Effect of Various Housing Patterns on Social Cohesion

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Abstract. Social cohesion in housing is an attribute of the quality of the community of its inhabitants. Housing planning needs to function to facilitate the social interaction of its inhabitants. This research aims to identify the effect of housing patterns on social cohesion in various housing patterns. Most existing housing patterns built are grid, linear, and T-shape patterns. It is necessary to know the effect of each pattern on social cohesion. The data collection technique used the questionnaire survey method. Two clusters were selected as samples such as the Lavender Lane 1 and Graha Sevilla in Citra Raya, Tangerang Regency. Those samples have linear, grid, and T-shape patterns. The total number of respondents from the three housing patterns is 121. The analysis technique used simple linear regression using Smart-PLS software. The results showed that the effect of housing patterns on social cohesion was evident in the linear and T-shape patterns, while it was not in the grid pattern. The housing pattern indicators affecting social cohesion are the total row of houses, building layout plans, and street patterns that need to be considered in cluster housing planning to build social cohesion.

1. Introduction

Social cohesion is the object of research in various disciplines and is one of the considerations in making spatial policies in European countries [1]. It is also a factor in creating a livable housing environment [2]. The cohesive social environment is an element that determines the quality and stability of life and is a standard for the success of urban spatial units [3]. A cohesive community is influenced not only by social environmental factors but also by the physical environment. Principle, the focus of housing physical environmental planning is to facilitate social interaction among residents. The survival of the community depends on the integration of those who help each other, have better social support and cohesion than isolated communities or live separately [4]. American Planning Association states that housing planning must be able to create a residential environment that makes it easier for residents to interact to form social cohesion [5].

Previous studies have shown that planned housing has low social cohesion [6] [7]. It can be considered a failure in housing planning. The low social cohesion of a residential community can be affected by setting housing patterns [6]. Street patterns and housing patterns can increase and control informal interactions between individuals leading to the creation of social cohesion [8]. Previous research stated that housing patterns can influence whether or not social cohesion is created [9]. The purpose of this research is to identify the effect of housing patterns on social cohesion in various housing patterns. The linear, grids, and T-shaped housing patterns are the ones most developed by

developers. Lavender Lane 1 and Graha Sevilla Clusters located in Citra Raya, Tangerang Regency were chosen as the research loci because they have all three housing patterns and the social conditions of their residents can be considered homogeneous.

2. Materials and Methods

To be able to test the effect of housing patterns on social cohesion, indicators are used as shown in Table 1.

Table 1. The Housing Pattern and Social Cohesion Indicators

Construct	Indicator	Source
Housing pattern	Road network pattern	[5] [10] [11]
	The width of the road	
	Housing layout	
Social cohesion	Frequency of interacting with neighbours	[2] [12] [13] [14] [15]
	Getting to know each other with neighbours	[16] [17] [18]
	Trust in neighbours	
	Sense of ownership	
	Sense of helping each other	

The unit of analysis in this study is the area according to the location of the housing pattern studied, namely areas with grid, linear, and T-shape patterns. The primary data was used collecting by the questionnaire survey method. The number of respondents was calculated using the Slovin formula for 121. The number of respondents for the linear pattern is 33, the T-shape is 52, and 36 for the grid pattern.

The analytical technique to examine the effect of housing patterns on social cohesion is a simple linear regression. The validity test used criteria to test indicators considering valid is the value of >0.7 on their loading factor or an Average Variance Extracted (AVE) value of >0.5. While the reliability test, the criteria used are Cronbach's alpha value and composite reliability above the value of 0.7. The structural model test used the R-square, Q-square, and Goodness of Fit (GoF) values. The R-square value shows how much influence housing patterns have on social cohesion. The Q-square value measures how well the observations are produced by the model, indicators and variables. A model can be said to be good if it has a predictive relevance value > 0 and is said to be poor if the predictive relevance value is < 0. After testing the measurement model and the structural model, it is necessary to evaluate the Goodness of Fit (GoF). The model can be said to be good if it has a GoF value of > 0.38. The hypothesis is considered significant if the P-Value is < 0.05 or the T-statistics value must be > 1.96. The analysis is carried out at two levels, namely at the level of each housing pattern and the total pattern simultaneously.

3. Results and Discussion

Valid and reliable indicators of housing patterns are the placement of house buildings, road network patterns, and road widths, while valid and reliable indicators of social cohesion are knowing each other with neighbours, trusting them, and helping each other.

The results of the inner model test for all housing patterns simultaneously obtained an R-Square value of 15.5% and it proves that there is an effect of housing patterns on social cohesion due to the T-Statistics > 1.96, the P-value <0.05, and the original sample value is positive. The result is in line with previous studies that said physical aspects like housing pattern and housing infrastructure can affect and has a strong relation to creating social cohesion [19][20]. Both samples of the housing cluster are gated housing types so they make more privacy and security. It is in line with a previous study that says that housing with good privacy and security can increase social interaction and social cohesion among neighbours [21].

The following are the results of testing the effect of housing patterns on social cohesion in each housing pattern.

3.1. Linear Housing Pattern

There is an influence of linear housing patterns on social cohesion which is significant with an R-squared value of 27.3% and a regression coefficient of 52.2%.

Table 2. The Significant Dimensions and Indicators of Linear Housing Patterns

Construct	Dimension	Indicator	Loading Factor	Respondents' Responses
Housing pattern	Placement of house building	Total Row of Houses	0,577	1,303
		Housing layout	0,938	4,090
	Road network pattern	Road pattern	0,922	4,424
Social cohesion	Frequency of interacting with neighbours	Participating in routine activities	0,749	4,000
		Attend neighbourhood association meeting	0,847	3,666
		Casually talking on the street in front of the house	0,629	4,030
		Casually talking with neighbours when you pass on the street	0,866	4,303
	Get to know each other with neighbours	Knows 50% of the names of the heads of neighbouring families	0,401	3,969
		Knows 50% of the religion adhered to by the head of a neighbouring family	0,741	4,121
	Sense of trust among neighbours	Allowing children to play in the neighbour's house	0,808	4,151
		Lending valuables	0,679	3,757
Average			0,741	3,801

Based on Table 2, the placement of house buildings facing each other and the straight road network pattern makes them more familiar with their neighbours (knowing the name of the head of the family and the religion of the head of their neighbour's family). The small size of the neighbourhood and the visibility between one house and another make residents interact more often with their neighbours, creating a sense of trust among them. These results are consistent with previous studies which state that the resident of a residential neighbourhood tends to interact more with their nearby neighbours [22]. This housing pattern can make the residents interact with their neighbour more often so it makes them knows each other well and can create trust among them.

3.2. T-shape pattern

The T-shape pattern of residential has an effect on social cohesion with a regression coefficient of 55.8% and an R-square value of 31.1%. The effect of this pattern is greater than the linear.

Table 3 shows in detail the significant indicators of each dimension in each construct. The dimensions of the placement of house buildings and the road network pattern affect social cohesion in the T-shape pattern, the same as in the linear pattern. In the dimensions of the placement of the house, there are different indicators, namely the T-shape road in front of the house while the indicator for the total series of houses is in a linear pattern. While the street pattern indicator is significant for both housing patterns.

The number of social cohesion indicators is more significant in the T-shape pattern than in the linear pattern with a higher average loading factor value. This shows that in the T-shape pattern, more indicators of social cohesion are affected by the placement of house buildings and the pattern of the road network.

Table 3. Significant Dimensions and Indicators of T-shape Housing Patterns

Construct	Dimension	Indicator	Loading Factor	Respondent's response
Housing pattern	Placement of house building	In front of the T-shape road	0,703	1,807
		Housing layout	0,906	2,173
	Road network pattern	Road pattern	0,810	2,288
Social cohesion	Frequency of interacting with neighbours	Participating in joint sports	0,733	3,903
	Get to know each other with neighbours	Knowing 50% of the names of the heads of neighbouring families	0,622	3,961
		Knowing 50% of neighbours regarding the education level of their eldest child	0,777	3,384
		Knowing 50% of the ethnicity of heads of neighbouring families	0,827	3,576
		Knowing 50% of the religion adhered to by the head of a neighbouring family	0,674	4,173
	Sense of trust among neighbours	Always leave house keys with neighbours	0,849	3,134
		Feeling anxious when not closing doors or fences	0,706	3,346
		Sharing personal problems with neighbours	0,785	3,153
		Asking neighbours for advice regarding personal problems	0,841	3,134
		Lending valuables	0,775	3,346
	Sense of ownership	Giving unsolicited contributions for joint activities	0,755	3,346
		Contributing energy or mind to solve common problems	0,743	3,846
		Issuing funds for physical improvement	0,745	3,538
		Assist in planning joint activities	0,689	3,807
	Mutual help among neighbours	Mutual borrowing of money	0,844	3,153
		Visiting sick neighbours	0,741	4,134
		When a neighbour is affected by the covid-19 virus other neighbours send food or foodstuffs	0,717	3,692
		Helping neighbours when they are organizing events	0,716	3,961
Average			0,759	3,374

The empirical condition of this housing pattern can stimulate resident's will on doing the sport together with their neighbour such as jogging and cycling. The road network of this pattern has a lot of crossroads

making the distance further. Also, the width of the roads allows them to talk and do sport together. This finding is consistent with the previous studies that stated the road network of walkable streets tends to promote social cohesion [23].

3.3. Grid Pattern

The grid pattern does not affect social cohesion as indicated by the negative value of the regression coefficient. The absence of the influence of this pattern on social cohesion lies in the indicators of the width of the road and the T-shaped road in front of the house. Physically in this pattern, the pieces of the road are perpendicular. It allows quite several houses to face the road directly. This makes it easier for residents to interact, considering that the road is one of the means of shared space. The narrow road width on the grid pattern is an obstacle because it interferes with the movement of passing cars.

3.4. Effect of Different Housing Patterns on Social Cohesion

Based on the hypothesis testing of the effect of housing patterns on social cohesion, the result is that of the three patterns, only linear and T-shape patterns affect the social cohesion of its residents. The R-Square value of the T-shape is greater than the linear pattern. While the original sample value shows that the grid pattern has a minus value, meaning that the grid does not affect social cohesion. See Table 4. This finding is following the results of previous research which stated that the physical distance between houses can lead to social interaction, the closer the distance between buildings, the greater the chance for residents to meet [9]. This can be explained by the empirical conditions of the linear and T-shaped pattern. The majority of the houses in the two patterns are close together, in the sense that they face each other and are next to each other. In a linear pattern, a road network that applies a two-way rule and can be traversed by vehicles freely can form a joint activity space that allows occupants to pass each other [9]. In the linear pattern, the road in front of the house is a two-way rule and can be passed by two cars passing each other, so that in this pattern the road in front of the house facilitates residents to interact. The previous study stated that the grid pattern can stimulate the will of the resident to walk creating social interaction and cohesion among the neighbour [10]. On the contrary, in this study, the grid pattern doesn't have an effect on creating social cohesion because the width of the road is quite small making it hard to walk on this road.

Table 4. The R-square and original sample values for various housing patterns

Value of	Housing pattern			
	Linear	T-shape	Grid	All pattern
R-Square	0,273	0,311	0,173	0,155
Original Sample	0,522	0,558	-0,416	0,394

Table 5 shows indicators that have a significant effect on social cohesion in three different patterns.

Table 5. Significant Indicators of Various Housing Patterns

Linear	T-shape	Grid	All housing pattern
Placement of house building • The total row of houses • Layout of housing **Road network pattern** • Road pattern	**Placement of house building** • House is in front of the T-shape road • Layout of housing **Road network pattern** • Road pattern	No effect	**Placement of house building** • House is in front of the T-shape road • Layout of housing **Road network pattern** • Road pattern **The width of the road** • Neighbourhood roads not allowing cars to be parked

Tests on all three patterns show that the placement of house buildings, the pattern of the road network, and the width of the roads affect social cohesion. When compared per housing pattern, the results show

that there is no effect on the grid housing pattern. Meanwhile, in the linear pattern and the T-shape, only the width of the road has no significant effect on social cohesion. This finding is different from the previous studies which say that a grid-shaped road network pattern can encourage residents to walk to create interaction between residents [24]. The width of the road in the grid pattern is limited, making it difficult for residents to just walk. Previous research also suggested developers build housing with a grid pattern because it can create social interaction [25]. In the overall test, an indicator of road width that has a significant effect on social cohesion is that the road does not allow car parking, meaning that the road is narrow.

4. Conclusion

This research concludes that housing patterns affect social cohesion in the linear and T-shape patterns, while the grid has no effect on the cases studied. Housing pattern indicators that have a significant effect on social cohesion are the placement of house buildings (total row of houses, housing layout) and road pattern. These indicators need to be considered in housing cluster planning.

References

[1]   Damurski Ł 2022 Neighbourhood cohesion and territorial cohesion: in search for conceptual integrity *GeoJournal* **87**(6) 4635-4651.

[2]   Mousavinia, S.F., Pourdeihimi, S. and Madani, R., 2019. Housing layout, perceived density and social interactions in gated communities: Mediational role of territoriality. *Sustainable Cities and Society* **51** p.101699.

[3]   Youssef, K. W. F. and Tsenkova, S 2020) Neighbourhood cohesion in the suburbs: insights from two quasi-gated communities in Calgary Canadian Planning and Policy 20-45.

[4]   Wood, L., Gilles-Corti, B., Zubrick, S.R., and Bulsara, M.K. 2011 Through the Kids... We Connected With Our Community: Children as Catalysts of Social Capital' *Environment and Behavior* **45**(3) pp. 344 – 368.

[5]   Ziegler, E. H. 2007 American Cities, Urban Planning, and Place-Based Crime Prevention Paper presented at the Pantheon Sorbonne University of Paris 1, France, Paris.

[6]   Koesoemawati, D. J., Yuswadi, H., Ratnaningsih, A., Alfiah, R., and Firmansyah, M. 2019 Neighbourhood space for formal housing based on social cohesion in Jember Region *In IOP Conference Series: Earth and Environmental Science* **340**(1),012015.

[7]   Olivia, M., Adianto, J., and Gabe, R. T. 2019 A post-occupancy evaluation study of a mixed-income gated community in Cibubur, West Java, Indonesia *Urbani Izziv* **30**(2) 95-104.

[8]   Taylor, R. B. 1997 Social order and disorder of street blocks and neighbourhoods: Ecology, microecology, and the systemic model of social disorganization *Journal of Research in Crime and Delinquency* **34**(1) 113-155.

[9]   Abu-Ghazzeh, T. M. 1999 Housing layout, social interaction, and the place of contact in Abu-Nuseir, Jordan *Journal of environmental psychology* **19**(1) 41-73.

[10] Youssef, K. W. 2015 Gated-ness, Income Segregation and Neighbourhood Cohesion in Two Western Canadian Metropolises Unpublished doctoral thesis University of Calgary, Calgary, AB.

[11] Dewi, R. C. P. 2022 Kohesi Sosial Lingkungan Ketetanggaan pada Perumahan Berpagar (Kasus: Emerald View Bintaro Jaya dan Taman Provence BSD City) Skripsi Program Studi Perencanaan Wilayah dan Kota, Universitas Trisakti, Jakarta.

[12] Triyuli et al. 2014 Identifikasi Pola Perumahan Rumah Sangat Sederhana di Kawasan Sematang Borang Kota Palembang *TEMU ILMIAH IPLBI 2014*.

[13] Kobayashi, Yoshihiro 2005 Housing Layout Design Using Fractals: Computer Tool dan Its Practical Use In *Caad Futures* pp. 243-254.

[14] Rahmawati TA et al, 2018 Spatial-Based Disaster Risk Reduction. UB Press, Malang

[15] Stansfeld, S. A., Marmot, M., & Wilkinson, R. 2006 Social support and social cohesion. *Social determinants of health* **2** 148-171.

[16] Vergolini L. 2011 'Social cohesion in Europe: How do the different dimensions of inequality affect social cohesion?' *International Journal of Comparative Sociology* 52(3), pp.197–21

[17] Laurence J. 2009 'Social Cohesion: A Multi-Level Analysis of Social Capital and Interethnic Relations in UK Communities' *European Sociological Review* **27**(1), pp. 70-89

[18] Jeannotte, M. S. 2000 'Social cohesion around the world: an international comparison of definitions and issues', Paper SRA-309, (Strategic Research and Analysis Directorate, Department of Canadian Heritage, Ottawa).

[19] Tamboeo, G., Waani, J.O. and Tilaar, S., 2016. Dampak Sosial dari Pola Perumahan Permata Asri Pineleng. *SPASIAL*, *3*(1), pp.46-54.

[20] Siregar, J.P., 2021. Korelasi antara Konfigurasi Ruang Publik dengan Interaksi Sosial. *Jurnal Tata Kota dan Daerah*, *13*(1), pp.15-22.

[21] Lindsay, M., Williams, K. and Dair, C., 2010. Is there room for privacy in the compact city? *Built Environment*, *36*(1), pp.28-46.

[22] Bruhn, J., 2009. The group effect. *Social Cohesion and Health Outcomes. Springer*.

[23] Lloyd Lawhon, L., 2009. The neighbourhood unit: physical design or physical determinism? *Journal of planning history*, *8*(2), pp.111-132.

[24] Chan, J., To, H.-P., & Chan, E. 2006 Reconsidering social cohesion: Developing a definition and analytical framework for empirical research *Social Indicators Research* **75**(2) 273–302.

[25] Spoonley P., Peace R., Butcher A. & O'Neill D. 2005 'Social Cohesion: A Policy and Indicator Framework for Assessing Immigrant and Host Outcomes' *Social Policy Journal of New Zealand* **24** pp. 85-11.

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