



Sustainability of Suburban Industrial Development through Place Attachment

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Abstract

This research uses urban space reconstruction as the entry point, discussing the characteristics of residents' sense of place in Lingang new town, Shanghai, based on the method of factor analysis to divide the sense of place into place attachment, place identity, and place dependence. On the whole, residents' sense of place in Lingang new town is at a common level, and the comprehensive score of residents' sense of place in Lingang new town is "more than half". Meanwhile, place attachment is the highest, place dependence is the lowest, and place identity is in the middle. Therefore, the sense of place mainly depends on place attachment. Using an independent T test and variance analysis to explore the characteristics of the sense of place, this paper has found that age, income level, education level, household registration, and migration patterns have significantly different influences on the three dimensions of the sense of place. There is no difference in gender and the type of occupation, whether they are working in Lingang New Town or not. The research on the sense of place in suburban industrial development zones presents a new perspective for solving the social space problems in the development zone. Finally, this research suggests improving the construction of public facilities, paying more attention to youth groups' sense of place, and enhancing the sense of belonging to the highly educated groups and high-income groups, as well as strengthening innovation and entrepreneurship cooperation between the new town and the main city.

Keywords: Development Zone; Industrial Development; Industry-City Integration; Sense of Place; Urban Space Reconstruction.

1. Introduction

For a long time, the construction of development zones in China has focused on production functions, relatively lacking in the planning and construction of urban services and infrastructural facilities [1]. Especially in the development zones far away from the home city, the lack of service functions in the surrounding cities of the development zones tends to aggravate the phenomena of "ghost cities" and "empty cities". Under the general trend of "industry-city integration" [2], more and more development zones begin to focus on the construction of commercial service facilities, hoping to gather popularity and be extended to new industrial cities with multiple functions [3], but often with little success. The reason, in addition to its geographical location, development conditions and the influence of policy factors,

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is closely related to the social space in the neighborhood of the development zones. Due to the large number and scale of constructions in the suburban industrial development zones, usually the space reconstruction is strenuous in the process of construction. On the one hand, it not only leads to the change of industries and the population structure, but also causes the reconstruction of geographical landscapes and social networking, which makes residents in the neighborhood experience the process of emotional fragmentation and the sense of place waning, interrupted, and even lost.

On the other hand, with the influx of a large number of migrants, the suburban industrial development zone has become a region with rapidly growing populations and a new town with frequent population movements. The space is mixed with factors such as strangeness, indifference and anxiety, which makes the new residents feel uneasy and fearful in a "local gap" [2]. Studies have shown that the differentiation in the emotional space of residents around the development zone is more serious than that in residential space, which has evolved into the space without emotional carriers, with prominent potential contradictions. It is difficult to resolve the emotional isolation between the main body of the development zone in the outer suburbs and the local area, if only by improving commercial service facilities and other physical space construction. As to the discussion of this problem, the research on the sense of place in cultural geography can be used for reference. A person's sense of place, to a large extent, determines his degree of integration and identification with the place [4]. When people have feelings and identity for where they are, their behavior in their daily lives [5], and work will be more responsible and own a stronger sense of ownership [6]. Research on the differences in sense of place can help urban administrators predict and understand residents' perception and evaluation of the city, providing an effective way of urban planning and management [7], which have important practical significance for the transformation and development of suburban industrial development zones.

The sense of place is often considered an implicit emotional structure [8], and its importance is easy to ignore in daily life. However, the sense of place will only appear when the environment changes and the connection between people and the place is threatened. Therefore, under the background of specific spatial reconstruction, the sense of place of different subjects has become a hot research topic at home and abroad. Such foreign studies focus on the changes in rural community residents' sense of place in the process of sub-urbanization [9], the characteristics of urban migrants' sense of local place in a rural environment [10], and the characteristics of urban residents' sense of place in the context of global urbanization [11]. Moreover, place-making and digital visualization will also affect urbanization and residents' sense of place [12].

Some Chinese researches gradually focus on the characteristics of different subjects' sense of place under the background of urbanization, tourism development and construction of development zones. For example, Wu and Zhou (2009) [13] have analyzed the changes in characteristics of rural community residents' sense of place under different urbanization levels, and have found that the differences in residents' sense of place are not only related to the differences in the residents' community attachment, but also related to public space of the community. Tang et al. (2020) [14] pointed out that in the context of tourism development, residents' emotional attachment to ancient villages is greater than their functional attachment, local identity is affected by residents' duration of residence, and place dependence is related to residents' economic benefits. Zhu et al. (2012) [15] discussed the place identity of local villagers and artists in Xiaozhou Village, Guangzhou City, and found that their place identity is in a negative state of separation and fault. The construction of development zones is the process of urban spatial reshaping. Kong and Yu (2014)[2], taking Shanghai Minhang Development Zone and Changsha Economic and Technological Development Zone as examples, has found that the space reconstruction in development zones has great impact on residents' sense of place in the neighborhood, where the residents' sense of place is at a low level. The construction of suburban development zone affects residents' local identity through the placeness of the host region [16]. Li and Kong (2020) [17] proposed that China's high-tech zones should have become globalized consumption space, and accompanied by multi-dimensional separation problems such as sense of place digestion. Furthermore, Chaghui (2020) [18] found there were some differences in the sense of place in old and new places, and Zhou et al. (2022) [19] focused on the development of rural residents' sense of place in an ecological restoration area. However, the research failed to further analyze the internal structural characteristics and influencing factors of residents' sense of place around the development zones. There is no detailed discussion on the characteristics of residents' sense of suburban industrial development zones, leaving space for further study in this paper.

Therefore, this paper will build a theoretical analysis framework of "local dependency -- local attachment -- local identity". Taking Shanghai Lingang New City as an example, this paper will use micro-survey data and SPSS software to analyze the characteristics of the residents' sense of place around the suburban development zone, and further analyze the differences in the characteristics of different residents' sense of place as well. It is expected to benefit the "integration of industry and city" in the suburban development zone. The theoretical framework of this paper is shown in Figure 1.

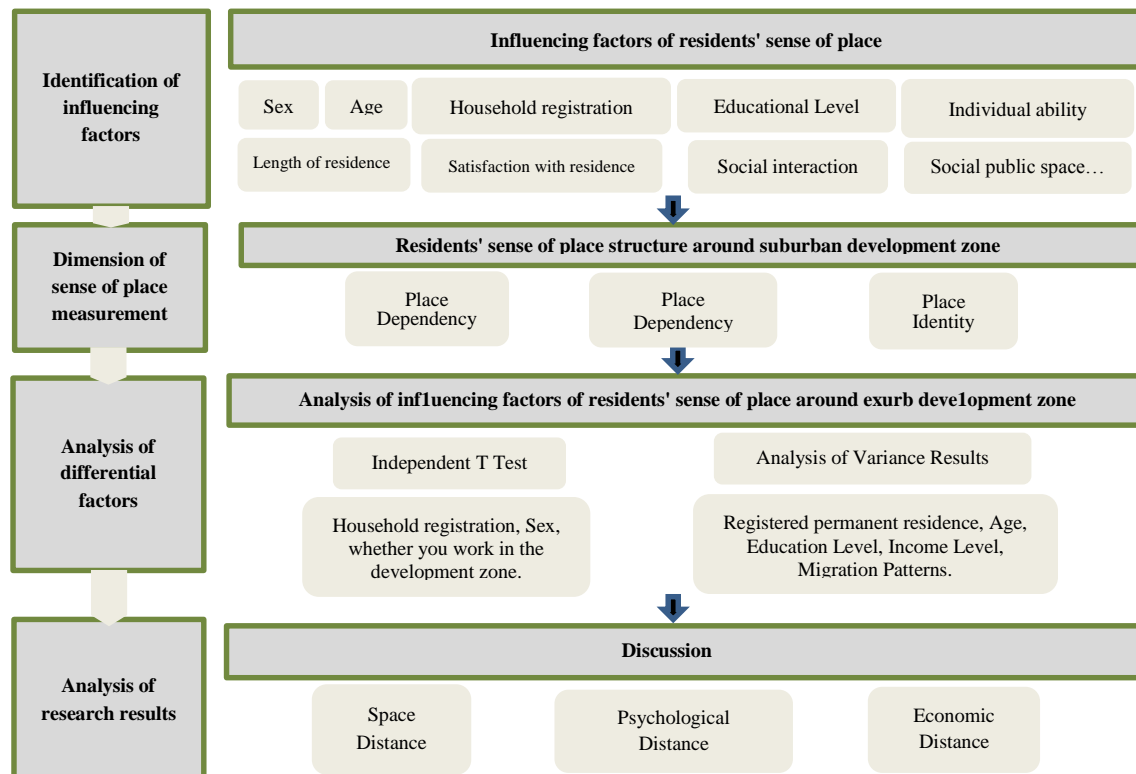


Figure 1. Theoretical Analysis Framework

2. Residents' Sense of Place in Suburban Industrial Development Zones

The sense of place is a kind of special relationship between people and land formed by long-term interaction between people and the land. It is based on the subjectivity of human local experience [20]. In a certain scope, through people's experience of long-term living and activities, the emotional attachment and identity for a particular place are generated [21], which emphasizes people's sense of belonging to a place and the sense of "home". Through this connection between people and places, the emotions, beliefs, thinking, unique life patterns and behavior patterns of the local place are derived [22].

Therefore, taking Lingang New town Shanghai as an example, this paper discusses the characteristics of residents' sense of place around the suburban industrial development zones, and further analyzes the differences in the characteristics of different residents' sense of place, so as to help the "industry-city integration" of suburban industrial development zones. It is generally believed that the sense of place is composed of three dimensions which are place attachment, place dependence and place identity [15]. These concepts seem to overlap, but each has its own characteristics. Place attachment is a positive emotional connection between individuals and places or groups and places, focusing on the psychological process of emotional connection between people and places. It is often used to express the psychological state that people tend to stay in a certain place and feel comfortable and safe [23].

Place dependence is the intensity of the relationship between people and places. Such kind of association is not necessarily positive, which is thought to be a kind of functional dependence, usually based on the comparison of subjects [22]. Perceiving that a certain place can better meet their own needs and goals than other places, subjects may move to another place if they think that this place can no longer meet their own needs. Place identity is considered to be emotionally dependent on the place. It refers to the complex social process including emotion and perception that an individual or group realizes through constant interaction with the place [11]. It is a part of self-identity and can construct its own social identity by identifying with a particular place [24].

Therefore, the transition from place dependence and attachment to place identity is a continuous process from a shallow to deep sense of place, and place identity is a deeper dimension of the sense of place [25].

3. Research design and methods

3.1. The Index Construction

According to the connotation and characteristics of the three dimensions of the sense of place, 18 perception items of sense of place are designed by referring to the scale on a sense of place put forward by William (1992) [26], Jorgensen (2001) [22] and Kyle (2005) [27] and combining with the characteristics of social space around Shanghai Lingang New Town (Table 1).

Table 1. Scale on a sense of place

Dimension	Items
Place Dependency (D)	I benefit more in Lingang than anywhere else (D1)
	There's no place more suitable for me than Lingang (D2)
	I'm quite satisfied with the living conditions in Lingang (D3)
	The living and commercial facilities are very complete in Lingang (D4)
	I can find a suitable job in Lingang (D5)
	The traffic is convenient in Lingang (D6)
Place Attachment (A)	If I leave Lingang, I will miss her (A1)
	Lingang has a unique meaning for me (A2)
	There is a place in my heart for Lingang that no other region can replace (A3)
	I have a very comfortable life in Lingang (A4)
	I am attached to Lingang (A5)
	I have fond memories of my life in Lingang (A6)
Place Identity (I)	I feel I belong to Lingang (I1)
	I agree with the lifestyle in Lingang (I2)
	I would like to live in Lingang (I3)
	Lingang is my home (I4)
	When someone makes negative comments on Lingang, I will argue with others (I5)
	I am proud of being a dweller in Lingang (I6)

3.2. The Research Area

Lingang New Town is located in the southeast corner of Shanghai (Figure 2), 75 kilometers away from the center of Shanghai, with a total area of 315.6 square kilometers (excluding Yangshan Bonded Port Area). Originally under the jurisdiction of Nanhui District, Lingang New Town was incorporated into Pudong New Area after the zoning reform in 2009. Since the construction of Lingang New Town started in 2003, it has formed the layout of “four towns and five districts” at present. Hundreds of famous enterprises such as China Shipping Group, Shanghai Electric, Siemens and Volvo gather in the park, constantly attracting high-end manufacturing talents. Its development goal is to become a demonstration area for developing “industry-city integration”. With the construction of the development zone, the influx of non-local population has changed the original local demographic structure. Take Nicheng community as an example. As of 2015, the registered population is 57,710, and the actual population is 85,713, while the migrant population has reached 34,489. According to the information provided by the Nicheng Community Citizen Service Center, migrants generally live in Nicheng for about two years, and the lack of population grounding and popularity is an important factor restricting the transformation of Lingang New Town into a complex new town.

3.3. The Research Methods

This research, based on the theory of sense of place, uses SPSS. 21 for factor analysis, mean comparison, variance analysis and other statistical methods to explore the internal factor structure of residents' sense of place in Lingang New Town, and analyze the differences in the characteristics of residents' sense of place. A questionnaire survey is the main method, supplemented by face-to-face interviews. Likert scale is used to measure residents' sense of place. From 1 to 5, it means “very inconsistent”, “not consistent”, “general”, “consistent” and “very consistent” respectively. The research is divided into two stages. The first stage is the preliminary data collection and pre-survey. The survey team conducted a preliminary survey of 50 questionnaires on July 4, 2017, and revised the questionnaire several times. The second stage is the formal research stage. From July 12 to July 17, 134, 43, 34 and 37 questionnaires were sent to Nicheng, Shuyuan, Luchao Port and Nanhui New Town respectively in Lingang New Town. A total of 270 questionnaires were distributed, and 257 were collected, with an effective rate of 95.2%.



Figure 2. The map of Lingang city in Shanghai

4. Research Results

4.1. Basic Information on the Interviewees

As shown in Table 2, female respondents are more frequent than male, mainly young people aged between 20 and 35. 57.9% of the respondents have Shanghai household registration, 43.1% are migrants, and most of them are locals. 44% of the respondents are native residents of Lingang, 33.1% are individuals who have moved to Lingang, and only 19.5% are family re-locations. The respondents' domicile origins are mostly in Nanhui and other provinces, but less in other urban areas of Shanghai. The education level is mainly undergraduates and junior colleges, and the overall education level is relatively high. Job types mainly include business and service industries, production technical workers, and students. 19.5% of the interviewees work in the development zones, and the income level of the interviewees is mainly within the range of 2,500-5,000 Yuan.

Table 2. Information about the interviewees

Basic Information	Type	Ratio	Basic Information	Type	Ratio
Gender	Male	257 (44.7%)	With/without registered permanent residence in Shanghai	with	57.9
	Female	257 (55.3%)		without	42.1
Age	Less than 20 years old	257 (10.5%)	Working in the development zone or not?	Yes	19.5
	20-35 years old	257 (60.7%)		No	79.4
	35-50 years old	257 (20.2%)	Permanent residence address	Nanhui	45.1
	More than 50 years old	257 (8.6%)		Shanghai (except Nanhui)	9.3
The type of position	Agriculture, forestry, fishery and animal husbandry	257 (1.2%)	Personal income	Jiangsu, Zhejiang, Anhui	17.1
	Civil servants; teachers and military personnel	257 (7.8%)		Other provinces	28.0
	Business & Services	257 (33.9%)		Less than 2000	23.0
	Production technicians	257 (14.0%)		2000-5000	43.6
	Students	257 (16.0%)	Education level	5000-10000	20.2
	The retired	257 (5.4%)		More than 10000	4.7
	Other personnel	257 (20.2%)		Junior High school and below	21.8
	Individual migrants	257 (33.1%)	Migration patterns	High school and technical secondary school	30.7
Migration patterns	family migrants	257 (19.5%)		Undergraduate and Junior College	38.9
	Natives	257 (44.0%)		Master and above	6.6

4.2. The Structure of Lingang Residents' Sense of Place

4.2.1. Analysis of the Reliability and Validity of the Questionnaires

Firstly, an exploratory analysis was conducted on the data to remove the two perception items of "Living and commercial facilities in Lingang are complete" (D1) and "I am proud to be a Lingang Resident" (I6), which have a poor correlation with the sum and a low factor load. Secondly, the reliability analysis of the scale on a sense of place is carried out, and the reliability is an indicator to detect the degree of consistency and reliability within the sample [28]. Cronbach's Alpha value of the overall reliability of the scale is 0.915 after calculation. Indicating that the reliability of the scale is relatively good. Finally, the validity of the scale on a sense of place was analyzed. Validity is generally divided into structure validity and content validity. By analyzing the correlation between 16 variables and the sum, the results show that the correlation coefficient between each variable and the sum is between 0.50 and 0.77. There was a significant correlation at the significance level of 0.01, and the content validity was good. Construction validity was measured by KMO and Bartlett's test. The KMO value of the sample was 0.913, and the statistical value of Bartlett's sphere test was $P=0<0.001$, indicating that the construction validity of the questionnaire was very ideal.

4.2.2. Extraction and Naming of the Factors for Sense of Place

The principal component method was used to extract the factor for sense of place, the maximum variance method was used to rotate the factor, and the three factors with the eigenvalue greater than 1 were extracted. The missing values were treated in the way of exclusion, and the cumulative variance contribution rate was 63.1%, and the variance contribution rate of the three factors was 45.391, 11.137, and 6.551%, respectively. The first principal component includes "If I leave Lingang, I will miss her", "Lingang has a unique meaning for me" and other six perception items. It mainly reflects the psychological process of attachment between the subject and the place, reflecting the positive tendency towards the place, so it is named the place attachment factor. The second principal component consists of 5 perception items including "I think I belong to Lingang" and "I identify with the lifestyle of Lingang", which mainly reflect the emotional belonging and identity construction with the place, so it is named as a place identity factor. The third principal component is composed of 5 perception items, such as "In Lingang I can find the right job", and "I can obtain more benefits in Lingang than in other places", reflecting the functional dependence on the place and mainly reflecting the target needs of the subject, so it is named as the place dependence factor (as shown in Table 3), and the internal structural relationship among the three dimensions of the sense of place is also verified through factor analysis.

Table 3. Factor Loading of the Sense of Place

	Factor Loading	Mean	SD	Correlation index
Place Attachment (Cronbach's Alpha=0.89)		3.42		
I'll miss her if I leave Lingang.	0.839	3.59	0.88	0.69
Lingang has a unique meaning for me.	0.821	3.40	0.88	0.69
Lingang is a place in my heart that no other region can replace.	0.669	3.25	0.89	0.76
I have a very comfortable life in Lingang	0.639	3.54	0.82	0.70
I am attached to Lingang.	0.608	3.24	0.82	0.76
I have fond memories of my life in Lingang.	0.592	3.52	0.89	0.70
Place Identity (Cronbach's Alpha=0.86)		3.38		
I feel I belong to Lingang.	0.768	3.30	0.91	0.74
I agree with the lifestyle in Lingang.	0.725	3.50	0.71	0.65
I would like to live in Lingang.	0.720	3.50	0.88	0.75
Lingang is my home.	0.645	3.42	0.86	0.77
When someone makes negative comments on Lingang, I will argue with others	0.539	3.19	0.85	0.61
Place Dependency (Cronbach's Alpha=0.77)		3.08		
I can find a suitable job in Lingang.	0.777	3.12	0.90	0.51
I can benefit more in Lingang than anywhere else.	0.764	3.00	0.82	0.53
There is no other place more suitable for me than Lingang.	0.679	2.94	0.90	0.63
I'm quite satisfied with the living conditions in Lingang.	0.593	3.31	0.79	0.62
The traffic in Lingang is convenient.	0.564	3.07	1.07	0.50
Whole sense of place (Cronbach's Alpha=0.915) 3.29				
KMO=0.913P=0<0.001				

4.3. The Current Situation of Residents' Sense of Place around Lingang New Town

When the five-point Likert scale is used to measure the sense of place, the average value between 3.5 and 5 indicates agreement, between 2.5 and 3.4 means general, and between 1 and 2.4 means disagreement [28]. According to this standard, the average of residents' overall sense of place around Lingang new town is 3.29. It can be seen that residents' sense of place around Lingang new town is at an average level. Of all the perception items, "If I leave Lingang, I will miss her (A1)" has the highest mean of 3.59, and "No place better for me than Lingang (D2)" has the lowest mean of 2.94. Among the three dimensions of the sense of place, the place attachment factor score is the highest with a mean of 3.42, the place dependence factor score is the lowest with a mean of 3.08, and the place identity factor is between the two with a mean of 3.38. It can be seen that the sense of the place of residents around Lingang new town is mainly reflected in the dimension of the place attachment, and the dimension of the place dependence is relatively low. It can reflect that the surrounding residents have a poor perception of place dependence on infrastructure, work income and living standards. However, most people have a deep emotional attachment to Lingang, especially the local native residents, who have a strong place attachment, which is also related to the distance between Lingang and Shanghai urban areas. In terms of the construction of place identity, many residents prefer to say that they are "Lingang people" rather than "Shanghai people".

Taking the cumulative variance of each factor as the weight, the formula was used to calculate the comprehensive score of sense of place. The comprehensive score of sense of place was converted into a value between 1 and 100 according to the standard score, and the specific score was calculated. The calculated standard score is 55.34, indicating that the comprehensive score of place sense of residents around Lingang New City is "more than half". To some extent, the results are different with residents' sense of place surrounding Minhang development zone [2], mainly because of the differences in industrial structures of the two development zones. Minhang Development Zone is mainly based on the labor-intensive processing and manufacturing industry.

Due to the influx and agglomeration of a relatively low-quality migrant population, the original social space has been impacted, and the surrounding residents generally have a low sense of place. The Lingang new town is high-end manufacturing-oriented. The high-end manufacturing positioning of Lingang new town has attracted a relatively large number of highly educated talents. Since the income level is higher than that of local residents, employees in the development zone face relatively less economic pressure and risks of income fluctuation, so it is relatively easy to find a feeling of safety and comfort. The local residents of Lingang new town also have new development opportunities due to the upgrading of the construction industrial structure and the relative improvement of the living environment of the development zone, so the sense of place of the residents around the development zone has not been greatly weakened on the whole.

Although the residents' sense of place in the neighborhood of Lingang new town is over "half" on the whole, the senses of place of internal local residents are different. The mean standard deviation shows that the sense of place of different residents varies in different dimensions, among which the difference in place dependence is the most obvious. Therefore, this study further analyzes the internal differences of the sense of place of residents with different social attributes.

4.4. Analysis of the Difference in the Sense of Place of Residents around Lingang New Town

Since the three variables of "gender", "whether you work in the development zone" and "whether you have Shanghai household registration" are dichotomous variables, this paper adopts an independent T-test for difference analysis. The results of the independent T-test (Table 4) show that "Shanghai household registration" has a significant difference in residents' sense of place, while "gender" and "whether to work in the development zone" have no significant difference with the three dimensions of sense of place.

Table 4. Independence T-Test

			The Test of Equal Variance				The T-test for Equal Means		
			F	Sig.	t	Df.	Sig. (two-tailed)	Difference	SE Mean Difference
With/without registered permanent residence in Shanghai	Place	Assume that the variances are equal.	0.267	0.606	2.579	238	0.011	0.33	0.13
	Attachment	Assume that the variances are not equal.			2.553	211.218	0.011	0.33	0.13
	Place Identity	Assume that the variances are equal.	2.318	0.129	4.015	238	0.000	0.50	0.12
		Assume that the variances are not equal.			3.941	203.085	0.000	0.50	0.13

"census registration", "age", "level of education", "income level" and "move mode" such variables belong to the multivariable. The method of variance analysis can be applied. In order to ensure the scientificity of inspection, homogeneity inspection is adopted before the analysis of variance; after that, the multiple comparison method, the most

stringent Scheffe method is applied [29]. The results of variance analysis (Table 5) show that the residents with different census registration sources, ages, education levels, income levels and relocation modes, have differences in sense of place around the development zone. Scheffe post-test results (Table 6) show the differences of different variables in various dimensions of sense of place.

Table 5. Analysis of Variance Results

Social Attributes of Interviewees	Dimension of the Sense of Place	Sum of Squares	Variance	Sum of Mean Squares	F Test	Sig
Permanent residence address	Place Identity	30.869	3	10.290	11.623	0.000
Education level	Place Identity	12.802	3	4.267	4.375	0.005
Income level	Place Identity	11.909	3	3.970	3.942	0.009
Age	Place Identity	22.388	3	7.463	8.107	0.000
	Place Dependency	10.520	3	3.507	3.618	0.014
Migration Patterns	Place Attachment	11.565	2	5.782	6.084	0.003
	Place Identity	19.037	2	9.519	10.243	0.000

Table 6. Scheffe Post-test

	(I) Characteristics	(J) Characteristics	The Mean Differences (I-J)	Standard Error	Sig.	95% Confidence Interval	
						Lower bound	Upper bound
Registered permanent residence * Place Identity	Nanhui	Shanghai	0.274	0.215	0.655	-0.332	0.880
		Jiangsu, Zhejiang, Anhui	0.676*	0.167	0.001	0.205	1.147
		Other provinces	0.776*	0.144	0.000	0.369	1.183
Age* Place Dependency	20-35 years old	Less than 20 years old	-0.349	0.216	0.458	-0.957	0.259
		35-50	-0.460*	0.159	0.041	-0.908	-0.012
		More than 50 years old	-0.395	0.229	0.397	-1.040	0.249
Education level * Place Identity	Master and above	Junior High school and below	-0.975*	0.274	0.006	-1.748	-0.202
		High school and technical secondary school	-0.855*	0.264	0.017	-1.601	-0.109
		University and Junior College	-0.820*	0.259	0.021	-1.552	-0.088
Personal income* Place Identity	2000-5000	Less than 2000	0.016	0.163	1.00	-0.444	0.477
		5000-10000	0.497*	0.169	0.037	0.020	0.975
		More than 10000	-0.328	0.305	0.763	-1.189	0.531
Age * Place Identity	20-35 years old	Less than 20 years old	-0.594*	0.210	0.050	-1.187	-0.001
		35-50	-0.431	0.155	0.055	-0.868	0.005
		More than 50 years old	-0.888*	0.223	0.002	-1.517	-0.260
Migration Patterns *Place attachment	Individual migrants	Family migrants	-0.404	0.176	0.074	-0.837	0.029
		Natives	-0.483*	0.142	0.004	-0.834	-0.131
Migration Patterns * Place Identity	Individual migrants	Family migrants	-0.226	0.174	0.429	-0.655	0.201
		Natives	-0.626*	0.140	0.000	-0.973	-0.279

4.4.1. Differences in the Sense of Place of Residents with Different Census Registration

Through an independent T-test, it is found that there are significant differences in the dimensions of place attachment and place identity (Table 3), regarding “whether with registered permanent residence in Shanghai”. Specifically, the level of place attachment and place identity of original residents with registered permanent residence in Shanghai is high, while the level of place attachment and place identity of migrants without registered permanent residence in Shanghai is low. This result is somewhat similar to the characteristics of migrant workers’ sense of place in Shanghai Minhang Development Zone by Kong X. et al. (2014) [2], and the characteristics of immigrants’ sense of place in urban villages in Guangzhou by Zhu H. et al. (2016) [30]. Migrant workers tend to have a low sense of place when they enter the city. Due to the system barrier of registered permanent residence in Shanghai, they cannot enjoy the same treatment with local residents in terms of children’s education, medical treatment and other social welfare. It is easy for migrant

workers to feel excluded and lost, drifting psychologically, and it is difficult for them to establish a place identity and attachment to the inflow area. It can be seen that the household registration system is an important factor to prevent the residents around the new town from building place attachment and place identity. In terms of the dimension of place dependence, there is no significant difference between the external population and the local residents. The scores of place dependence factors of both groups are low, and both groups have a poor perception of the living environment, working environment traffic, and travel in Lingang new town, showing consistency.

Through the analysis of variance to further explore the difference in the sense of place of residents of different areas of household registration, it was found that the place identity of residents of different areas of household registration was significantly distinct, and the later test showed that the place identity of residents in Nanhui was higher than that of migrants from Jiangsu, Zhejiang and Anhui provinces as well as other provinces in China. The difference is not obvious in place dependence and place attachment factor, which shows that the sense of place identity is the deeper dimension of sense of place, and the “place” here is of different scales. Lingang local residents prefer to build their own identity with the scale of “Nanhui”. There is no difference in the dimension of local sense of Lingang new town among residents from other areas of Shanghai (except Nanhui District), Jiangsu, Zhejiang and Anhui and other provinces in China.

4.4.2. Differences in the Sense of Place of Residents at Different Ages

According to the running results of ANOVA, residents of different age groups have significant differences in the dimensions of place identity and place dependency. The post-test shows that: in terms of the dimension of place dependency, the place dependency of the 20-35-year old group is the lowest, significantly lower than that of the 35-50-year old group. It shows that the development status of Lingang new town and the supporting facilities of entertainment and transportation cannot meet the development goals and needs of the group aged between 20 and 35, and the group lacks the functional dependence on Lingang. In terms of the dimension of place identity, the group over 50 years old has the strongest identity. Most of this group are original residents, who have a long life experience in Lingang and have strong embeddedness. The local identity of the group from 20 to 35 years old is significantly lower than that of the groups above 50 years old and below 20 years old, and the place identity is the lowest among the four age groups. This shows that people aged between 20 and 35 have no strong desire to stay in Lingang, and Lingang is only a temporary residence for their work, rather than the “home” they belong to. The 20-35 age group, accounting for 60.7% of the total sample, is also the main force in the construction of Lingang new town. The majority of this group is outsiders, who are more mobile than other groups. When the construction and development of Lingang cannot satisfy its functional dependence and increase its emotional belonging, the flow of this group of people is bound to occur, which is mainly reflected by the frequent flow of the migrant population.

4.4.3. Differences in the sense of Place of Residents with Different Education Levels

There is no significant difference in the dimensions of place dependence and place attachment among respondents with different education levels. However, in the dimension of place identity with a deeper sense of place, the significance of place identity of the group with a master's degree or above is lower than that of the group with the education background graduated from a junior high school or below, a senior high school, a technical secondary school, a university or a junior college. It reflects that the current construction status and development prospects of Lingang new town are not attractive enough to build the confidence and sense of belonging of the highly educated group with a master's degree or above. As the construction speed of Lingang is slowing down in recent years, it is difficult to make a good breakthrough, and the advantage of the policy is gradually lost. Besides, it does not exert the aggregation effect formed by the depression of foreign talents, and its location is far away from the main urban area. It is difficult to build a place identity for high-end talents with a broad vision, outstanding abilities and mainly from outside. Therefore, it is an important problem facing Lingang that high-end talents cannot be retained at present.

4.4.4. Differences in the Sense of Place of Residents of Different Income Levels

Residents of different income levels have no significant differences in the dimensions of place dependence and place attachment, while in the dimension of place identity, the place identity of residents with an income of 2000-5000 is significantly higher than that of those with an income of 5000-10000. Zhao & Li (2013) [31] found in their study of place identity of new migrants in big cities that monthly income had an indirect linear influence on place identity. Tang (2011) [32] has also pointed out in his analysis of characteristics of residents' sense of place in ancient villages that economic income directly affects residents' place dependence on ancient villages and affects residents' identification with ancient villages. The research on residents' sense of place around Lingang new town shows that the impact of income level on place identity is complex, and it is not that the higher the income, the stronger the place identity, which needs to be analyzed in combination with the actual situation. As the construction of Lingang new town attracts a large number of high-end talents, the income level of the floating population is relatively higher than that of local residents. However, due to Lingang's location far from the main city, imperfect living and working environment and lack of community-level cultural construction, it makes it difficult for high-end talents to emotionally belong, and Lingang cannot become “home” in their hearts. Therefore, the place identity of this group is significantly lower than that of place residents.

4.4.5. Differences in the Sense of Place of Residents with Different Migration Patterns

In terms of different migration patterns, the results of variance analysis show that residents with different migration patterns manifest differences in the dimensions of place attachment and place identity. Specifically, the dimensions of place attachment and place identity of original residents are significantly higher than those of individual migrants, while the dimensions of place attachment and place identity of family migrants are significantly higher than those of individual migrants. Similar to the research by Hong Zhu and others, migrants who live with their families generally have a relatively high sense of place. As Lingang new town is a suburban industrial development zone, it is different from the social and material environment of urban villages.

5. Discussion and Conclusion

Based on the background of spatial reconstruction, this paper discusses the characteristics of residents' sense of place in the suburban industrial development zone and finds that the comprehensive score of residents' sense of place around Lingang new town is "more than half", which belongs to the general level on the whole. The result is different from the overall lack of sense of place of residents around Minhang Development Zone (Kong, 2014) [2]. The construction of Lingang new town has not completely weakened the sense of place of local residents, but the sense of place of different groups has some internal differences. The result of the research is shown in Figure 3.

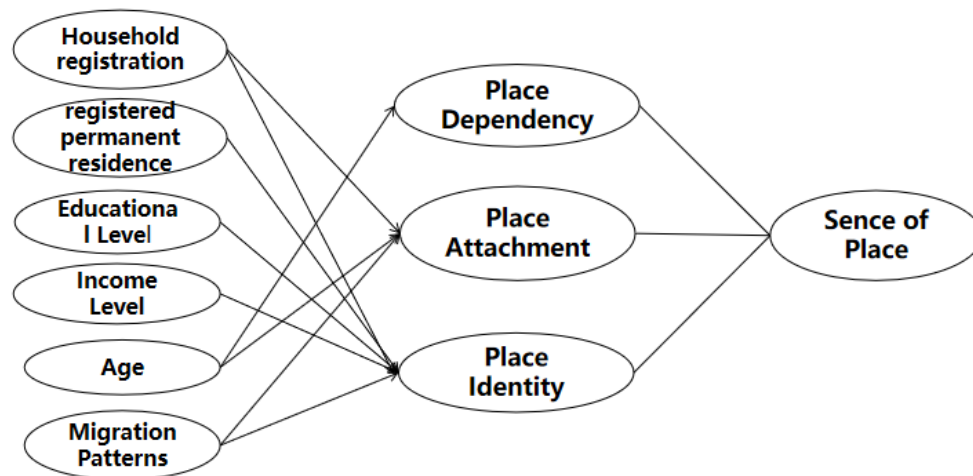


Figure 3. The result of the research

In order to deeply analyze the internal differences of different residents' sense of place, the independent T-test and analysis of variance are used to study the results. The results show as follows:

5.1.1. Space Distance

One is the commuting cost. The outer suburb development zone is far away from the main urban area, and the traffic is inconvenient, which increases the commuting cost of residents going out daily. The second is the problem of family members working and living space distance. The above research finds that the relocation of the migrant family can solve the problem of working family members' working and living space distance, which is more conducive to the construction of the sense of place of the migrant residents in Lingang. This is similar to the research by Zhu H. (2016) [30] and others, in that migrants who live with their families generally have a relatively high sense of place.

5.1.2. Psychological Distance

First, it's about the dual urban and rural household registration system. The place of domicile has no significant influence on the construction of the sense of place, and the household registration system is an important factor affecting the construction of the deeper sense of place. Due to the shield of the household registration system, migrants are always on the edge of the city, and they feel a sense of drift and exclusion in the destination. This is similar to the sense of place of the migrants in urban villages [30], and the local household registration system significantly affects the level of place attachment and place identity of migrant residents. Second, it's about the issue of cultural identity. It is difficult for the youth group and the high-income group to construct the place identity in Lingang new town. The main reason is that they cannot satisfy their place dependence on material conditions, and at the same time, it is difficult to find their emotional belonging and identity. Therefore, this is another major cause of the outflow of talents in Lingang new town, Shanghai.

5.1.3. Economic Distance

First, the economic distance between the new town and the main urban area is mainly reflected in the industrial chain of the upper and lower reaches. The economic activity between them depends on the economic relationship rather than geographical adjacency. The close economic activity between the enterprises in the new town and the main city will not only affect the income of the residents in the new town but also affect their sense of place and belonging. Second, the impact of income level on place identity. The impact of income level on place identity is complicated. It is not that the higher the economic income is, the stronger the place identity of residents is, which is different from the sense of place of residents in ancient villages [32]. The sense of place of residents around the suburban industrial development zone has its own complexity, which should be analyzed in detail in combination with the actual situation.

Based on the perspective of humanism, the following four aspects should be paid attention to in the process of transformation and development of suburban industrial development zones. First, we should actively improve urban public facilities. The "industry-city integration" in suburban industrial development zones should not only improve urban public service facilities to reduce residents' commuting costs, education costs, and other problems, but also improve residents' place dependence. At the same time, the construction of social and cultural space should be strengthened to provide emotional belonging and create a sense of "home" for migrant people and enhance their local identity.

Second, the sense of place of the youth group should be paid attention to. The youth group is the main driving force of construction and transformation in development zones. Suburban industrial development zones should actively create conditions for the integration of youth groups into the local area. In addition to improving their place dependence, on the one hand, they should actively build communication and interaction platforms for youth groups and strengthen their local social network. On the other hand, the publicity of Lingang new town's cultural concept and development blueprint should be strengthened to enhance the confidence and emotional belonging of young people in the development zone.

Third, the sense of belonging of high-income groups and highly educated groups should be enhanced. Suburban industrial development zones should give play to the aggregation effect of "talent depression" and give proper preference to policies, such as issuing relevant talent support policies and adopting preferential policies to help them in local areas. At the same time, migrant workers are encouraged to move in with their family members to solve the problem of working family members' living space distance. In order to increase the sense of place and belonging of the migrant residents and meet the basic cultural needs of the migrant workers, the suburban industrial development zone should also strengthen the construction of basic culture and construct a good social and cultural space.

Fourth, strengthen innovation and entrepreneurship cooperation between the new town and the main city. Considering the economic relevance of entrepreneurial knowledge spillover, cooperation has become one of the main trends in entrepreneurial activities [33]. The local government of the suburban industrial development zone should create a good environment for innovation and entrepreneurship [34], encourage cooperation and innovation between the new town and the enterprises in the main city, so as to improve the income of the residents in the new town and reduce the difference in the residents' sense of place, leading to better social resilience as well [35].

5.1. Theoretical Contribution

In previous studies, scholars failed to further analyze the internal structural characteristics and influencing factors of residents' place sense around the development zones. There is no detailed discussion on the characteristics of residents' sense of place around the suburban development zone. This research created a theoretical analysis framework of "local dependency-local attachment-local identity" and used micro-survey data and SPSS software to analyze the characteristics of the residents' sense of place around the suburban development zone, and further analyzed the differences between the characteristics of different residents' sense of place as well. Research on the sense of place in suburban industrial development zones can present a new perspective for solving the social space problems in the development zone.

5.2. Limitations

This study also has some limitations, and some conclusions need further verification. For example, taking Shanghai Lingang New City as an example, the survey data was completed in 2017, and cannot be updated in time due to the current COVID-19 pandemic. Therefore, in the study of the internal differences of different residents' sense of place, the relative conclusions are worthy of further investigation.

6. Declarations

6.1. Author Contributions

Conceptualization, L.W. and D.J.; methodology, L.W. and Y.C.; formal analysis, L.W. and Y.C.; investigation, D.J.; writing—original draft preparation, L.W., M.P. and D.J.; writing—review and editing, M.P. and X.H. All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

Data sharing is not applicable to this article.

6.3. Funding

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6.4. Conflicts of Interest

The authors declare no conflict of interest.

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