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An Empirical Exploration of Exhibition-Driven Sustainable Urban Renewal for SDGs: Based on the Panel Data of the Shenzhen-Hong Kong Bi-City Biennale of Urbanism/Architecture

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Abstract. Based on the panel data of the Shenzhen-Hong Kong Urban Architecture Bi-City Biennale, this paper studies the exhibition-driven urban renewal with the help of frequency time series analysis, word frequency analysis, co-occurrence analysis, single factor analysis of variance, and linear regression analysis. The paper demonstrates that the exhibition focuses on "urban symbiosis": "derivative" research is carried out from two aspects: urban development is the symbiotic soil for the birth of the exhibition, and the exhibition thinks about how urban villages and cities co-exist. This paper finally demonstrates the interaction between the exhibition and the city and the relationship between their mutual influence and integration. It shows that exhibition-driven sustainable urban renewal is positive.

Keywords. Exhibition, urban renewal, empirical analysis, sustainable development

1. Introduction

The correlation between architectural exhibitions and cities' economic and cultural growth has aroused broad concern [1-3]. For the first time in his doctoral thesis, Cai comprehensively organized the exhibitions participated by Chinese architects after the founding of the People's Republic of China [4]. It conducted a detailed study on the widespread phenomenon of Chinese architects participating in exhibitions: the information database of 538 Chinese architects participating in exhibitions at home and abroad from 1956 to 2019 has been established, some gaps in the current archive mining and sorting have been filled, the outline of the four stages of "Hongmeng, exploration, research and development" is refined, the overall outline features of "from less to more, from small to large, from weak to strong," "learning to surpass, going out to see the

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pattern of development and growth," and "theme focusing on architecture and urban and rural areas" have been extracted [5].

The 2017 Shenzhen-Hong Kong Urban Architecture Bi-City Biennale (Shenzhen) was themed "Urban Symbiosis." The "urban symbiosis" issue is a critical explanation of the current world and China's urbanization reality and an attempt to propose another future urban vision [6]. Shenshuang is an exhibition venue and the most intense urbanization scene of the 20th and 21st centuries. This city is the largest exhibition venue from Shenzhen to the Pearl River Delta. At the same time, Shenzhen and Shenzhen combine nomadic exhibitions and many urban interventions, building various "symbiotic" city models. The cities, a civilization community with high-level heterogeneity and differentiation, are supposed to be the consequence of balancing multiple value systems nowadays. Cities, Grow in Difference "is the English translation of" urban symbiosis, "aiming to emphasize the culture, society, space, and daily life within this complex urban system [7]. In the next 15 years, despite the decline in natural resources and the environment, China is still undergoing a rapid urbanization process. What does this mean for the future of the world [8]? This has become a severe topic; to solve this problem, we cannot just consider building more buildings [9]. We must consider how to utilize existing things better and reconsider the power, dreams, desires, and challenges that bring people into the city [10].

2. Results

2.1. Composition of Three Industries in Regional Gross Domestic Product

As the first special economic zone established by the policy of reformation and opening in China, Shenzhen is a milestone in world industrialization, urbanization, and modernization. Another way of saying it is that the pioneering practice of China's reform and opening began in Shenzhen. Therefore, in the past 40 years, Shenzhen's economy has developed rapidly. Shenzhen's GDP was merely ¥197,000,000, with a GDP per capita of ¥606 in 1979. In 2018, the gross domestic product of Shenzhen exceeded¥2,400,000,000, an increase of about 7.5percent on a year-on-year basis, ranking in the list of top five Asian cities in total economic output; The public financial revenue of the jurisdiction is ¥910,240,000,000, an increase of 5.5 percent; Local general public budget revenue reached ¥353,840,000,000, an increase of 6.2 percent; The per capita disposable income increased by 8.4 percent. Economic development has speed, quality, and efficiency. The total economic output ranks among the top five Asian cities [11].

Shenzhen is a sample of China's urbanization and was once a place for new social practices, ideological concepts, and institutional innovations. Forty years after the reform and opening up, although Shenzhen has long stopped all kinds of idealistic experiments in that year, a Shenzhen-style spirit that does not ask for the source, pays attention to practical work and takes into account pragmatism style and idealism complex remains in the blood of this city. Shenzhen has already emerged from the "urban wonder" state of "rapidly transforming from a small fishing village into an urban miracle in 40 years", with a new layer of cultural and social connotations. Aside from the works of internationally renowned architects such as Rem Koolhaas, Steven Hall, and Yoshizaki Shin, there are still many works left by Shenzhen firms that focus on the local design spirit, such as Urban Practice Architecture Firm, Yuanji Architecture Firm, etc.

Through the change of the proportion of the construction industry to GDP in the past 40 years of reformation and opening (Figure 1), it can be seen that: (1) the first peak of construction investment in the reformation and opening of special zones (19790-1990); The proportion reached its highest point in the forty years of reform and opening up in 1982. (2) the second peak period of building proportion (1991-2004); In 1993, it reached the second peak of proportion (strongly stimulated by the policy after Deng Xiaoping's 1992 southern tour). (3) the third stable fluctuation cycle of buildings (2005-2018); Since 2005 (December 6, 2005, according to the "Regulations on the Administration of Foreign-Invested Construction Engineering Design Enterprises," Hong Kong and Macao applied for relaxing the relevant policy conditions for the qualification of construction engineering design enterprises), there has been no ups and downs in more than ten years.

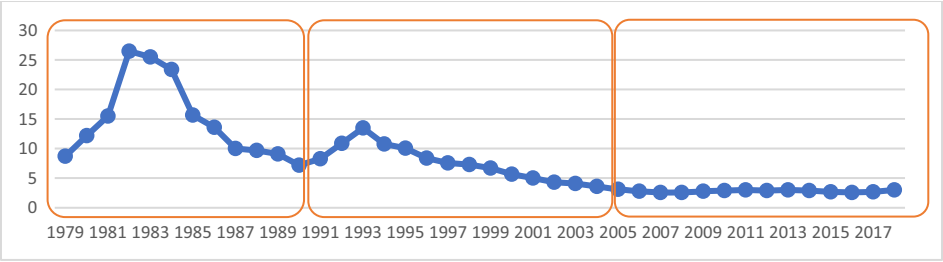

Figure 1. Change in the composition of the construction industry (1979-2018).

Analysis of the correlation between the proportion of the construction industry and the holding time of the Shenzhen Double Exhibition: From the analysis results of the following charts (Tables 1-3, Figures 2 and 3), it can be seen that the year of exhibition holding is positively correlated with the proportion of the construction industry to the regional GDP (%). From the univariate linear regression analysis, one-way ANOVA, and correlation coefficient analysis, it can be seen that the p-value (sig.) is less than 0.001, indicating that it meets the requirements of statistics. In univariate linear regression analysis, R is 0.571 (>0.5 indicates a high correlation); The adjusted R Square is 0.308 (>0.5 indicates correlation); Therefore, it can be explained that the changes in the construction industry have a significant impact on the holding of exhibitions (which is positively correlated with the proportion of the construction industry to regional GDP). The proportion of the construction industry to regional GDP (%) has a positive impact on the holding of exhibitions; There is a positive correlation between the proportion of the construction industry and the holding of exhibitions.

Table 1. Simple linear regression (Model Summary[b]).

Model	R	R square	Adjusted r square	Std. error of the estimate	Change statistics				
					R square change	F change	df1	df2	Sig. F change
1	.571a	.326	.308	.65208	.326	18.384	1	38	.000

Note: A=Exhibition held (year before, year during, and year between) ([b] Dependent Variable: A); A0=The proportion of construction industry to regional GDP (%) ([a] Predictors: (Constant), AO).

Table 2. Oneway ANOVA (ANOVA[a]).

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	7.817	1	7.817	18.384	.000b
	Residual	16.158	38	.425		
	Total	23.975	39			

Note: [a] Dependent Variable: AO; [b] Predictors: (Constant), A.

Table 3. Correlation (Coefficients[a]).

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.	95.0% Confidence interval for B	
		B	Std. error	Beta			Lower bound	Upper bound
1	(Constant)	1.902	.169		11.260	.000	1.560	2.243
	A0	.071	.017	.571	4.288	.000	.037	.105

Note: [a] Dependent Variable: AO.

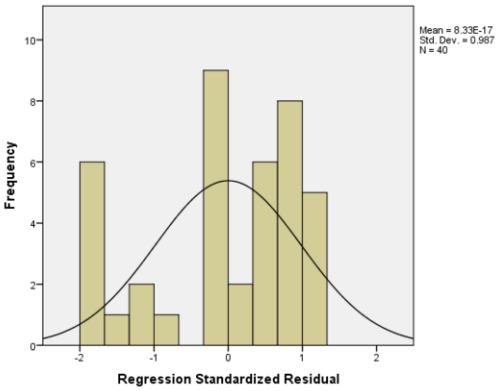

Figure 2. Histogram a. Dependent Variable: AO.

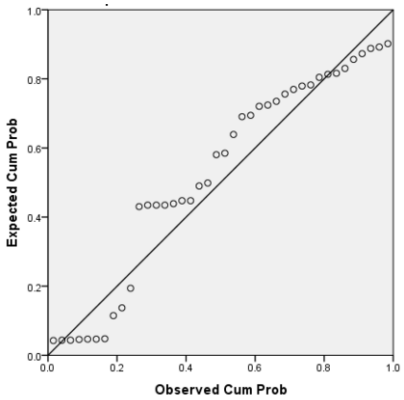

Figure 3. Normal P-P plot regression standardized residual ([a] Dependent Variable: AO).

2.2. Total Output of Building Industry

The second part investigates and analyzes the different compositions within the construction industry (Table 4).

Table 4. Correlations.

		A0	A1	A2	A3	A4	A11	A12	A13	A14	A15	A16	A17	A18	A19	A20	A22
	Pear.	1	.405	.402	.455	-.335	.351	.500	.276	.280	.258	.671*	-.028	.253	.233	.574*	-.553
A0	Sig.		.170	.174	.118	.263	.240	.082	.361	.354	.395	.012	.929	.404	.445	.040	.050
	N	40	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.405	1	1.000**	-.164	-.901**	.979**	.917**	.967**	.976**	.978**	-.039	-.313	.979**	.920**	.099	.157
A1	Sig.	.170		.000	.592	.000	.000	.000	.000	.000	.000	.900	.297	.000	.000	.747	.608
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.402	1.000**	1	-.167	-.903**	.980**	.918**	.968**	.976**	.978**	-.045	-.317	.979**	.919**	.090	.157
A2	Sig.	.174	.000		.585	.000	.000	.000	.000	.000	.000	.884	.291	.000	.000	.769	.609
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.455	-.164	-.167	1	.178	-.304	-.168	-.348	-.359	-.324	.661*	-.088	-.325	-.337	.530	-.600*
A3	Sig.	.118	.592	.585		.562	.312	.582	.244	.229	.280	.014	.776	.278	.260	.062	.030
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	-.335	-.901**	-.903**	.178	1	-.923**	-.828**	-.926**	-.862**	-.873**	.218	.230	-.885**	-.742**	-.006	-.040
A4	Sig.	.263	.000	.000	.562		.000	.000	.000	.000	.000	.475	.450	.000	.004	.984	.898
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.351	.979**	.980**	-.304	-.923**	1	.933**	.989**	.975**	.966**	-.150	-.292	.970**	.890**	-.041	.209
A11	Sig.	.240	.000	.000	.312	.000		.000	.000	.000	.000	.624	.333	.000	.000	.895	.494
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.500	.917**	.918**	-.168	-.828**	.933**	1	.870**	.893**	.871**	.045	-.299	.871**	.813**	.031	.185
A12	Sig.	.082	.000	.000	.582	.000	.000		.000	.000	.000	.883	.321	.000	.001	.920	.546
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.276	.967**	.968**	-.348	-.926**	.989**	.870**	1	.972**	.968**	-.225	-.278	.973**	.887**	-.069	.210
A13	Sig.	.361	.000	.000	.244	.000	.000	.000		.000	.000	.460	.358	.000	.000	.824	.490
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.280	.976**	.976**	-.359	-.862**	.975**	.893**	.972**	1	.995**	-.149	-.270	.993**	.963**	.010	.311
A14	Sig.	.354	.000	.000	.229	.000	.000	.000	.000		.000	.626	.372	.000	.000	.974	.300
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.258	.978**	.978**	-.324	-.873**	.966**	.871**	.968**	.995**	1	-.170	-.293	.999**	.961**	.032	.280
A15	Sig.	.395	.000	.000	.280	.000	.000	.000	.000	.000		.579	.332	.000	.000	.916	.354
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.671*	-.039	-.045	.661*	.218	-.150	.045	-.225	-.149	-.170	1	.245	-.186	-.108	.674*	-.272
A16	Sig.	.012	.900	.884	.014	.475	.624	.883	.460	.626	.579		.420	.542	.726	.011	.369
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	-.028	-.313	-.317	-.088	.230	-.292	-.299	-.278	-.270	-.293	.245	1	-.304	-.231	.302	.098
A17	Sig.	.929	.297	.291	.776	.450	.333	.321	.358	.372	.332	.420		.313	.448	.317	.749
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.253	.979**	.979**	-.325	-.885**	.970**	.871**	.973**	.993**	.999**	-.186	-.304	1	.950**	.017	.265
A18	Sig.	.404	.000	.000	.278	.000	.000	.000	.000	.000	.000	.542	.313		.000	.955	.381
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.233	.920**	.919**	-.337	-.742**	.890**	.813**	.887**	.963**	.961**	-.108	-.231	.950**	1	.093	.394
A19	Sig.	.445	.000	.000	.260	.004	.000	.001	.000	.000	.000	.726	.448	.000		.763	.183
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	.574*	.099	.090	.530	-.006	-.041	.031	-.069	.010	.032	.674*	.302	.017	.093	1	-.342
A20	Sig.	.040	.747	.769	.062	.984	.895	.920	.824	.974	.916	.011	.317	.955	.763		.252
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
	Pear.	-.553	.157	.157	-.600*	-.040	.209	.185	.210	.311	.280	-.272	.098	.265	.394	-.342	1
A22	Sig.	.050	.608	.609	.030	.898	.494	.546	.490	.300	.354	.369	.749	.381	.183	.252	
	N	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13

Note: Pear=Pearson Correlation; Sig.= Sig. (2-tailed).

The proportion of construction sector in gross regional domestic product (%) is positively correlated with the proportion of privately owned enterprises and Hong Kong, Macao and Taiwan invested enterprises in domestic enterprises. (i.e., there is a positive correlation between the proportion of private sole proprietorships and Hong Kong,

Macao, and Taiwan invested enterprises in domestic enterprises and the construction industry).

3. Conclusion

The phrase 'city is exhibition hall' refers to the blending and integration of city and exhibition, city and architecture, and city and people. The theme of curation and exhibition is the exploration of diversity. For example, the village in the city is compared to "a diverse old-growth forest with different species, which can be observed from different perspectives." Consider the hybridity and importance of differences, mixing, endogeneity, and resistance in today's urban concept. The public and compound attributes of the city: it is said to be an art exhibition, but it is full of academic criticism; It has the ambition to create a "literature exhibition," but it always presents a sincere dialogue with the public and an interactive attitude with urban life. As mentioned earlier, considering the relationship between exhibitions and cities in China began with the Shenzhen Hong Kong Urban Architecture Biennale. For example, several practical issues related to sustainable urban development in China have been addressed, including considering urban issues after reform and opening up, considering collaborative development between particular urban villages and cities, and the consideration of the reuse of urban industrial heritage. On the other hand, out of 751 papers, 69 papers were about the Shenzhen Hong Kong Urban Architecture Biennale, accounting for nearly 10%, second only to the Venice Architecture Biennale (189 papers). From the first session in 2005 to the current 15 years, the tremendous domestic attention to Shenzhen Double is enough to prove its importance.

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