Exploring the Feasibility of Intergenerational Co-Living based upon the Perspective of Inclusive City

Yong-en Zhang, Tzu-Ling Chen

(Yong-en Zhang, University of Taipei 1, No. 101, Sec. 2, Zhongcheng Rd., Shilin Dist., Taipei City, u10750006@go.utaipei.edu.tw)
(Supervisor Tzu-Ling Chen, University of Taipei 1, No. 101, Sec. 2, Zhongcheng Rd., Shilin Dist., Taipei City, skylight@mail2000.com.tw)

1 ABSTRACT

Due to globalisation nowadays, the flow of population, information, and goods has not only diversified the city but also intensified the living style within the city. An inclusive city has been proposed and advocated by UN-Habitat, where everyone, regardless of their economic means, gender, race, ethnicity, or religion, is enabled and empowered to fully participate in the social, economic, and political opportunities that cities should offer. With advanced technology and health care, cities have confronted serious issues with ageing. The social isolation problem of elders has been gradually valued and regarded as an important issue. Intergenerational co-living might be a possible approach for solving both elder landlords and the youth working population and further establishing inclusiveness within the city.

Therefore, the study attempts to explore the feasibility of intergenerational co-living based on the perspective of an inclusive city. As we all know, the basic living styles among the elders and the young are quite different. In addition, most elders might own real estate ownership due to the high housing price in the city while most of the young working population might not be able to own or afford high rent in the city. Intergenerational co-living might be a possible solution to deal with elder landlords to rent out the idle room with lower rent to the youth to acquire company and even health care.

In the beginning, the study will review the past literature regarding the concept of inclusive city and the successful case studies of intergenerational co-living. To select an appropriate study area, the study will then utilise suitability analysis to search for potential sites. The criteria include the population composition, the real estate market, and the location of the university. The composition of intergenerational co-living is the elder and the young, while the young could be separated into college students and the working population. Due to this being a preliminary study, we will then focus on exploring the feasibility of intergenerational co-living between the elders and college students.

Afterward, the study will apply surveys to explore both the demand from the elders and the young population on the topic of intergenerational co-living and the structural equation model (SEM) will then be applied to explore the relationship between the elders and the young. The purpose of the study is to provide policy recommendations for promoting intergenerational co-living in Taiwan.

Keywords: structural equation model, suitability analysis, inclusive city, intergenerational co-living, statistics

2 LITERATURE REVIEW

2.1 Inclusive City

The urban environment is an important centre of political, economic, and cultural development. Recently, emerging technologies especially in communication, transportation and globalisation accelerate the circulation of groups, information, and culture, that change the lifestyles in the urban environment directly or indirectly and strengthen connections. However, it has also become the source of differentiation and the basis of exclusion in society (UN-Habitat, 2004; Stren, 2001). In 2000, UN-Habitat proposed the "Inclusive City", which is defined as "a place where everyone, regardless of their economic means, gender, race, ethnicity, or religion, is enabled and empowered to fully participate in the social, economic, and political opportunities that cities have to offer. Participatory planning and decision making are at the heart of the inclusive city." (Asian Development Bank, 2017). In 2015, the United Nations released the 17 Sustainable Development Goals (SDGs), of which the 11th goal is "Sustainable Cities and Communities" and reveals that cities and human settlements should be inclusive, safe, resilient, and sustainable by improving the living environment of disadvantaged groups. As a result, many countries, local governments, and scholars have realised the importance of inclusiveness, and have begun to discuss some related areas like inclusive growth, inclusive urban design, and inclusive city assessment (Liang et al. 2021；World Bank, 2016；Espino, 2015；Dani & Haan, 2008；Westendorff et al., 2004).

However, due to the lack of a complete and systematic definition, framework, and execution of an inclusive city, it is difficult to have appropriate policies to implement the goals that an inclusive city wants to achieve. In addition, social exclusion is still a widespread issue (World Bank, 2013). The people who have been excluded who belong to all categories: gender, race, class, ethnicity, religion, and disability status, are prone to be stigmatised and stereotyped because of their unique differences and are treated unequally and there is little chance for them to change status. Among them, advanced age, a stage that many will go through, has also become one of the groups that suffer from social exclusion. Elderly people over the age of 65 are prone to major changes in their lifestyles and interpersonal relationships due to factors such as retirement, chronic diseases, and loss of important relatives and friends, and gradually become physically and psychologically weak. It is difficult to maintain participation in social activities, or expanding new friendship contacts (Smith, 2021).

With the daily progress of society, the rapid development of medical technology, and the change in people's ideas, the birth rate, and death rate have decreased year by year, while the proportion of the elderly population has increased significantly. The ageing society has become a major issue in the world. According to the definition of the World Health Organisation of the United Nations, in 1993, the proportion of my country's population over the age of 65 reached more than 7%, becoming an ageing society. In 2018, it exceeded 14% and became an ageing society. In just 25 years. ageing, was much faster than in other developed countries. According to the analysis by experts through population estimation, it is expected that the proportion of the population over the age of 65 in Taiwan will reach 20% by 2025, making it a super-aged society, and urban-friendly architectural design for the elderly is more imperative (Institute of Architecture, Ministry of the Interior, 2018). On the other hand, according to the statistics of the Ministry of Finance, about 30% of the houses in the country are owned by people over the age of 65 (Statistics Department of the Ministry of Finance, 2020). According to the summary analysis of the results, the elderly living alone increased from 14.3% to 15.6%, and the proportion of only living with a spouse or common-law partner also increased from 19.5% to 21%. The increasing number of elderly people living alone year by year may cause problems such as the inability of immediate treatment of accidents of the elderly at home, the disconnection between life and society, and the cluttered and unattended home environment, which are urgent issues to be solved today (Yang Huiru, 2005).

2.2 Intergenerational co-living

The concept of "co-living" originated in the 1960s with the Danish scholar Bodil. The idea began to take shape after Graae wrote the report "Children Should Have One Hundred Parents." According to the concept in the article, in 1967 about fifty families came together to form an organisation, the Sættedammen, which is currently the world's first group of co-housing communities. In addition to the independent space of the bedroom, the community has a larger number of public facilities for the general community, so that the residents living in the communal house have a strong sense of community, can actively participate in community affairs, and residents can also take care of each other, taking care of children, sharing childcare, gardening and other work. At dinner time twice every Monday, residents will also take turn in cooking, sharing cooking work and sharing meals, as welll as at the weekly community meetings. Members of the community will also take care of the overall management of the community through joint efforts. Thus they liive and engage in activities that foster a sense of community. Generally speaking, the decision-making of the community comes from the consensus of the members - the opinions of all residents of the community are adopted, and decisions are made based on membership agreement (Wu Cihua, 2017).

After that, the concept of co-living has gradually become popular, as the proportion of elderly people increases year by year. Inter-generational co-living has also been proposed and implemented. Its ancestor can be traced back to the Mediterranean port city of Alicante in Spain. In the early 2000s, the local municipal government built a "senior village" specially tailored for the elderly. Although the living environment is excellent, the elderly living in them still feel lonely and isolated from society. At that time, nearly half of the young people in Spain were unemployed. Even if the university was free of tuition fees, the young people could not find part-time jobs, making their food, clothing, housing, and transportation expenses a problem. Therefore, the government decided to recruit young people to live there. In 2003, the "Municipal Project For Intergenerational Housing and Community Services" was launched. The selection is based on conditions such as experience and love and patience. After establishing its effectiveness, some universities have

implemented the "Programa Vive Y Convive" intergenerational co-living programme, using the resources hidden in the two major groups of the elderly and young people - young people have the physical strength and spare time, and the elderly have a house. These are resources for the two generations to live together and take care of each other, to protect both parties. In addition of being managed by the university as an intermediary, students and the elderly sign a contract to ensure that both parties abide by their commitments. From the perspective of society, cross-generational houses can use land resources more effectively, which is also in line with economic principles (Liu Yijun, 2019).

3 RESEARCH DESIGN

3.1 Research area

Considering the benefit of the needs of the elderly, this study takes Taipei City as the preliminary research scope, and then divides "intergenerational co-living" into three different needs of "youth", "elderly" and "housing", and sets the screening conditions; In the research, the "silver" part obtained information on the age and proportion of household heads in each district in the first quarter of 2011 in Taipei City through the information provided by the real estate information platform of the Ministry of the Interior. The third quantile of each mile in Taipei City was used as the boundary, and then compared with other conditions. In the "House" part, the positioning statistics are based on the number of rented houses in the first quarter of 2011. The first 25% of the number of rented houses are taken and then compared with the above screened out ones. The 59 village do not overlap. The "youth" part is based on college students who are the main rental demanders. The research scope is narrowed down to the "village" level by screening the conditions of whether they are close to the university. Quantitative analysis to explore the feasibility assessment of localised intergenerational co-living. Therefore, in this study, Minhui Village, Daan District will be taken as the final research field to conduct a feasibility analysis.
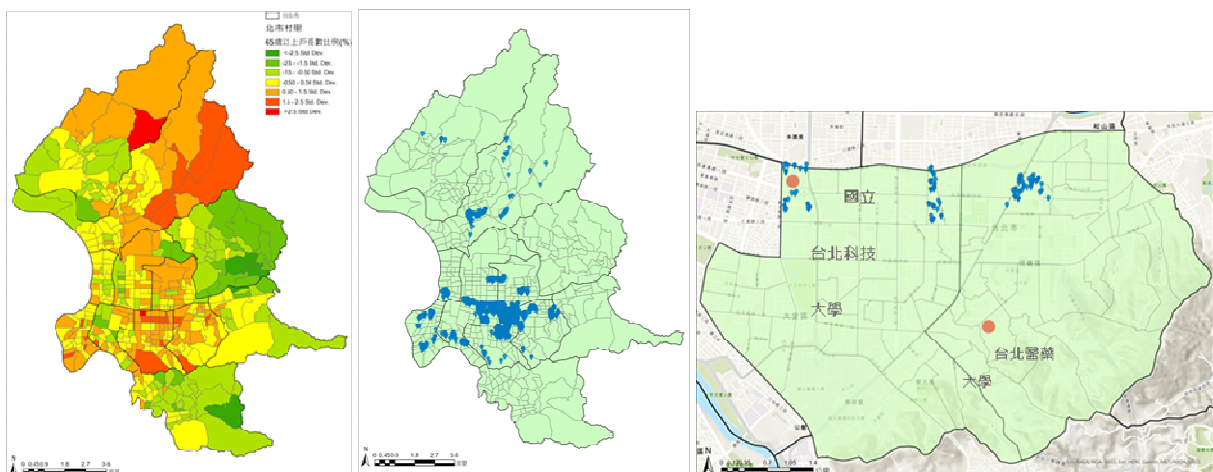

Fig. 1: Heads of households of Taipei City in 2021 (left). Fig. 2: The number of housing rentals in Taipei City in 2021 (middle). Fig. 3: Location relationship with the nearest university (right).

3.2 Survey design

This research hopes to understand the willingness of the elderly and young people to intergenerational co-living by distributing online questionnaires to the elderly over 65 living in Minhui Village, Daan District, as well as students of Taipei University of Technology. The content design of the questionnaire can be divided into four parts, including basic personal information, the expected benefits of participating in the intergenerational co-living, the price you are willing to pay for participating in the intergenerational co-living process, and the factors that will reduce participation in the intergenerational co-living; The seven-point scale is used to ask questions, with seven different grades: strongly agree, agree, somewhat agree, average, somewhat disagree, disagree, and strongly disagree, to explore the respondents' agreement on the narrative questions.

4 CONCLUSION

In this study, a total of 187 recovered data were collected from the elderly questionnaire, of which 18 were invalid questionnaires, and a total of 166 valid questionnaires; a total of 160 recovered data were collected from the youth questionnaire, of which 2 were invalid questionnaires. There were 158 valid questionnaires.

4.1 Descriptive statistical analysis

The sample structure of the questionnaire for the elderly in this study, in terms of gender, is dominated by women, accounting for 60.84%. In terms of age, it is mostly in the range of 65 to 70 years old, accounting for 81.33%. Employment status is mainly retired, accounting for 77.11%, while those in employment and unemployed account for 21.69% and 1.20% respectively. The distribution of average monthly income is relatively even within the range of 10,000 to 20,000 yuan (30.12%). and is slightly higher than other ranges. The respondents live mostly with their family members or relatives, accounting for 92.77%. The housing type is mainly self-owned houses, accounting for 90.96%. The respondents who are willing to participate in intergenerational co-living account for 78.92%, and those who are unwilling to live together accounted for 21.08%.

Item	Options	Times	Percent	Item	Options	Times	Percent
Gender	Male	65	39.16%	average monthly income	Under $10,000	34	20.48%
	Female	101	60.84%		$10,000-$20,000	50	30.12%
Age	65-70	135	81.33%		$20,000-$30,000	37	22.29%
	71-75	26	15.66%		$30,000-$40,000	20	12.05%
	76-80	3	1.81%		$40,000-$50,000	14	8.43%
	81-85	2	1.20%		Over $50,000	11	6.63%
	Over 86	0	0.00%	living situation	alone	9	5.42%
marital status	Unmarried	13	7.83%		With families or relatives	154	92.77%
	Married	136	81.93%		With friends	3	1.81%
	Widowed	14	8.43%	Dwelling type	Own	151	90.96%
	Divorced	3	1.81%		Rent	14	8.43%
Have child or not	Yes	153	92.17%		Other	1	0.60%
	No	13	7.83%	Physical conditions	Disabled	2	1.20%
Employment status	Retired	128	77.11%		Part disabled	29	17.47%
	Employed	36	21.69%		Normal	135	81.33%
	Unemployed	2	1.20%				
Willing to join intergenerational co-living or not	Yes	131	78.92%				
	No	35	21.08%				

Table 1: Times and Percentage of Part I

	I expect the occupants to provide company (including chat and entertainment)		I expect the occupants to accompany when I go out (including walking, shopping, and attending gatherings)		I expect the occupants to assist in daily life care (such as assistance with housework)		I expect the occupants to help maintain the home environment		I expect the occupants to provide special talents (such as playing an instrument or teaching painting)	
	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage
Strongly disagree(1)	0	0%	0	0%	1	0.76%	0	0%	0	0%
Disagree (2)	1	0.76%	1	0.76%	2	1.53%	1	0.76%	4	3.05%
Slightly disagree (3)	3	2.29%	7	5.34%	1	0.76%	2	1.53%	8	6.11%
Neutral(4)	21	16.03%	13	9.92%	19	14.50%	8	6.11%	48	36.64%
Slightly agree (5)	47	35.88%	38	29.01%	40	30.53%	45	34.35%	31	23.66%
Agree (6)	46	35.11%	52	39.69%	46	35.11%	58	44.27%	30	22.90%
Strongly agree (7)	13	9.92%	20	15.27%	22	16.79%	17	12.98%	10	7.63%
Descriptive analysis										
Average	5.320610687		5.473282		5.450382		5.587786		4.801527	
Standard deviation	0.98658054		1.083642		1.124645		0.90188		1.179438	
Standard error of the mean	0.086197942		0.094678		0.098261		0.078798		0.103048	
Confidence(95%)	0.17053232		0.18731		0.194397		0.155892		0.203868	

Table 2: Times, Percentage, and Descriptive Analysis of Part II

The second part of this questionnaire is a continuation of the question "Want to participate in the intergenerational co-living". In the first part, the total number of respondents is 131, and the interview is conducted with a seven-level Likert scale, with options ranging from 1 to 1. 7 which are strongly disagree, disagree, somewhat disagree, average, somewhat agree, agree and strongly agree, so as to understand why the elderly need more assistance in the intergenerational symbiosis. In the analysis, it was found that among

the various items of assistance that the elderly expect from intergenerational symbiosis are as follows: the residents who are expected to assist in maintaining the home environment have the highest demand, with an average of 5.59; for shopping and attending gatherings the average is 5.47. The lowest demand is for those who expect the occupants to provide special talents (such as performing musical instruments or teaching painting); the average is only 4.80, between ordinary and somewhat agreeable.

This part is a continuation of the second part, hoping to understand what kind of assistance the elderly are willing to give. In the third part of the questionnaire, the elderly are the most willing to provide their past knowledge and experience, with an average of 5.53; while the willingness to provide their own connections and to provide rent relief is second, with an average of 5.23. However, in the standard deviation, the option of providing personal connections is greater than the option of providing rent reduction or exemption, indicating that the elderly have a large gap in their willingness to provide their personal connections; the

	I am willing to offer rent relief		I am willing to provide knowledge and experience		I would like to provide my connection		I am willing to adjust the layout and furnishings of the space	
	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage
Strongly disagree(1)	0	0%	0	0%	0	0%	0	0%
Disagree (2)	2	1.53%	0	0%	0	0%	0	0%
Slightly disagree (3)	2	1.53%	2	1.53%	6	4.58%	6	4.58%
Neutral(4)	21	16.03%	14	10.69%	25	19.08%	24	18.32%
Slightly agree (5)	54	41.22%	45	34.35%	44	33.59%	49	37.40%
Agree (6)	43	32.82%	53	40.46%	45	34.35%	41	31.30%
Strongly agree (7)	9	6.87%	17	12.98%	11	8.40%	11	8.40%
Descriptive analysis								
Average	5.229008		5.526718		5.229008		5.206107	
Standard deviation	0.957279		0.905778		1.004336		0.990086	
Standard error of the mean	0.083638		0.079138		0.087749		0.086504	
Confidence(95%)	0.165467		0.156566		0.173601		0.171138	

lowest willingness is to adjust the layout and decoration of the interior space, with an average of 5.21.

Table 3: Times, Percentage, and Descriptive Analysis of Part III

	I'm worried about the incompatibility with the occupants' personalities		I'm worried about the difference in schedule with the occupants		I'm worried about the difference with the living habits of the occupants		I'm worried about feeling uncomfortable with the changes in the furnishings		I'm worried about sharing bathrooms and kitchens with others		I'm worried about the lack of integrity of the occupants	
	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage	Times	Percentage
Strongly disagree(1)	0	0%	0	0%	0	0%	1	0.60%	0	0%	0	0%
Disagree (2)	0	0%	0	0%	1	0.60%	0	0%	0	0%	0	0%
Slightly disagree (3)	6	3.61%	4	2.41%	3	1.81%	3	1.81%	7	4.22%	5	3.01%
Neutral(4)	20	12.05%	20	12.05%	20	12.05%	58	34.94%	32	19.28%	26	15.66%
Slightly agree (5)	65	39.16%	50	30.12%	46	27.71%	45	27.11%	47	28.31%	38	22.89%
Agree (6)	51	30.72%	59	35.54%	59	35.54%	46	27.71%	46	27.71%	61	36.75%
Strongly agree (7)	24	14.46%	33	19.88%	37	22.29%	13	7.83%	34	20.48%	36	21.69%
Descriptive analysis												
Average	5.403614		5.584337		5.626506		5.024096		5.409639		5.584337	
Standard deviation	0.996837		1.015991		1.052683		1.055731		1.13923		1.085215	
Standard error of the mean	0.07737		0.078856		0.081704		0.081941		0.088421		0.084229	
Confidence(95%)	0.152762		0.155697		0.16132		0.161787		0.174583		0.166306	

Table 4: Times, Percentage, and Descriptive Analysis of Part IV

In the fourth part, regardless of whether the respondents are willing to participate in the intergenerational symbiosis, they will fill in this part, so that they can fully understand the doubts of the elderly about the

implementation of the intergenerational symbiosis. According to the compilation of this study, it is found that the elderly are most worried about the difference in living habits with the residents in intergenerational co-living, with an average of 5.63; secondly, they are worried about the lack of integrity of the residents and the difference in the living habits of the residents. The average is the same. It is 5.58, but in terms of standard deviation, the option of worrying about the lack of integrity of the occupants is slightly larger than the option of worrying about the difference in the living routine of the occupants. Among the options that feel uncomfortable with changes in home furnishings, the average number is the lowest (5.02), which is the item that the elderly are least worried about.

4.2 SEM

In the structural equation, the questions in the second and third parts of the questionnaire are mainly used for analysis, and the questions will be re-divided into "willingness to intergenerational co-living", "rewarding from young/old people", and "personal willingness to pay." "Three aspects are discussed, and finally the feasibility of co-living between youth and elderly is drawn from these three aspects.

1. Questionnaire for the elderly

The "intergenerational co-living willingness" dimension of the elderly questionnaire includes two variables: expecting the occupants to provide company (including chatting and entertainment) and expecting the occupants to accompany them to go out (including walking, shopping, and attending meetings). The "Benefits from youth" dimension includes three variables: the expectation that the occupant can assist with daily life (such as assisting with housework, safety monitoring), the expectation that the occupant can assist in maintaining the home environment, and the expectation that the occupant can provide special talents (such as performing musical instruments or Teaching painting). "Personal willingness to pay" includes four variables: willingness to provide rent reduction, willingness to provide past knowledge and experience, willingness to provide one's own contacts; and willingness to adjust the layout and decoration of the interior space. The structural equation constructed by it is as follows:
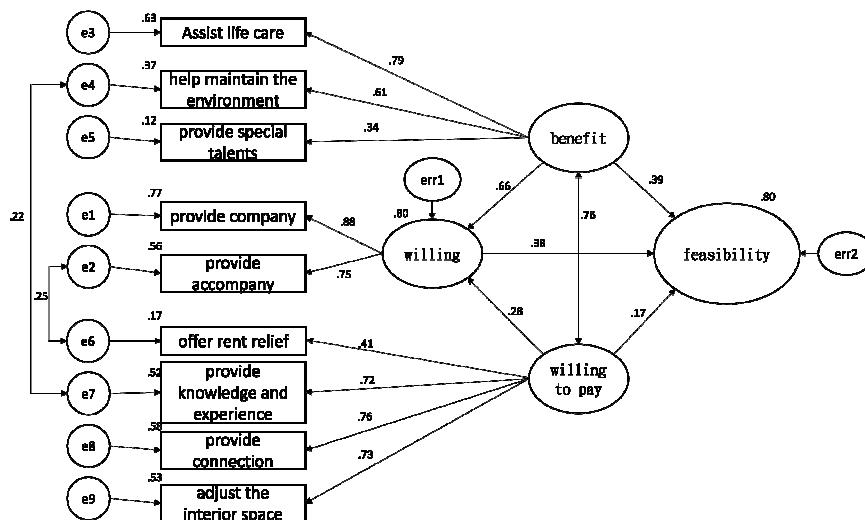

Fig. 4: Structure of SEM

Standardized regression coefficients, also known as "factor loadings", represent the direct effects of latent factors on measurement indicators, and values between 0.50 and 0.95 indicate that the basic fit of the model is good. If it is larger, the greater the variation of the index variable can be explained by the facet (>0.6 is acceptable, and >0.7 is the ideal value), and the variable index can more effectively reflect the characteristics of the facet to be measured. In order to confirm that the research model of the elderly is consistent with the questionnaire data, the following indicators can be used to illustrate the overall fitness of the research model of the elderly. For the results of each fitness index, the chi-square value is 25.041, the degree of freedom is 22, the p value is 0.295 and greater than 0.05 indicates that it is not significant, and the RMSEA 0.032 is lower than 0.05, indicating that the model error is low and the model has excellent adaptability. The Fit Index (GFI) is 0.962 higher than 0.9 and the Adjusted Fit Index (AGFI) is 0.922 higher than 0.9, the Fit Index (NFI) is 0.943 higher than 0.9 The Fit Index (IFI) is 0.993 higher At 0.9, the indicator is suitable.

item	modle data	standard	up to standard or not
CMIN	25.041	The smaller the better	—
DF	22	The smaller the better	—
P-value	.295	>.05	Yes
CMIN/DF	1.138	Preferably between 1 to 3	Yes
RMR	.043	<.05	Yes
RMSEA	.032	<.08(good) <.05(excellent)	Yes
GFI	.962	>.90	Yes
AGFI	.922	>.90	Yes
NFI	.943	>.90	Yes
RFI	.907	>.90	Yes
IFI	.993	>.90	Yes
TLI(NNFI)	.988	>.90	Yes
CFI	.922	>.90	Yes

Table 5: Modle data and standard of SEM

Through the analysis of the above coefficients and fit indicators, it can be seen that the model of the elderly has a certain degree of fit, and for the elderly, the willingness to intergenerational co-living, the benefits from youth, and the personal contribution willingness will all affect the feasibility of intergenereational co-living. Among the three, the influence of benefit from youth is the most significant, followed by willingness to intergenerational co-living, and finally the personal contribution willingness; in addition, benefit from youth will also affect the willingness of intergenerational co-living, while benefit from youth and personal contribution willingness affects each other. It shows that the elderly pay more attention to the project of benefit from youth. If it can meet the related needs of the elderly, it can greatly enhance the willingness of the elderly to participate and personal contribution willingness, and then promote the feasibility of intergenerational co-living.

5 REFERENCES

Asian Development Bank. (2017). ENABLING INCLUSIVE CITIES Tool Kit for Inclusive Urban Development.

World Bank. (2013). Inclusive Matter.

World Bank. (2015). World Inclusive Cities Approach Paper.

World Bank. (2016). Inclusive Cities and Access to Land, Housing, and Services in Developing Countries.

A.A. Dani, & A. de Haan. (2008). Inclusive States: Social Policy and Structural Inequalities: World Bank Publications.

N.A. Espino. (2015). Building the Inclusive City: Theory and Practice for Confronting Urban Segregation: Taylor & Francis.

Emma Garland. (2018). Learning from Intergenerational Housing Projects in the USA.

Danni Liang, Martin De Jong, Daan Schraven, & Lili Wang. (2021). Mapping key features and dimensions of the inclusive city: A systematic bibliometric analysis and literature study. International Journal of Sustainable Development & World Ecology, 1-20. doi:10.1080/13504509.2021.1911873

Nantes'Renoue. (2022). Nantes'Renoue. Retrieved from https://www.nantesrenoue.com/

Benjamin J. Smith. (2021). Exploring student discourses: Would intergenerational cohousing be possible?

Richard E. Stren. (2001). Thinking about Urban Inclusiveness.

UN-HABITAT. (2001). The State of the World's Cities, 2001: UNCHS (Habitat).

UN-Habitat. (2004). THE STATE OF THEWORLD'S CITIES 2004/2005.

D.G. Westendorff, United Nations Research Institute for Social Development, Swiss Agency for Development, Co-Operation, Switzerland. Direktion für Entwicklungszusammenarbeit und Humanitäre Hilfe, & Schweiz. Direktion für Entwicklung und Zusammenarbeit. (2004). From Unsustainable to Inclusive Cities: UN Research Institute for Social Development.