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Suburban Development Model: A Transformation Determinant Perspective on Settlement Densification in Makassar City, Indonesia

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***Abstract*— The growth of settlement areas experienced a pattern of densification and was followed by physical spatial, residential, economic, and sociocultural transformations. Given the importance of conceptualizing development models and modeling the relationship between densification and transformation in peri-urban settlements, this study aims to analyze the factors that determine the densification and physical transformation of residential areas, the effect of transformation on densification, and the suburban development model. This study uses a quantitative survey method with 391 samples in the settlement community of Bumi Tamalanrea Permai and its surroundings. The data were analyzed simultaneously using a structural equation modeling (SEM) approach with the help of partial least squares (PLS) software. The results showed that spatial transformation and physical residential determined densification with an R^2 value of 0.466, or 46.6%, while spatial, economic, and sociocultural transformation determined physical residential with an R^2 value of 0.47.8, or 47.8%. The urban development model determines the spatial and physical transformation of housing that encourages an increase in residential units with designations for the middle and upper economic communities with the growth of affordable housing and luxury housing vertically and horizontally. The settlement transformation model determines the spatial and socioeconomic transformation process that encourages increased activity and interaction in new socioeconomic spaces. The results of this research will assist in formulating urban development sector policies for realizing suburban sustainability.**

***Keywords*— Development; spatial transformation; physical residential; sociocultural; densification.**

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I. INTRODUCTION

By 2050, more than 70% of the world's population is expected to live in cities, exponentially increasing urban densification and high-rise landscapes. The increasing rate of urbanization in cities implies growth in the urban periphery and a process of transformation with increased urban economic development, where urbanization and densification play an important role in the socioeconomic vitality of cities [1]. Changes in the dynamics of the pace of urbanization raise enormous issues and changes in social, economic, and environmental transformation [2]. Increasing populations of migrants, economic growth, and population density impact and cover changes, i.e., large-scale housing and new towns, large-scale industrial estates, and toll road development [3], [4].

The suburbs are experiencing growth and transformation due to urbanization, highlighting the peculiarities of rural-to-urban transformation [5]. Furthermore, urban transformation is a diverse set of factors, processes, and dynamics based in some places and not others, occurring globally and regionally due to urbanization and urban development approaches as well as transformational changes in city sub-systems [6].

The suburbs of Makassar City have increased land use, with housing and residential areas as the dominant land use types. Land use and land cover changes in the built area increased by 13.92% from 7849 hectares in 2006 to 10,294 hectares in 2016. It is predicted that the built area will cover 80.37% of the total area of Makassar in 2031 [7]. The growth of housing built in suburban areas, especially in the Bumi Tamalanrea Permai area, from the period 1989–1999, with an area of 57.36 ha or 21.65%, increased to 114.49 ha or 43.20% in the period 2000–2018, which means that there was an additional built-up area of 171.85 ha or 64.85% during the period 1989–2018. This shows that suburban areas experience growth in settlement densification from the transformation

process. The stages of transformation include (a) a change from residential to buildings with a service and trade function; (b) a mature land plot into a new housing area; and (c) buildings with a service and trade function [8].

Densification is a global issue that affects urban and environmental development [9]. UN-Habitat has identified planned city infill, redevelopment, and densification as three important focuses and criticisms in the global urban development agenda. The densification strategy was an effective tool for improving the sustainability of cities [10], [11]. Urban densification is the most relevant strategy for urban spatial development [12]. Densification is a policy to control urban sprawl and the challenges in determining the potential and priorities of urban densification at the city scale and densification as a sustainable housing strategy [13], [14]. Densification of the built environment is thus a key contemporary urban planning paradigm worldwide [15]. The densification strategy is inseparable from the growth of buildings and infrastructure and harms the environment [12].

Conceptually and theoretically, the development of this research is based on the theory that densification is a response to the increasing demand for space in urban areas. n the end, there is a process of spatial transformation followed by socioeconomic, cultural, and physical transformation of the environment in the city's suburbs. In the process of building densification, there is a diffusion of social and economic infrastructure buildings toward the suburbs, ultimately affecting the density of buildings in the city's suburbs [16]. Urban densification processes result in great variation in the type of physical change and character of the built environment and have implications for cities more generally [17].

Another conceptualization theory explains that spatial transformation significantly affects the socio-economics of local communities. Spatial transformation impacts the socioeconomic sustainability of local communities, as does social transformation, where changes in single social formations become multiple social formations and encourage changes in the economic production modes of migrants and local communities [18]. Spatial transformation impacts changes in social formation; changes in space utilization, social formation, and occupational differentiation significantly affect the socioeconomic sustainability of the community [18].

Another conceptualization theory explains that the transformation of neighborhoods could be explained by the contextual factors of the area, including land-use characteristics and socioeconomic factors [19]. The research results by Abed et al. explain that significant sociocultural factors affect internal layout transformations in public housing. Sociocultural factors play a significant role in determining units' layout transformation [20]. Formal private sector-driven densification strengthens affluent neighbourhoods' social and economic vibrancy [21]. Lien [22] conceptualization states that a reciprocal relationship exists between the house's physical condition and the occupants' socioeconomic conditions.

Various literature studies have not explained the concept of city development more deeply, where the transformation process is a working determinant of the growth of densification. This phenomenon requires the creation of the concept of a theory construction plot with a causal relationship. Thus, this study needs to conceptualize the flow model of the relationship between the structural model and its measurement model, where transformation is a determinant of the densification perspective with a suburban residential area approach. From the research problems above, a structural development model is needed based on constructing the theoretical concept flow. This research intends to answer the research questions as follows:

- What is the description of factors that determine the growth of densification?
- How does the physical spatial, economic, and physical transformation of housing affect densification and the effect of spatial, economic, and sociocultural transformation on physical housing?
- How is the suburban development model?

The novelty of this research is a model of suburban development where the spatial and physical transformation of residential determines the subsequent growth of densification; a transformation model where spatial, economic, and sociocultural transformation determines the physical transformation of residential; and a model of influence relationships between variables with a large-scale settlement case approach with structural equation model (SEM) path equation analysis using Smart-PLS 3 tools. Therefore, this research can fill the gap in the literature on suburban neighborhood transformation models.

II. Materials and Method

A. Method of Collecting Data

The population in this study comprises people who have lived for at least five years in the Bumi Tamalanrea Permai residential area and its surroundings. The research sample consisted of 391 respondents, namely a sample with a known population size and an unknown population size. The sample was determined using a multistage random sample, namely the two-stage sampling method [23]. The provisions include the characteristics of a heterogeneous community, starting with random cluster sampling and individual random sampling. Sampling by random cluster sampling includes:

- Main roads that have undergone massive residential-physical changes from land plots to residential areas to mixed land use functions.
- Environmental roads have changed their function from residences to areas with dual functions, namely services, and trade, with socioeconomic interaction activities.
- Environmental roads connecting the settlements of Bumi Tamalanrea Permai and its surroundings.

Meanwhile, an individual random sampling includes:

- The representation of residential unit types 21, 32, 36, 45, 54, and 70 in the Bumi Tamalanrea Permai residential area
- The representation of the residential community of the suburban village is typical of stilt houses.

Characteristics of respondents indicate that most participants are women (62.92%), mostly working in the tertiary sector, namely entrepreneurs/traders, civil servants, private sector employees/TNI/Polri, and freelancers. The rest work in the primary sector (0.75%). Most respondents are college

graduates (54.73%) and high school graduates (34.02%) (see Table 1 below).

TABLE I
DEMOGRAPHIC CHARACTERISTICS OF THE PARTICIPANT

Characteristics	Percentage Value
Age %	
Female	62.92
Male	37.08
Occupation %	
Primary sector	0.76
Tertiary sector	86.95
Unemployed	12.27
Education %	
No education	1.79
Elementary School	2.30
Middle School/Equivalent	7.16
High School/Equivalent	34.02
College	54.73

B. Data Analysis Method

This research used a quantitative analysis method of path equation model analysis with the Partial Least Squares-Structural Equation Modeling (Smart-PLS 3) approach. The variables' value was measured using a Likert scale to determine respondents' perceptions of growth and changes in the settlement environment. Respondents answered on a numerical scale for each question, with five being the highest and one being the lowest. Partial Least Squares-Structural Equation Modeling (SEM-PLS) analysis was used to test theoretical frameworks with complex structural models. It included many constructs, indicators, or relationship models to explore theoretical extensions of established theories or exploratory research for theory development [24]. Analyze the path equation with partial least squares structural equation modeling as follows:

$$X_1 = X_3 + e \quad (1)$$

$$X_2 = X_1 + X_3 + e \quad (2)$$

$$X_4 = X_1 + X_2 + X_3 + e \quad (3)$$

$$Y = X_1 + X_2 + X_4 + e \quad (4)$$

The dependent variable in this study is Y, and the independent variables are X_1, X_2, X_3, and X_4.

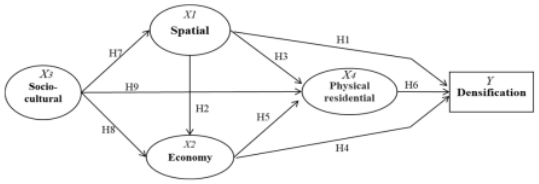

Fig. 1 The research proposed model.

Based on the formulation of the problem and the proposed research model, the results of identifying variables are shown in Table 2.

TABLE II
VARIABLES, INDICATORS, AND REFERENCES

Variable	Indicator	Reference
D	Y1. Population and employment increase	[17], [25]–[30]
	Y2. Through increasing the floor area built within the specified area	
	Y3. Increase in residential units.	
	Y4. Land Value	
	Y5. Location Characteristics	
	Y6. Building age	
	Y7. Building density	
	Y8. Infill development	
SPT	X11. Land use change	[18], [31]–[33]
	X12. Land price	
	X13. Building characteristics	
	X14. Settlement characteristic	
	X15. Circulation characteristic	
ET	X21. Increase in the proportion of migrants.	[3], [4], [18], [34]
	X22. Changes in work structure	
	X23. Increased revenue	
	X24. Increase in the number of formal and informal economic activities	
ST	X31. Social system change	[18], [35]
	X32. Social order	
	X33. Social mobility	
	X34. Cultural pattern	
PTR	X41. Changes in the shape and space of the house	[36]
	X42. Changes in house function	
	X43. Changes in house elements	

Notes: SPT=spatial physical transformation; D=densification, ET= economic transformation; and PTR=physical residential transformation.

Based on the relationship between the flow and the research model proposed above, the following research hypotheses can be drawn:

- H1: Physical spatial transformation positively impacts settlement densification.
- H2: Spatial physical transformation positively impacts economic transformation.
- H3: Spatial physical transformation positively impacts the physical transformation of the residential.
- H4: Economic transformation positively impacts settlement densification.
- H5: Economic transformation positively impacts the physical transformation of the residential.
- H6: Physical transformation of the residential positively impacts settlement densification.
- H7: Sociocultural transformation positively impacts spatial transformation.
- H8: Sociocultural transformation positively impacts economic transformation.
- H9: Sociocultural transformation positively impacts the physical transformation of the residential.

III. RESULT AND DISCUSSION

The Structural Equation Modeling Partial Least Squares (SEM-PLS) analysis consists of 2 evaluation stages, namely the evaluation of the measurement model and the evaluation of the structural model [24], [37].

A. Evaluation of Measurement Model

Indicators measuring a latent variable include an outer loading value of 0.7, a composite reliability value > 0.70, and an average variance extracted value > 0.50 [37]. Model

indicators that are eliminated from the outer loading value 0.7, where the invalid indicators of the spatial transformation variable are land value, settlement characteristics, and circulation characteristics; in the economic transformation variable, the invalid indicator is the increasing proportion of migrants. The invalid indicator of sociocultural transformation is cultural patterns. Furthermore, the densification variable's invalid indicators are land value, location characteristics, and building age.

Based on the test results of the outer and inner models, an indicator with a standard value of loading factor > 0.7 means that the model has met the standard, all indicators of the latent variable are considered valid, or all indicators can explain the latent variables well. Two indicators reflect the results of spatial transformation; three indicators reflect economic transformation; The physical transformation of the residential area is reflected in three indicators; three indicators reflect sociocultural transformation; and five indicators reflect densification, as shown in Table 3.

TABLE III
PATH COEFFICIENT AND P-VALUES

Variable	Indicators	Factors Loading	CR	AVE
SPT	Changes in Land use	0.826	0.874	0.776
	Building characteristics	0.933		
ET	Changes in work structure	0.984	0.994	0.983
	Increased revenue	0.995		
	The increasing number of formal and informal economic activities	0.995		
ST	Changes in the social system	0.807	0.842	0.640
	Social order	0.771		
	Social mobility	0.822		
PTR	Changes in the shape and space of the house	0.825	0.855	0.662
	Changes in Home functions	0.851		
	Changes in house elements	0.763		
D	Population and employment increase	0.776	0.927	0.718
	increased floor area built	0.941		
	Increase in residential units	0.827		
	Density	0.932		
	Infill development	0.742		

Notes: Loading Factor >0.70, CR>0.70, AVE>0.50 [37]; SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

B. Evaluation of Inner Model Analysis Results (Structural Model)

The result of the discriminant validity test (Fornell-Larcker approach) is that the square root value of the AVE is higher than the correlation between other variables. Table 3 shows that the densification discriminant validity value is 0.724, greater than 0.290, 0.646, 0.471, and 0.580. The result of the value test on the discriminant validity of ET, RPT, ST, and SPT is that the discriminant validity value is met as shown in Table 4.

TABLE IV
DISCRIMINANT VALIDITY TESTING

Variable	D	ET	PTR	ST	SPT
D	(0.724)				
ET	0.290	(0.873)			
RPT	0.646	0.138	(0.814)		
ST	0.471	0.768	0.390	(0.718)	
SPT	0.580	0.433	0.617	0.592	(0.661)

Notes: SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

At the evaluation stage of structural model testing, direct effects, indirect effects, total effects, and the effect of moderating significance were found. The coefficient of determination (R2) test results conclude that the existing exogenous latent variable can explain densification well because it has an R^2 value of 0.47. This means that the diversity of latent densification variables of 47% can be explained by exogenous latent variables, namely spatial, economic, and physical transformation of the residential variables. Another result is that the existing exogenous latent variable is able to explain the physical transformation of the residential well because it has an R^2 value of 0.482. This means that the diversity of the physical transformation of residential latent variables of 48.2% can be explained by exogenous latent variables. This coefficient of determination indicates that the model has strong, moderate, and weak predictive power for in-sample data, so it can be used to find the right model (see Table 5). This means that this test describes the determinants of settlement densification.

TABLE V
RESULTS OF COEFFICIENT OF DETERMINATION (R^2) TESTING

Variable	R^2	R Square Adjusted
D	0.470	0.466
RPT	0.482	0.478
ET	0.160	0.155
SPT	0.096	0.093

Notes: 0.75, 0.50, and 0.25 indicate a strong, moderate, and weak model [37]. SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

Path coefficient testing was used to determine the feasibility of the model (see Table 6). The results of the hypothesis are accepted if the relationship between latent variables has a positive and significant effect. The results of the path coefficients show that out of nine proposed hypotheses, eight were accepted, namely SPT-D, SPT-ET, ST-PTR, ET-PTR, PTR-D, ST-ET, ST-SPT, and ET-D, because they had an effect and were significant. One hypothesis was rejected, ET-D, because it had a negative and insignificant effect, which means that the requirements for the hypothesis were not met (see Tables 7 and 8).

TABLE VI
PATH COEFFICIENT AND P-VALUES

Hypothesis	Path	Path coefficients	T Statistics (|O/STDEV|)	P Values
H1	SPT-> D	0.222	4.047**	0.000*
H2	SPT-> ET	0.140	2.490**	0.013*
H3	SPT -> PTR	0.548	12.775**	0.000*

Hypothesis	Path	Path coefficients	T Statistics (|O/STDEV|)	P Values
H4	ET -> D	0.080	1.870	0.062
H5	ET -> PTR	-0.143	3.252**	0.001*
H6	PTR -> D	0.506	10.994**	0.000*
H7	ST -> ET	0.334	5.929**	0.000*
H8	ST -> PTR	0.345	6.566**	0.000*
H9	ST -> SPT	0.309	5.381**	0.000*

Notes: **t-value is below 1.96 and *p < 0.05; SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

TABLE VII
TOTAL EFFECT TESTING

Variable	D	ET	PTR	SPT
ET	0.007		-0.143	
PTR	0.506			
ST	0.332	0.377	0.461	0.309
SPT	0.501	0.140	0.528	

Notes: SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

TABLE VIII
TOTAL INDIRECT EFFECT TESTING

Indirect Effects	Path coefficient	t-Count	P Values
ST -> ST-> D	0.027	1.722	0.086
ST-> ET-> PTR	-0.048	2.814**	0.005*
ST-> SPT-> PTR	0.170	5.689**	0.000*
SPT -> PTR-> D	0.278	8.338**	0.000*
SPT -> ET-> PTR	-0.020	1.980**	0.048*
ST -> SPT -> PTR -> D	0.086	5.058**	0.000*
ET -> PTR -> D	-0.072	3.078**	0.002*
ST -> SPT-> ET	0.043	1.882	0.060
ST -> PTR -> D	0.175	5.341**	0.000*
SPT -> ET-> PTR-> D	-0.010	1.879	0.061
ST -> ET-> PTR-> D	-0.024	2.797**	0.005*
ST-> SPT-> ET-> PTR -> D	-0.003	1.593	0.112
ST -> SPT-> ET-> D	0.003	1.162	0.246
ST-> SPT-> ET-> PTR	-0.006	1.662	0.097
ST -> SPT-> D	0.069	3.260**	0.001*
SPT -> ET-> D	0.011	1.374	0.170

Notes: **t-value is below 1.96 and *p < 0.05; SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential

The path coefficient results show that ST-ET-RPT, ST-SPT-RPT, SPT-RPT-D, SPT-ET-RPT, ST-SPT-RPT-D, ET-RPT-D, ST-RPT-D, ST-ET-RPT-D, and ST-SPT-D have indirect effects. This means that densification is positively influenced directly and indirectly by intervention variables or the spatial and physical transformations of residential and economic transformations. Meanwhile, residential-physical transformation is positively influenced directly and indirectly by intervention variables, such as spatial-physical transformation and economic transformation.

The value of $Q^2>0$ indicates that the model has accurate predictive relevance to certain constructions, while the value of $Q^2<0$ indicates that the model lacks predictive relevance [24] as shown in Table 9.

TABLEI IX
ANALYSIS (Q^2) CROSS-VALIDATED REDUNDANCY TO VARIABLE

Variable	SSO	SSE	Q^2 (=1-SSE/SSO)
D	1955.000	1310.309	0.330
PRT	1173.000	812.476	0.307
SPT	782.000	732.638	0.063
ET	1173.000	997.337	0.150
ST	1173.000	1173.000	

Notes: SPT = spatial physical transformation; ET= economic transformation; ST = socio-cultural transformation; D= densification; and PTR= physical transformation of the residential.

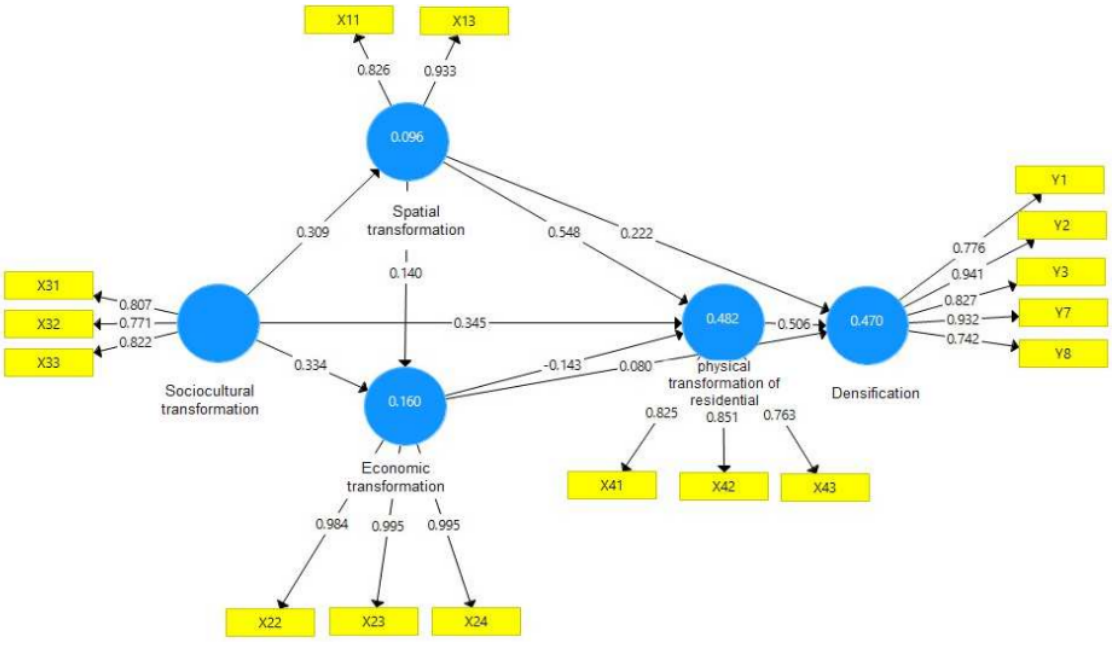

Fig. 2 Significant Test of Direct and Indirect Effects

The densification Q^2 value of 0.330 explains that the two latent variables of exogenous densification, namely spatial transformation and physical transformation of the residential, have a strong influence, namely 33%. The physical transformation of residential Q^2 value of 0.307 explains that the two latent variables of exogenous physical transformation of residential, namely spatial transformation, economic transformation, and sociocultural transformation, have a strong influence of 30.7%. The Q^2 value in the combined model between transformation and densification theory has a positive coefficient value with a strong value of (>0.3).

The dimensions of land use changes and building characteristics affect a physical spatial transformation characterized by a large-scale housing development phase driven by the Perumnas VII/South Sulawesi Project for the Bumi Tamalanrea Permai location. The area's development was marked by an increase in residential units in 1991–1996, with phase 1 of the handover of land management rights (HPL) from the government to Perumnas developers starting in single blocks, namely Blocks A, B, C, and L. The second phase, 1996, handed over Land Management Rights (HPL) land covering an area of 67,691 hectares. Then, in 1997/1998, the 3rd phase of land handover was carried out with a land area of 91.77 hectares. In the construction of single and multiple dwelling units, namely Blocks J, K, G, H, I, E, F, AA, AC, AF, AD, and AB, in the period 2001–2011, occupancy increased with the growth of cluster or gated community housing, rental flats (Rusunawa Kodam), and shophouse complexes with 2-story building characteristics by private developers utilizing Perumnas' commercial land lot purchase policy. This finding is in line with Giyarsih [16] finding of transformation due to densification and contradicts Bibby et al. [17] finding that densification results in physical changes to the neighborhood. The findings of this study reveal that physical spatial transformation has a direct positive effect and an indirect effect on settlement densification (see Fig. 2). This means that densification is determined by the economic transformation process, with an emphasis on the magnitude of the physical changes in residential and commercial buildings that occur.

This finding also shows that physical spatial transformation positively affects economic transformation. This is in line with the results of Surya et al. [18]. The findings of this study reveal that spatial transformation from initial and new spatial conditions encourages economic changes in the economies of migrant communities, especially local communities, with changes in work structure and increased revenue.

The change in land use from non-built areas to built-up housing is the initial factor in changing the structure of work, especially in the primary sector, which initially dominates, and there is an increase in the tertiary sector. The development of the area also encourages changes in family income through side businesses, both run by the husband or wife and supported by the income of family members. The economic transformation also encourages an increase in the intensity and activity of the formal and informal economies found along main roads and neighborhood roads for 24 hours. This means that the economy in the Bumi Tamalanrea Permai area encourages changes in the economic structure and eventually becomes a growth magnet for suburban areas.

This means that physical spatial transformations contribute to and cause changes in social status characterized by increased economic functions. Changes in the social system are highly dependent on changes in social status and can occur both before and after settling in a place due to changes in livelihoods, affecting community income. Increased migration and settlement eventually formed a modern social structure as an urban industrial society. With the growth of gated communities developed by Perumnas (government) as strategic sales and the private sector, rental flats (Rusunawa Kodam), the process of spatial change with the growth of gated communities eventually evolved towards spatial segregation. Changes in the social structure within the BTP area and its surroundings eventually changed the social order. In open settlement communities, spatial changes encourage changes in the social system from being conflict-prone due to heterogeneous communities to social segregation based on ethnic, religious, and regional groups.

There is social mobility between local communities and migrants, as measured by economic and social capital mobility. Changes in mobility in local communities move to vertical mobility with the support of economic capital and intergenerational capital that prioritize good education, which certainly encourages changes in the income of local communities. However, the cultural capital of the Kampung community passes on culture to children and grandchildren, which means that social mobility from the cultural aspect moves to horizontal cultural mobility. Furthermore, the shift in social status formed by the form of residential space arrangements for the upper middle class in gated community housing makes a difference to the process of sociocultural transformation in suburban residential areas, which leads to the development of spatial segregation. Social mobility is a change in social processes that involves vertical and horizontal mobility between migrants and residents. In Surya et al. [38], the development of an increasingly complex social order impacts population mobility, population composition, and the separation of groups of people based on ethnicity and economic ability.

Sociocultural transformation is characterized by changes in the social system where there are changes in the social structure of the community both before and after spatial changes that encourage socioeconomic changes and improve the quality of life in the environment and residence, and ultimately encourage the need for change, adjustment, and physical transformation of the residential, which is characterized by changes in form, space, elements, the building complements, and function of residential buildings.

Spatial transformation has a direct and indirect effect on the physical transformation of residential areas. This finding aligns with Forouhar et al. [19] and Lien [22]. The findings of this study reveal that socio-spatial, socioeconomic, and spatial-economic factors can determine the physical transformation of residential areas. Physical residential transformation is a process of socio-spatial changes in the settlement environment that begins with changes in land use and building characteristics that encourage sociocultural changes and ultimately encourage the intensity of household economic changes and cause changes in the form, elements, and functions of housing.

Furthermore, it was also found that the economic transformation directly influences the residential-physical transformation but does not directly relate to densification. These findings are in line with Lien [22], and this finding contrasts with the fact that formal private sector-driven densification strengthens social and economic life in affluent neighborhoods, according to Scheba et al. [21]. The findings of this study illustrate that economic transformation does not directly affect densification but contributes through the process of physical residential transformation. This means that socioeconomic factors are a driver of the increasing growth of densification of economic service space in residential areas through the physical transformation of residential areas. This physical change in housing is closely related to changing the structure of employment for the better by increasing household income and the number of formal and informal economic activities.

Physical spatial transformation, directly and indirectly, influences the residential physical transformation. This finding aligns with Forouhar et al. [19] and Lien [22]. The findings of this study reveal that physical spatial transformation is a determinant of changes in the house's form, element, space, and function. These changes are also influenced by several factors: (a) the potential for increasing the value of space and weak spatial control; and (b) the need for changes in the expansion of territory and the use of residential space; changes in environmental adaptation due to flooding and road improvements; changes in form and space; elements; and changes in the culture of the residential community.

The suburban development model in Indonesia, especially in Makassar City, is uncontrolled and unsustainable. Hence, this research becomes a model of suburban development in the spatial aspect, namely control through regulation and utilization of spatial aspects, physical control of buildings and houses in residential units, and urban development sectoral policy aspects.

IV. Conclusion

The suburban development of Makassar is growing rapidly and transforming uncontrollably. This has an impact on the value of suburban sustainability integration. The impact of this unsustainability is due to the weakness of the spatial plan, which has not become a benchmark for controlling spatial development and building in residential areas.

The concept of the relationship model is that spatial-physical transformation has a positive and significant effect on densification, and spatial transformation indirectly affects densification through the physical transformation of housing. Furthermore, the physical transformation of housing has a positive and significant effect on densification. Another relationship is that socioeconomic transformation has a positive and significant effect on the physical transformation of housing. The determining factor for the physical transformation of housing is the process of spatial and socioeconomic transformation and the need for changes desired by the community, government, and developers for buildings and their spaces to encourage increased land use activities, socioeconomic spatial interactions, and the process of sustainable integration of residential areas.

Urban development illustrates that the suburban development model results from the spatial and physical transformation of residential areas, and the settlement transformation model results from spatial, economic, and social changes encouraging increased activity and interaction in new socioeconomic spaces. Therefore, settlement densification is the growth of residential units among local settlements with the intensity of continuously increasing units both on a small scale and through periodic large-scale development with the determination of the spatial and physical transformation of residential. The results of this research will help formulate urban development policies.

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