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Sustainable residential area development in slum area of Makassar city

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Abstract: The problem of slum creation remains a significant issue in urban development in Indonesia, including in Makassar City. This study aims to formulate strategies for developing sustainable organizational areas within slum regions in Makassar City, particularly in Tallo, Tanjung Merdeka, and Bontorannu Sub-districts. The research employed a mixed-method approach, utilizing internal and external factor analysis (IFE-EFE), SWOT analysis, and prioritization of strategies. The findings indicated that Bontorannu Village exhibited the highest readiness in terms of physical and institutional aspects, whereas Tallo and Tanjung Merdeka still require improvements in basic infrastructure and community participation. Seven primary strategies were identified, with four prioritized: constructing integrated wastewater treatment plants and drainage systems, increasing access to clean water and fire protection, implementing collaborative waste management, and strengthening local institutions. This study underscores the importance of a collaborative, participatory, and locally contextual approach to achieving habitable, safe, and sustainable settlements.

Keywords: *Development strategy, Slums, Sustainable settlements, SWOT.*

1. Introduction

Settlements and housing in Indonesia are experiencing a decline in the quality of the residential environment. This is due to irregular building conditions, optimal land use, inadequate environmental facilities and infrastructure [1]. Currently, there are many slums in urban and rural areas, with urban areas being higher and having a larger population [2]. Residential areas form an integral system, including the development, management, maintenance, and improvement of housing and the environment [3]. This system also includes efforts to prevent and improve the quality of life in slums, land provision, financing systems, and the participation of community groups. In addition, a study by Harja [4] emphasized that slums are a difficult focal point in urban development, especially when not supported by structured planning. This affects not only the physical condition of the settlement, but also the quality of life of the local community [4, 5].

Slums are a complex problem that is difficult to handle without proper and orderly planning from the beginning. This has an impact on building irregularities, environmental accessibility, drainage systems, drinking water services, and wastewater management which are very important to prevent health problems in settlements. Local communities often show resistance or lack of interest in participating in efforts to prevent or improve slum conditions, despite various government regulations and policies aimed at addressing this problem in developing cities [6, 7].

Settlements are also closely related to settlements located in plains or city centers, waterfronts or riverbanks, disaster-prone and hilly topography. Based on the Regulation of the Minister of Public Works and Public Housing Number 14 of 2018 concerning the Criteria for Slum Housing and Slum

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Settlements reviewed from seven indicators, namely: building structures, environmental roads, provision of drinking water or clean water, environmental drainage, wastewater management, waste management and fire protection [8]. Sustainable development in slums requires a balanced approach in improving physical infrastructure, empowering communities, enforcing regulations, and encouraging collaboration among stakeholders to create livable, productive, and resilient urban environments [2].

The problem of slum areas in urban areas, especially in Makassar City, is still a crucial issue in the national development agenda [9]. In Makassar City, slum areas are spread across various sub-districts, including Tallo, Tanjung Merdeka, and Bontorannu, each of which exhibits complex and diverse slum characteristics. Rapid population growth, uncontrolled urbanization, and weak supervision of spatial planning are the main causes of the emergence and expansion of slum areas in urban areas [10]. This has a direct impact on people's quality of life, hinders economic productivity, and increases the risk of environmental and health disasters [11]. The existence of slum areas in Makassar City has become a major challenge for the city government in realizing inclusive, livable and sustainable city development.

In the 2020–2024 National Medium-Term Development Plan document, the Indonesian government targets reducing slum areas to 0 hectares by 2024. This goal is in line with global commitments in the Sustainable Development Goals (SDGs), especially Goal 11: "Make cities and human settlements inclusive, safe, resilient and sustainable" [12, 13]. Based on data from the Makassar City Statistics Agency in 2023, the population increase was 10.11% due to urbanization and a fairly high birth rate. This increase needs to be anticipated so that the growth pattern is even and orderly, in accordance with the mandate in the Sustainable Development Goals (SDGs) which are global and national commitments in an effort to improve people's welfare. To achieve this goal, the approach to settlement development needs to be directed not only at physical improvements, but also at strengthening local institutions, community empowerment, and collaborative governance that is able to synergize the roles of government, the private sector, and the community.

Based on a study of the 2017 Makassar City Slum Improvement Action Plan (SIAP) Document, the three dominant slum aspects in Makassar City are 45.36% of the waste facilities and infrastructure system has not been processed, 41.09% of environmental drainage conditions do not meet technical standards and 40.08% of residential building conditions do not meet eligibility standards. The three aspects are on average in the typology of lowland slums, city centers, canal banks, riverbanks, coastal slums and there are even slum buildings above the river. For this reason, a study of the characteristics of slum settlements in Makassar City is needed, especially from the aspect of residential buildings considering that one of the main basic human needs is a place to live.

The study areas in this research, namely Tallo, Tanjung Merdeka, and Bontorannu Sub-districts, each have specific problems that require different development strategies. Tallo Sub-district, for example, faces fundamental problems such as poor drainage systems, damaged environmental roads, and unorganized waste management. These conditions make the area very vulnerable to inundation and flooding, especially during the rainy season. In contrast, Tanjung Merdeka Sub-district shows problems in terms of building quality that does not meet technical standards and poor household waste management. Bontorannu Sub-district is located in a coastal area that faces the threat of abrasion, low fire protection, and high vulnerability of semi-permanent buildings to disasters [14].

Previous studies have shown that successful slum development strategies always involve a combination of basic infrastructure development and community capacity building. A study by Nilandita, et al. [15] stated that community-based interventions in the form of labor-intensive programs, local institutional capacity building, and community empowerment through collaborative schemes have proven effective in addressing slums sustainably [15]. This approach emphasizes the importance of community participation in the planning, implementation, and supervision of settlement development programs. The strategy also emphasizes the importance of adaptation to local conditions, both in terms of social, cultural, and geographical aspects [16].

The Makassar City Government has tried hard to improve the residential environment through projects or programs for the development of city facilities/infrastructure, such as widening and

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improving roads, residential areas, repairing water channels on the side of the highway, shopping centers, school buildings, health facilities and so on. However, this has not been implemented comprehensively due to limited funds, equipment and other facilities [5]. The purpose of this study is to formulate a strategy for developing sustainable residential areas in the slum areas of Tallo, Tanjung Merdeka, and Bontorannu Sub-districts of Makassar City. This study holistically examines the physical, social, economic, and environmental conditions of three sub-districts that have different slum characteristics.

2. Materials and Methods

This research method is descriptive-qualitative and quantitative (mix-method) with a case study approach. In addition, a study of slum indicators was conducted according to regulations and academic literature. Such as the Regulation of the Minister of PUPR No. 14/PRT/M/2018 concerning the Prevention and Improvement of the Quality of Slums, RPJMD, RTRW, and Settlement Arrangement Plan documents.

This research was conducted in three sub-districts in Makassar City that have been designated as slum areas based on the Decree of the Mayor of Makassar No. 050.05/1341/Kep/05/2014, namely Tallo Sub-district, Tanjung Merdeka Sub-district, and Bontorannu Sub-district. The research was conducted from November 2024 to March 2025, which included the field observation process, secondary and primary data collection, as well as data analysis and preparation of research report.

The data analysis used is internal and external factor analysis. Internal factors examine the strengths and weaknesses of residential areas based on physical, social, economic, infrastructure, and governance aspects. While external factors examine opportunities and threats from the aspects of policy, regulation, government support, potential collaboration, and environmental risks. Then a SWOT analysis is carried out using the results of IFE and EFE to compile a SWOT matrix. Priority strategy analysis, the strategy resulting from the SWOT analysis is further studied using one of the prioritization methods, such as the feasibility matrix.

3. Results

3.1. Internal dan Eksternal Factor Analysis

3.1.1. Matrix Internal Factor Evaluation (IFE)

Table 1.
Matrix Internal Factor Evaluation (IFE).

Internal Factors	Proportion	Three		Cape Merdeka		Tray and railing	
		Rating	Score	Rating	Score	Rating	Score
Condition of the building	0.10	1	0.10	2	0.20	2	0.20
Environmental road conditions	0.10	1	0.10	1	0.10	2	0.20
Provision of drinking water	0.10	2	0.20	3	0.30	3	0.30
Wastewater management	0.10	1	0.15	1	0.15	1	0.30
Environmental drainage conditions	0.10	1	0.15	1	0.15	1	0.30
Waste management	0.10	3	0.30	1	0.15	2	0.30
Fire protection	0.10	3	0.30	1	0.10	3	0.10
Local institutional support	0.05	1	0.10	1	0.10	2	0.15
Total	1.00	-	1.40	-	1.25	-	1.85

Based on the results of the IFE matrix, Bontorannu Village has the highest score of 1.85, indicating the strongest internal conditions in supporting sustainable settlement development. Tallo Village obtained a score of 1.40, while Tanjung Merdeka only 1.25, indicating weaknesses in several aspects. Bontorannu's main strength lies in the provision of drinking water and road conditions. Tallo excels in waste management and fire protection, although other aspects are still weak. Tanjung Merdeka is

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relatively weak overall, except for the provision of drinking water. Thus, Bontorannu is more ready to be developed, while Tallo and Tanjung Merdeka require internal improvements.

3.1.2. Matriks EFE (Eksternal Factor Evaluation)

Table 2.
Matrix Eksternal Factor Evaluation (EFE).

Eksternal Factors	Proportion	Three		Cape Merdeka		Tray and railing	
		Rating	Score	Rating	Score	Rating	Score
Government programs (KOTAKU, DAK)	0.20	3	0.60	4	0.80	3	0.60
Regional Priorities in RPJMD	0.15	2	0.30	3	0.45	2	0.30
Climate change and disasters	0.15	1	0.15	1	0.15	1	0.15
Land conversion	0.10	2	0.20	2	0.20	2	0.20
Potential for local tourism or economic development	0.20	3	0.60	3	0.60	4	0.80
Availability of land for relocation/consolidation	0.20	2	0.40	2	0.40	3	0.60
Total	**1.00**	**-**	**2.25**	**-**	**2.60**	**-**	**2.65**

Based on the results of the EFE matrix, Bontorannu Village has the highest score of 2.65, followed by Tanjung Merdeka 2.60, and Tallo 2.25. This shows that Bontorannu and Tanjung Merdeka are better able to take advantage of opportunities and face external threats than Tallo. The most supportive factors are government programs and the potential for local economic development. However, all villages face similar challenges on the issue of climate change and land conversion which received low scores.

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3.2. Analysis SWOT

Table 3.
SWOT Matrix, as a Strategy for Developing Sustainable Residential Areas in Slum Areas of Makassar City in 2025.

SWOT	Development Location		
	Three	**Cape Merdeka**	**Tray and railing**
Strenghts	- Access to drinking water is quite good - Fire protection is partly adequate	- Open space is still available - Good drinking water coverage	- Active local institutions - Strategic geographical location
Weakness	- Poor drainage - Unmanaged waste - Damaged roads	- Poor drainage - Poor waste management - Buildings do not meet technical standards	- Low fire protection - Semi-permanent buildings
Opportunities	- Government program support - Land availability for consolidation	- Potential for tourism villages - Collaboration with the private sector	- Included in the coastal revitalization plan - Support for dak drinking water and sanitation
Threats	- Floods due to climate change - Urban sprawl	- Conversion of green open space land - Potential for land conflicts	- Risk of abrasion - Social conflict due to relocation
Strategy			
SO (Strengths-Opportunities)	Take advantage of government support to improve clean water and fire systems	Develop tourist villages based on clean water and available land	Maximize dak and strategic position for coastal area revitalization
WO (Weaknesses-Opportunities)	Build drainage and waste management through collaborative programs	Improve drainage and waste through ngo cooperation	Building and fire rehabilitation through local collaboration
ST (Strengths-Threats)	Enhance flood protection with local power-based infrastructure	Protection of green open spaces and green open spaces with participatory-based policies	Community-based abrasion protection and institutional support
WT (Weaknesses-Threats)	Labor-intensive program to handle roads and waste	Social assistance in building and drainage planning	Social education and negotiation approaches to relocation

The SWOT analysis shows that Tallo Village has strengths in access to clean water and fire protection, but is weak in drainage, waste, and roads. Tanjung Merdeka excels in the availability of open space and clean water coverage, but faces problems with waste and building management. Bontorannu has active institutions and a strategic location, although it is still weak in fire protection and building quality. The main strategies proposed include: utilization of government programs, development of tourist villages, infrastructure rehabilitation, and collaborative and participatory approaches to address weaknesses and threats.

3.3. Priority Strategy Analysis

Priority strategy analysis is conducted by compiling a Strategy Feasibility Matrix based on the needs and conditions of each sub-district. Each strategy is evaluated for its relevance to the target area, and grouped into priority levels: high, medium, and low

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Table 4.
Priority Strategy for Sustainable Residential Area Development in Slum Areas Makassar City in 2025.

No.	Strategy	Three	Cape Merdeka	Tray and railing	Priority
1	Construction of communal wastewater treatment plants and integrated drainage systems	✓	✓	✓	High
2	Labor-intensive settlement rehabilitation	✓	✓	✗	Currently
3	Open space development and coastal protection	✗	✓	✓	Currently
4	Improving access to clean water and fire protection	✓	✓	✓	High
5	Institutional collaboration for waste and garbage management	✓	✓	✓	High
6	Increasing local institutional capacity and community participation	✓	✓	✓	High
7	Limited relocation based on consolidation	✗	✓	✓	Low

Table 4 shows seven priority strategies for developing sustainable residential areas in the slum areas of Tallo, Tanjung Merdeka, and Bontorannu Sub-districts in 2025. Three strategies have high priority, namely the construction of communal wastewater treatment plants and integrated drainage systems, increasing access to clean water and fire protection, and institutional collaboration for waste and garbage management implemented in all sub-districts. Increasing local institutional capacity is also a high priority and is being implemented in Tallo and Bontorannu. Two other strategies, namely labor-intensive settlement rehabilitation and open space development and coastal protection, have priority Currently. Meanwhile, limited relocation based on consolidation is only carried out in Tanjung Merdeka and has low priority.

4. Discussion

The realization of urban settlements as habitable begins with comprehensive and collaborative handling of urban slums [16]. Developing sustainable strategies for slum areas involves a multi-faceted approach that combines physical improvements, community empowerment, institutional strengthening, and integrated urban planning [2].

4.1. Factors Internal dan Eksternal

Strategic factors that influence the handling of slum areas in Tallo, Tanjung Merdeka, and Bontorannu Sub-districts are then entered into the form of IFAS and EFAS Tables before each factor that influences the development of slum areas is weighted. Based on the results of the analysis, both matrices show that Bontorannu Sub-district is the area with the greatest potential for sustainable development, both internally and externally. On the other hand, Tallo and Tanjung Merdeka Sub-districts still need strengthening from internal aspects, especially in basic infrastructure and local institutions, as well as strengthening community participation in dealing with external threats such as climate change. Regional development strategies must consider mitigation of disasters and environmental damage as part of adaptive policies [17].

4.2. SWOT (Strenghts-Weaknesses-Opportunities-Threats)

The SWOT analysis method is used to obtain strategies for the arrangement and control of urban slum areas [18]. The results of the SWOT analysis indicate that the development of sustainable residential areas in the three sub-districts requires an integrative approach based on strengthening local capacity and adaptive risk management. Strategies that are collaborative, participatory, and responsive

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to local characteristics are the main keys in efforts to improve the quality of settlements and reduce vulnerability to disasters. This is in line with Joni [19] which states that the success of slum development programs is highly dependent on the integration of structural policies and the active role of the community in managing the residential environment [19].

4.3. Strategi Prioritas

Based on the results of the analysis of priority strategies in the development of sustainable residential areas in the slum areas of Makassar City, namely Tallo, Tanjung Merdeka, and Bontorannu Sub-districts, it shows that basic infrastructure development and institutional strengthening are key components that dominate the 2025 strategic planning. The results of the analysis determined that there are four strategies with a high priority level that are implemented comprehensively in the three sub-districts, namely: construction of communal wastewater treatment plants (IPAL) and integrated drainage systems, increasing access to clean water and fire protection, institutional collaboration in waste and garbage management, and increasing local institutional capacity and community participation. These strategies were chosen based on their direct relevance to the crucial problems faced by the three areas, such as poor sanitation, flood-prone areas, minimal access to clean water, and weak waste and domestic waste management. The implementation of communal wastewater treatment plant (IPAL) and integrated drainage systems is a top priority because all sub-districts experience drainage and environmental sanitation problems. The PUPR Ministry continues to support the fulfillment of access to proper sanitation as mandated in the Sustainable Development Goals (SDG's) Number 6 and the 2019-2024 RPJMN through the Community-Based Sanitation Program (SANIMAS), which is implemented through the Cash for Work (PKT) scheme with a community empowerment approach. This approach is in line with the findings [15] which state that the development of community-based sanitation infrastructure can significantly reduce the incidence of environmental-based diseases and improve the quality of life of people in densely populated areas.

The second strategy that is also prioritized is increasing access to clean water and fire protection systems. This condition reflects the basic needs of the community in ensuring environmental health and disaster preparedness. To ensure sustainable access to clean water that is safe for daily consumption, a strong integration between public policy, innovative technology, and community participation is needed [20]. In addition to the infrastructure aspect, institutional collaboration in waste and sewage management is a high priority because it is considered crucial in strengthening the effectiveness of urban environmental services. This strategy shows the importance of synergy between the government, local communities, and the private sector in creating a sustainable environmental management system. Research by Andi Lestari [21] supports this by emphasizing that strengthening cross-sector institutional networks can accelerate the achievement of environmental development goals in slum areas [22].

Meanwhile, two other strategies, namely labor-intensive settlement rehabilitation and open space development and coastal protection, are at the Currently priority level. This strategy not only improves the physical condition of settlements, but also provides job opportunities and increases residents' income [21]. Open space development and coastal protection are more focused on Tanjung Merdeka and Bontorannu Sub-districts which have ecotourism potential and are located in coastal areas. This is important to increase the resilience of the area to climate change and coastal abrasion, in accordance with the recommendations of the Agency for the Assessment and Application of Technology in ecosystem-based coastal area management [23-26]. Limited relocation based on consolidation is the only strategy with low priority due to the complex social, political, and economic factors. This strategy is only implemented in Tanjung Merdeka and Bontorannu Sub-districts, considering the limited land and high risk of social conflict if not managed carefully. In this context, relocation is only the last option if existing conditions no longer allow for in-situ rearrangement. This states that relocation policies must consider the socio-cultural aspects of the community and require an intensive mentoring process so as not to cause resistance.

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5. Conclusion

The strategy for developing sustainable residential areas in the slum areas of Makassar City, namely Tallo, Tanjung Merdeka, and Bontorannu Sub-districts, must be adjusted to the internal and external conditions of each region, with an adaptive, collaborative, and participatory approach. The main priority strategies for the three regions include: construction of communal wastewater treatment plants and integrated drainage, increasing access to clean water and fire protection, collaboration in waste management, and strengthening community participation and local institutions. Handling slum areas must be part of inclusive city planning, through the integration of cross-sector programs such as sanitation, housing, health, environment, and disaster management. This integrated approach will accelerate the achievement of the SDGs targets, especially Goal 11 on sustainable cities and settlements.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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