square with a single function. In the design, it was positioned as mainly targeting the 0-12 year old parent-child group, with the main function being an activity venue for promoting natural cognition and relaxation among parents and children. The overall site is dominated by landscapes and green plants. Currently, it includes two main areas: the Cognitive Garden and the Goldfish Pond.

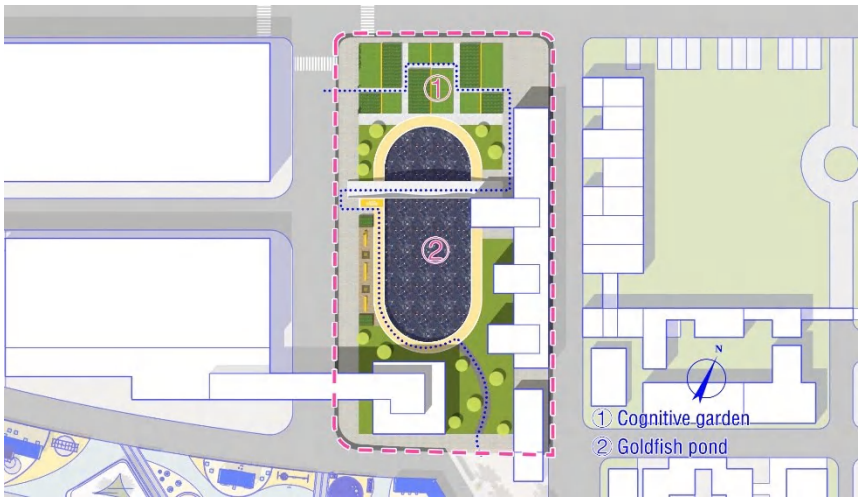


Figure 5-53 Plan of Dream Bridge Garden
(Image credit: Author's own drawing)

In the cognitive garden area, a large number of local plants are concentratedly planted. Combined with natural science education devices, it provides a space for enhancing parent-child natural cognition education. On the goldfish pond, a bridge printed using 3D technology is erected. During actual research, it was found that the fish pond is very attractive to parent-child families with young children. Therefore, some parking spaces for baby strollers are set up beside the fish pond, and at the nearby area, some wooden flooring is used for distinction, and some landscape seats that can be shared by parents and children are set up, making it convenient for parent-child families to relax and enjoy the scenery here.

（7） Hope Theatre

The Hope Theatre is located on the southwest side of the park, not far from the river. Originally, this area was a leisure square and a landscape green space. In the design, it was positioned as mainly targeting children and their parents aged over 6 years old, with the main function being an activity venue for children's self-expression and parent-child relaxation and interaction. Currently, the site includes two main areas: the forest play area and the leisure grass slope.

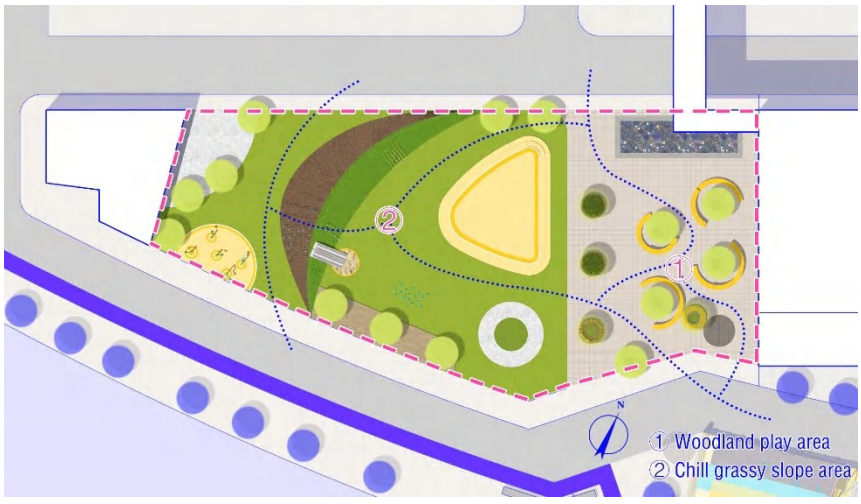


Figure 5-54 Plan of Hope Theatre
(Image credit: Author's own drawing)

The play area in the forest uses the existing tree formations in the site, combined with colorful and functionally multi-purpose recreational and game facilities, to form a shaded area beneath the trees where parents and children can play and interact. The facilities, through their own shapes, semi-enclose a rich area for activities. Children can play together here, parents can

look after their children here, interact with their children, or communicate and chat with other parents of children. The leisure grass slope area creates a space where children can showcase themselves and hold small parent-child cooperative activities. This is beneficial for enhancing children's self-confidence, strengthening the collaboration skills between parents and children. Combined with the height difference of the grass slope, children's climbing facilities and slides are also added. A functional, multi-purpose leisure, display and game area is created. On the south side of the site, a small house made by 3D printing is combined with some activity facilities on the grass, such as plum blossom stilts and sound tubes. On the side of the road not far from the activity area, a parent supervision area is set up.

（8） Dreamland

The Dreamland Amusement Park is located on the south side of the park by the river. Originally, this area was a children's activity venue. In the design, it is positioned as a parent-child game activity venue for children of all ages. Currently, the site mainly consists of four areas: age-specific game activity zones for children aged 0-3, 3-6, and 6-12, as well as a parent care and relaxation area.

Figure 5-55 Plan of Dreamland
(Image credit: Author's own drawing)

For the area for children aged 0-3, a pavilion for parents to rest has been set up using containers, making it convenient for parents to closely supervise the children. For the area for preschool children aged 3-6, a moderately challenging children's activity facility has been created using containers, and various facilities are provided for selection. For the area for

school-aged children aged 6-12, the facilities created using containers have a higher difficulty level, suitable for older children who enjoy exploration and have good body control. The parent care area is located between the two activity areas, facilitating parents' supervision of their children. At the same time, a sunshade roof is set up, making it more convenient for parents to rest and chat here.

Conclusions and outlook

The renewal of public spaces in existing industrial parks is a requirement for the high-quality development of cities and the improvement of urban spatial quality. This study begins by identifying the insufficient attention to public spaces in the current renewal of old industrial spaces. The external spaces of the parks are often highly homogeneous, lack vitality, and have a single function, failing to fully realize the value of public spaces and causing a significant waste of spatial resources. This phenomenon prompts reflection on the development of urban assets. Combining the current growing attention and demand for parent-child interaction and parent-child spaces, the possibility of combining parent-child interaction scenarios with the renewal of existing industrial parks is considered. This not only provides a differentiated renewal idea for the renovation of industrial park spaces but also offers a possibility for higher-quality parent-child interaction in different types of venues, realizing the value of public spaces.

This study takes the creation of parent-child interaction scenarios as the starting point and investigates the renewal of public spaces in old industrial parks. Firstly, it clarifies the basic conditions required for creating parent-child activity scenarios in old industrial parks, which is the prerequisite for the subsequent research. Secondly, it systematically explores how parent-child scenarios can be combined with the renewal of industrial park spaces. 1. This part systematically collects and summarizes the relevant content related to parent-child space creation, including the classification and summary of the characteristics of parent-child subjects and types of parent-child interaction; studies the theories related to parent-child space creation; and summarizes the common design concerns and measures for general parent-child space creation. This part mainly masters the relatively general strategies for creating parent-child spaces. 2. It studies the development process and common current problems of public spaces in old industrial parks, clarifying the positive significance of creating parent-child scenarios in old industrial spaces for both the park space and the parent-child group. Then, based on the analysis of actual cases of creating parent-child scenarios in old industrial spaces, it summarizes and concludes the differences in creating parent-child scenarios in old industrial park spaces and general urban spaces, and accordingly proposes supplementary strategies and operational steps

for creating parent-child scenarios in old industrial spaces. This part of the research further supplements the strategies for creating parent-child spaces in old industrial spaces and clarifies two points: There are differences in the compatibility between various types of spaces within the park and the creation of parent-child scenarios. Moreover, depending on their own characteristics, each space is suitable for creating different types of scenarios. Subsequently, Shanghai Wisdom Bay Creative Park was selected for on-site research using questionnaire survey and behavior observation methods, obtaining real first-hand data on the park's environment, parent-child needs, and parent-child behavior activities, preparing for the specific design practice in the subsequent chapters. Finally, taking Shanghai Wisdom Bay Creative Park as an example, the strategies and methods for creating parent-child scenarios in old industrial spaces derived from the previous research were practiced to verify their operability.

The main research results of this study include:

(1) It explores the feasibility of combining parent-child interaction perspectives with the renewal of old industrial park renovations, clarifying that not all old industrial park spaces are suitable for the activation method of combining with parent-child activities, and clarifying the basic conditions required for specific types of existing industrial parks: 1. Good surrounding transportation conditions and high density of parent-child groups; 2. A gap in parent-child outdoor spaces in the surrounding area; 3. Abundant external space resources in the park. And it considers how the park can continue to develop and maintain its attraction to parents and children in the long term, through: 1. Creating a comprehensive experience and entertainment model, introducing parent-child-related service businesses to attract surrounding parent-child families; 2. Introducing parent-child tourism products, conducting creative marketing planning and comprehensive channel promotion to attract parents and children to visit. It is also pointed out that not all spaces within the park are suitable for creating interactive scenarios for parents and children, and this needs to be considered in conjunction with safety and the main functions they are intended to fulfill. Moreover,

(2) Strategies and methods for creating interactive scenarios for parents and children in combination with old industrial spaces were explored, including general methods for creating

parent-child spaces and special strategies for old industrial spaces. Firstly, the relevant content related to creating parent-child spaces was systematically summarized and organized. In terms of the characteristics of the parent-child subjects, the physical and mental characteristics, psychological characteristics, and behavioral characteristics of parents and children were summarized; in terms of the types of parent-child interactions, the interaction behaviors between parents and children and the interaction behaviors occurring within the parent-child family were sorted out, and classified into four types: parent-child exercise, leisure, games, and cooperation; the theories related to creating parent-child spaces were sorted out, including the behavior demand theory, environmental behavior theory, and behavior scene theory; the strategies for creating parent-child spaces were summarized.

(2) The physical, mental, and behavioral characteristics of parents and children and the types of parent-child interaction activities were systematically summarized and analyzed, and the differentiated spatial demands of different subjects and different types of activities were discussed. Based on the accumulation of case experiences of parent-child interaction and industrial space renewal at home and abroad, four aspects were proposed to address spatial issues from the perspective of parent-child interaction for the external space renovation of old industrial parks: adding site functions, optimizing the spatial environment, improving spatial facilities, and enhancing activity planning. This provides a relatively positive supplement to the theory and strategies for the renewal of external public spaces in old industrial parks.

(3) A field investigation was conducted on the old renovation park of Shanghai Wisdom Bay, obtaining real data on the park's spatial environment, the needs for parent-child interaction within the park, and the parent-child behavior activities. Space problems were summarized and the potential for parent-child design in different types of spaces within the park and the types of parent-child activities that are more suitable for supporting them based on their own characteristics were evaluated. In the practical part, detailed suggestions for creating parent-child scenarios were proposed based on the survey results for the types of spaces within the Shanghai Baoshan Wisdom Bay park, and a more specific and intuitive design plan was completed for a certain area, which has certain reference and guidance significance for the

creation of outdoor parent-child interaction spaces in similar parks in the future.

Due to the limitations of my own cognitive ability and research level, there are still many deficiencies in the research that need to be improved in the subsequent work.

(1) This article summarizes the common strategies for creating parent-child scenarios, and supplements the strategies for creating such scenarios based on the characteristics of industrial parks. However, the content and depth of these strategies need to be further refined.

(2) Comparatively, this article pays more attention to the renewal at the physical space level. The research on parent-child-related planning and improvement of parent-child services is not deep enough. The updated and optimized content based on the perspective of parent-child interaction needs to be supplemented and improved.

Reference

[1] 韩晗，孙崇辕．2023 年度中国工业遗产研究学术报告[J]．文化软实力研究，2024，9（02）：111-125．

[2] Warner, E., & Andrews, F. J. (2019). “Surface acquaintances”: Parents’ experiences of social connectedness and social capital in Australian high-rise developments. Health & Place, 58.

[3] 高峰.基于使用者满意度的工业遗产类创意产业园景观优化设计研究[D].石家庄铁道大学,2023.

[4] 王颖异.上海创意产业园公共空间的适应性研究[D].江南大学,2014.

[5] 宋春联.初中生亲子冲突问题的干预研究[D].西南大学,2010.

[6] 邹萍.父母共同养育行为及其对小学生人格发展的影响[D].辽宁师范大学,2007.

[7] 王一茜.基于行为心理学的户外亲子互动空间设计研究[D].南京林业大学,2018.

[8] 黄云.谈谈如何建立良好的亲子互动关系[J].中国科教创新导刊,2009,(30):227.

[9] 马德峰.亲子互动的现状及问题[J].社会,2003,(07):45-46.

[10] 张景.居住区亲子互动空间及其优化设计对策研究——以宁德市为例[J].宁德师范学院学报(哲学社会科学版),2015,(04):26-30.

[11] 孔令鹤.住区“亲”“子”互动空间景观设计研究[D].重庆大,2021.

[12] 徐盈婷.景象空间营建理念在儿童活动场所设计中的运用[D].江南大学,2014.

[13] 李博.儿童游戏空间趣味性景观研究[D].东北林业大学,2013.

[14] 林玉莲,胡正凡.环境心理学[M].北京:中国建筑工业出版社,2000:221.

[15] 李娟. 基于环境心理的历史街区外部空间适应性更新研究[D]. 重庆: 重庆大学, 2011: 54-5.

[16] 任重.浅析发展心理学在学前教育和中小学教育中的应用[J].成功(教育),2011,(12):248.

[17] 李博文.亲子体育的父母参与研究[D].上海体育大学,2024.

[18] 扬.盖尔.交往与空间.[M]:何人可译北京:中国建筑工业出版社 2002.

[19] (美)弗罗斯特，(美)沃瑟姆，(美)赖费尔著.游戏与儿童发展 原书第 4 版[M].北京: 机械工业出版社.2015.

[20]亚历山大.加文，盖尔.贝伦斯等著.城市公园与开放空间规划设计[M].中国建筑工业出版社，2007.

[21]克莱尔库博.马库斯，卡罗琳.费朗西丝.人性场所-城市开放空间设计导则[M]:第 2 版.俞孔坚，孙鹏等译.北京:中国建筑工业出版社,2008.

[22]叶家兴.基于亲子互动行为的儿童阅览空间设计研究[J].城市建筑,2021,18(24):115-117+174.

[23]洪慧敏.基于儿童心理的城郊亲子民宿设计研究[D].兰州理工大学,2022

[24]方雯,周韦玮.体验式亲子餐饮空间室内设计策略研究[J].美与时代(上),2023,(01):115-118.

[25]李希博.户外景观环境中亲子互动空间设计研究[D].西南交通大学,2014.

[26]徐梦雪. 城市居住区中趣味亲子互动空间设计研究[D].燕山大学,2017.

[27]孙宇萱,罗正理.基于儿童情感需求的居住区亲子互动空间设计研究[J].居舍,2021,(30):30-31.

[28]江皓冉.基于儿童绘画测试的城市公园亲子互动空间设计研究[D].四川农业大学,2022.

[29]张瑛,沈林明.关怀童心——亲子互动空间设计必要性分析[J].理论研究,2016(13):52-53.

[30]黄奇琳. 住宅社区环境的亲子情景空间设计研究[D]. 华中科技大学,2010.

[31]段丽. 儿童公园中亲子互动空间设计研究[D]. 燕山大学,2016.

[32]许晓东,任轩.旧工业厂区再利用及其外部空间营造初探[J].山西建筑,2007,(11):41-42.

[33]张苏敏.旧工业区外部空间改造的活力要素浅析——以深圳为例[J].中外建筑,2015,(09):69-71.

[34]邹宇翔.工业遗产改造中的开放空间营造——以景德镇艺术瓷厂改造项目为例[J].建筑与文化,2020,(01):113-115.

[35]程伟.存量开发导向下工业遗产外部空间改造价值评定研究[D].北京建筑大学,2020.

[36]昕璐,江海涛.工业遗产改造中的开放空间设计[J].城市建筑,2020,17(18):56-57.

[37]聂传恩,陈亚斌,刘文波.工业园区更新中的公共空间品质提升策略——以杭州市滨江区智造供给小镇为例[J].未来城市设计与运营,2024,(09):54-58.

[38]邹佰林.城市工业园区公共空间的设计策略探索——以《寻·谧》为例[J].艺术市场,2025,(02):110-111.

[39]王栋,盛世佳,秦苏东.基于步行适宜性的工业遗产开放空间活化策略研究——以徐州创意 68 产业园为例[J].城市建筑,2025,22(10):105-108.

[40]苏佳.后工业园区公共空间景观重塑设计方法研究[D].长安大学,2015.

[41]吴晗.面向亲子研学基地的工业遗产建筑设计研究[D].南京工业大学,2023.

[42]曹盼宫,吴兴宇.工业遗产再利用背景下的城市亲子互动空间设计研究[J].智能建筑与智慧城市,2024,(02):56-59.

[43]王燕青.基于行为需求的城市商业街公共空间设计研究[D].长安大学,2014.

[44]张玉莹.基于环境行为学的体育公园景观设计[D].河南科技大学,2023.

[45]李道增. 环境行为学概论[M]. 北京: 清华大学出版社, 1999: 1-60.

[46]林玉莲, 胡正凡. 环境心理学[M]. 北京: 中国建筑工业出版社. 2000: 1-20.

[47]孙宏生, 苏钠. 环境行为学视角下的城市公共空间设计研究——以西安环城公园为例[J].华中建筑, 2015, (3): 75-79.

[48]田瑶,肖景方.浅析行为场所理论在城市设计中的应用[J].门窗,2014(11):339

[49]Kaplan S, Talbot JF. Psychological benefits of a wilderness experi ence[M]//Altman I, Wohlwill JF, Eds. Human behavior and environment: Advances in theory and research: Behavior and the natural environment. New York: Plenum Press,1983:163—203.

[50]臧玉玲,姜小娣.儿童心理行为问题的分析[J].江苏大学学报(医学版),2003,(04):91-93

[51]Ozgece, N., & Edgü, E. (2015). Exploring children's perceptions and experiences of outdoor spaces.

[52]Van Truong, M., Nakabayashi, M., & Hosaka, T. (2022). How to encourage parents to let children play in nature: Factors affecting parental perception of children's nature play. Urban Forestry & Urban Greening, 69, Article 127497.

[53]曹永康.沈阳市社区儿童户外活动空间友好性评价及优化研究[D].沈阳建筑大学,2024.

[54]张文新.儿童社会性发展[M]. 北京师范大学出版社,1999:132.

[55]Elshater, A. (2018). What can the urban designer do for children? Normative principles of

child–friendly communities for responsive third places. Journal of Urban Design, 23(3), 432–455.

[56] 刘宇.基于自然教育理念的南京老山森林公园儿童活动区景观设计研究[D].南京林业大学,2024.

[57] 张爱萍. 创意产业园的公共空间设计研究[D]. 同济大学, 2008.

[58] Piaget j. Play, Dreams, and Imitation in Childhood[M]. New York : Norton, 2012: 38-45.

[59] 曹鸣谦.基于行为需求的长沙地区城市商业综合体公共空间优化研究[D].湖南科技大学,2023.

[60] 曾越.上海市宝山旧工业区空间功能转型与更新研究[D].苏州科技大学,2023.

[61] 周咏馨,李胄宁,黄国华等.国土空间规划视角下低效工业用地更新意愿研究——以苏南地区为例[J].城市发展研究,2022,29(03):22-27.

[62] 曹文利.基于环境行为学的邯郸工业遗存型创意园区公共空间营造策略研究[D].河北工程大学,2023.

[63] 邓兴梅.基于游客行为的重庆市主城区创意产业园公共空间设计研究[D].西南大学,2020.

[64] 瞿莹.基于多感官体验理念的亲子互动空间设计研究[D].东南大学,2022.

[65] 周达.观光农业园儿童活动场地设计研究[D].湖南农业大学,2019.

[66] 董晶.基于心理学导入:论南昌市儿童公园的体验设计[D].江西:江西师范大学,2012.

[67] 欧阳艳.城市公园绿地中儿童游戏场地设计研究[D].中南林业科技大学,2008.

[68] Loo, B. P., & Fan, Z. (2023). Social interaction in public space: Spatial edges, moveable furniture, and visual landmarks. Environment and Planning B: Urban Analytics and City Science. , Article 239980832311605.

[69] Rorabaugh, S. (2019). Flexible futures: Children's agency on the adventure playground. Cities & Health, 3(1–2), 111–126.

[70] Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. People and Nature, 2(3), 619–642.

[71]（Sadafi, N., & Azhdari, L. (2020). Investigating the impact of nature in designing cultural

environments for children. International Journal of Engineering and Management Sciences, 5(1), 244–256.）

[72] Hsiao, K., Newbury, C., Bartlett, N., Dansey, R., Morreau, P., & Hamill, J. K. (2009).Paediatric driveway run-over injuries: Time to redesign? The New Zealand Medical Journal, 122(1298), 17–24.

[73] Mouratidis, K. (2021). Urban planning and quality of life: A review of pathways linking the built environment to subjective well-being. Cities, 115(April).

Appendix

智慧湾工业旧改创意园外部公共空间调研

您好！我正在进行创意产业园外部空间的调查，想要了解亲子群体对空间的需求和现状评价。非常感谢您的理解，希望您配合完成以下问卷，您的回答对研究非常重要！

*所有问卷数据仅用作研究使用，资料保密，不予公开，请您放心作答。

一. 亲子互动概况

1. 您的孩子一般和谁的互动多一些？（单选）

A. 爸爸　　B. 妈妈　　C. 独自玩耍　　D. 其他小伙伴

2. 您的孩子在创意园里会与其他孩子一起玩吗？（单选）

A. 经常　　B. 有时　　C. 很偶尔　　D. 完全不

3. 您和孩子在创意园中停留、活动的总时长大概有？（单选）

A. 半小时以下　　B. 0.5-1 小时　　C. 1-2 小时　　D. 2-4 小时　　E. 4 小时以上

4. 您和孩子在创意园外部空间中停留、活动的时间大概有？（单选）

A. 半小时以下　　B. 0.5-1 小时　　C. 1-2 小时　　D. 2-4 小时　　E. 4 小时以上

5. 您与孩子来创意园亲子活动的目的是？（最多可选 3 项）

A. 感受工业/创意氛围（拍照、观光、游览等）　　B. 学习相关知识（接受科普、体验等）

C. 体育锻炼（自行车、滑板、滑轮等）　　D. 休闲放松（休憩、散步、交谈等）

E. 游戏娱乐（追逐打闹，嬉戏玩乐）

6. 您和孩子来创意园，除了亲子互动需求外，还有自己个人的期望吗?（可多选）

A. 有，期待与家人朋友或其他家长互动交流

B. 有，想学习和了解创意、文化相关的内容

C. 有，希望可以休憩放空一下，舒缓心情

D. 无，一切以孩子为主，无个人需求和期望

二. 亲子互动空间需求

1. 您认为创意园外部空间需要结合亲子需求设计吗？应该根据谁的需求设计?（单选）

A. 需要，只考虑儿童使用　　B. 需要，以儿童为主，兼顾家长需求

C. 需要，平等考量儿童和家长需求　　D. 需要，以家长需求为主

E. 需要，只考虑家长需求　　F. 不需要

2. 您与孩子希望与其他亲子家庭一起交流交往吗？（单选）

A. 非常希望　　B. 比较希望　　C. 一般　　D. 不太希望　　E. 非常不希望

3. 您和孩子在创意园区外部空间中倾向于什么样的互动行为？（最多选择 5 项）

A. 追逐打闹，嬉戏玩乐　　B. 自然教育类（认知植物）　　C. 运动锻炼类（自行车、轮滑）

D. 体育竞技（打球）　　E. 冒险类（攀爬）　　F. 观光游览类（拍照、漫步）

G. 研学合作类（学习知识，参加活动等）　　H. 休闲放松类（休憩，交谈，展示）

I. 群体活动类（社交，交友）

4. 您和孩子在创意园外部空间活动时，注重空间的哪些特性？（最多选择 5 项）

A. 场所是安全与可达的　　B. 多选择的儿童游憩设施　　C. 良好的景观环境

D. 丰富的感官体验（色彩、材质）　　E. 兼顾家长多样需求的　　F. 宜人的使用尺度

G. 有文化科普、研学内容的　　H. 浓厚的创意文化氛围　　I. 完善的服务设施

J. 全龄儿童可参与（考虑到不同年龄儿童）

三. 亲子互动空间现状

1. 您一般何时与孩子来创意园？（请圈出时段）

周内：上午 / 中午（午饭点） / 下午 / 傍晚（晚饭点） / 晚上

周末：上午 / 中午（午饭点） / 下午 / 傍晚（晚饭点） / 晚上

2. 您和孩子通常会在创意园的哪些外部场地中进行亲子互动？（可多选）

A. 展演的硬质广场　　B. 休憩区域（商业外摆，座椅）　　C. 开放草坪/绿地

D. 人行的街道空间　　E. 科创大厦旁的小庭院/灰空间　　F. 儿童游乐场地内

G. 创意小品/装置旁　　H. 景观节点（水池/喷泉旁，绿植廊道）　　I. 滨水区/跑道附近

3. 您认为本创意园的外部公共空间是否能满足您与孩子亲子互动的多样需求？（单选）

A. 能完美满足　B. 大部分能满足　C. 基本能满足　D. 不太能满足　E. 完全不能满足

4. 您认为是哪些因素限制了创意园外部公共空间的亲子互动时长？

A. 可供亲子活动的户外场所少　　B. 天气炎热，场地缺乏遮蔽　　C. 可供活动的设施单一

D. 家长难以参与和互动　　E. 场地活动类型大同小异，缺乏吸引力

F. 场地安全性不足　　G. 配套设施太少　　H. 场地趣味性设计不足

5. 您和孩子希望创意园的布局、环境、设施等在哪些方面可以有所提升？（可多选）

A. 宜人性（安全、可达、合适的尺度）　　B. 吸引性（感官趣味体验，情境主题）

C. 多样性（提供多种选择，功能复合）　　D. 参与性（满足家长和各年龄儿童使用）

E. 教育性（科普，寓教于乐）　　F. 创意文化性（工业/文化氛围）

四. 亲子基本信息

1. 您的年龄是？（单选）

A. 70 后　B. 75 后　C. 80 后　D. 85 后　E. 90 后　F. 95 后　G. 其它

2. 您的学历是？（单选）

A. 硕士及以上　B. 本科　C. 大专　D. 高中/中专　E. 其它

3. 与您共同出行的孩子的年龄是？（单选）如有多个孩子，请根据年龄最小的填写

A. 0-3 岁　B. 3-6 岁　C. 6-12 岁　D. 12-18 岁

4. 孩子的性别是？（单选）

A. 男孩　　B. 女孩　　C. 男孩女孩都有

5. 您与孩子来创意园的亲子出行模式是？（单选）

A. 父/母一方带领出行　　B.父母双方带领出行　　C. 与其他亲子家庭结伴出行

组合中孩子的总数（单选）：　A. 只有一个孩子　　B. 有多个孩子

*再次感谢您的配合，祝您与孩子在创意园中玩得愉快!

Acknowledgement

At this point, I have many thoughts. I put down my pen to thank you and finish writing.

I am deeply grateful to my family, who have been my strongest support, offering me unconditional support and trust. Especially, my mother's unwavering support for my studies has helped me regain my courage and stay on the path forward when I feel discouraged. I am thankful for the silent dedication and hard work of my mother and family over the past twenty years, who have taken care of my daily needs and nurtured me with great care, allowing me to focus entirely on my academic pursuits without any worries. My family is the foundation of my success; my present achievements are a direct result of their support and efforts. I will always remember their kindness and hope that they remain healthy and happy!

I sincerely thank my mentors, including Su Ping, Huang Yi, and Tian Ruifeng, for their guidance. From the initial confusion about my topic to the refinement of my research ideas, and finally to the meticulous polishing of my thesis, they have always been patient and supportive, illuminating my path forward with their profound knowledge and rigorous approach. Each of your suggestions has been like a ray of light, helping me find a breakthrough in difficult situations. I also thank the teachers who participated in the proposal, mid-term review, and pre-defense of my thesis. Your valuable insights from various perspectives have greatly enhanced my research, and your constructive feedback has helped me identify and address the shortcomings in my work, allowing me to optimize my thesis in a timely manner. I especially want to thank Professor Tao Jin, the pre-defense committee member, for your critical guidance and valuable advice. Additionally, I am grateful to the professors at Politecnico di Torino for their dedicated teaching during my graduate studies, which has provided me with diverse perspectives and has been immensely beneficial. May all the teachers have a garden full of successful students!

I am grateful to my good friend for discussing methods and viewpoints with me while writing the thesis. Despite the distance, they have still made every effort to support and assist me. I wish my friend a bright future and our friendship a long-lasting one! I also thank my senior sister and classmates for their patient answers and generous help when I was confused

about my studies and job hunting. I hope everyone has smooth sailing in all aspects of life.

Finally, I would like to thank myself for sticking to the road. Hard work will not be wasted and jade will be formed. Although there are ups and downs in the process, I believe that hard work will be rewarded by heaven. In addition, I would like to express my most sincere thanks to everyone who has helped me and wish you all the best.

The road is long and difficult, but if you go, you will arrive. I wish you a bright future ahead.