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Transport-Oriented Planning: A Development for Sustainable Urban Growth in Butuan City

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Abstract: *Rapid urbanization presents significant challenges for cities in balancing economic growth, environmental sustainability, and efficient mobility. As the regional center of the Caraga Region, Butuan City continues to experience increasing population, expanding commercial activities, and growing demand for transportation infrastructure. These trends have intensified travel demand and highlighted the need for greater integration between transportation systems and land use planning. Although the City has adopted several planning instruments, including the Comprehensive Land Use Plan (CLUP), the Master Plan for Sustainable Urban Infrastructure Development (MPSUID), and transport sector plans, limited research has examined how these planning documents collectively support transport-oriented planning principles.*

This study assessed the readiness of Butuan City to implement Transport-Oriented Planning (TOP) as a framework for sustainable urban growth. A qualitative case study approach was employed using documentary analysis of the City's Comprehensive Land Use Plan, Ecological Profile, Master Plan for Sustainable Urban Infrastructure Development, Transportation Master Plan, Tricycle Route Plan, Pedicab Route Plan, and relevant national planning policies. The analysis focused on the integration of transportation and land use planning, accessibility, multimodal connectivity, sustainable mobility, and institutional support.

The findings indicate that Butuan City possesses a strong planning foundation for transport-oriented planning through its existing transportation and land use policies. However, greater coordination among planning instruments is needed to strengthen multimodal transport integration, improve first- and last-mile connectivity, promote active transportation, and encourage compact, mixed-use urban development. The study concludes that Butuan City demonstrates moderate to high readiness for transport-oriented planning and recommends strengthening policy integration to support a more connected, resilient, and sustainable urban future.

Keywords: *Transport-Oriented Planning, Sustainable Urban Growth, Integrated Land Use Planning, Urban Mobility, Butuan City*

I. INTRODUCTION

Urbanization continues to reshape cities by increasing the demand for housing, transportation, public services, and infrastructure. The United Nations projects that approximately 68% of the world's population will reside in urban areas by 2050, emphasizing the need for planning approaches that integrate land use and transportation to support sustainable urban development (United Nations Department of Economic and Social Affairs [UN DESA], 2019). As cities expand, the relationship between urban form and mobility becomes increasingly important because land use decisions directly influence travel demand, accessibility, and infrastructure requirements.

The integration of transportation and land use planning has long been recognized as a fundamental principle of sustainable urban development. Cervero and Kockelman (1997) demonstrated that urban density, land use diversity, and neighborhood design significantly influence travel behavior and public transport use. Similarly, Calthorpe (1993) introduced Transit-Oriented Development (TOD) as a planning approach that promotes compact, mixed-use, and walkable communities centered on high-quality public transportation. While originally associated with rail transit, the underlying principles of TOD have increasingly been adapted to cities with multimodal transportation systems where buses, jeepneys, active transport, and other public transport services collectively support urban mobility.

Recognizing these principles, the Department of Human Settlements and Urban Development (DHSUD, 2022) adopted the Transit-Oriented Development Policy Framework, encouraging local government units to integrate transportation investments with land use planning. The framework promotes compact urban growth, accessible public transportation, walkability, mixed land uses, and climate-resilient communities as key elements of sustainable urban development.

Butuan City, the regional center of the Caraga Region in northeastern Mindanao, has experienced steady urban expansion driven by population growth, commercial development, institutional investments, and public infrastructure projects. As the primary center for commerce, education, healthcare, and government services in the region, the City attracts substantial daily movement of people and goods, increasing pressure on its transportation network. While recent infrastructure investments and transportation initiatives have improved regional connectivity, growing traffic demand, expanding residential developments, and increasing dependence on road-based transportation highlight the need for more integrated urban planning.

To guide its long-term development, the City Government has prepared several planning instruments, including the Comprehensive Land Use Plan (2019–2028), Master Plan for Sustainable Urban Infrastructure Development (MPSUID), Transportation Master Plan, Tricycle Route Plan, and Pedicab Route Plan. Collectively, these plans establish policy directions for land use, infrastructure development, public transportation, and urban growth. However, despite the availability of these planning documents, limited studies have examined how they collectively support transport-oriented planning principles and contribute to sustainable urban development.

For this study, Transport-Oriented Planning (TOP) is defined as the localized application of Transit-Oriented Development principles within Butuan City's multimodal transportation system, where mobility is primarily supported by buses, public utility jeepneys, tricycles, pedicabs, walking, and other emerging transport modes. Rather than focusing solely on transit infrastructure, TOP emphasizes the coordinated planning of transportation systems, land use, accessibility, and urban development to improve mobility and guide sustainable urban growth.

Accordingly, this study evaluates the extent to which Butuan City's existing planning framework supports transport-oriented planning principles. Specifically, it seeks to (1) assess the City's current transportation and land use conditions; (2) examine the integration of existing planning instruments; (3) identify planning gaps and opportunities; and (4) propose planning strategies that strengthen the integration of transportation and land use planning. By providing an evidence-based assessment of the City's planning framework, the study aims to contribute practical insights that may assist policymakers and planners in promoting a more connected, accessible, and sustainable urban environment.

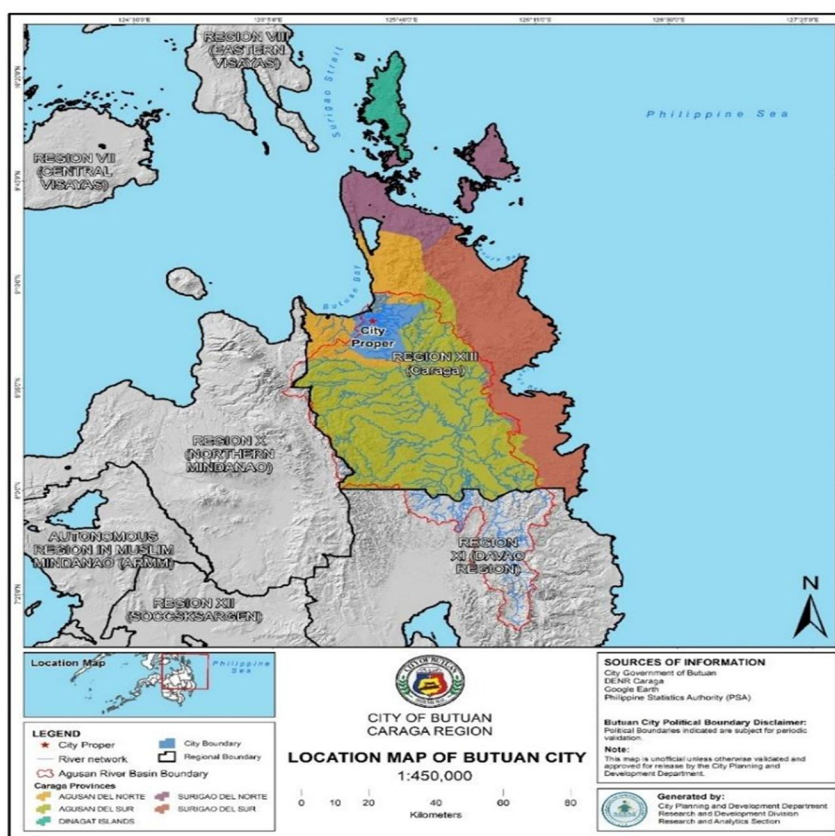


Figure 1. Location Map of Butuan City

II. METHODOLOGY

A. Research Design

This study employed a qualitative case study design to assess the readiness of Butuan City to adopt Transport-Oriented Planning (TOP) as a framework for sustainable urban growth. A case study approach is appropriate for examining contemporary planning issues within their real-world context, particularly when the interaction between planning policies, transportation systems, and land use strategies cannot be isolated from local conditions (Yin, 2018). The study utilized documentary analysis as its primary research method. Documentary analysis enables the systematic review and interpretation of official documents to generate empirical insights and evaluate planning frameworks (Bowen, 2009). Rather than assessing the implementation of a single transport project, the study examined how existing planning instruments collectively support transport-oriented planning principles.

B. Study Area

The study was conducted in Butuan City, the regional center of the Caraga Region in northeastern Mindanao, Philippines. As a highly urbanizing city, Butuan functions as the region's primary center for commerce, education, healthcare, government services, and transportation. Rapid population growth, expanding economic activities, and increasing infrastructure investments have intensified travel demand and influenced urban development patterns, making the city an appropriate case for assessing transport-oriented planning.

C. Sources of Data

The study relied on secondary data obtained from official planning documents, policy issuances, and relevant scholarly literature. The principal documentary sources included:

- Comprehensive Land Use Plan (CLUP) 2019–2028;
 - Butuan City Ecological Profile (2024);
 - Master Plan for Sustainable Urban Infrastructure Development (MPSUID);
 - Draft 10-Year Transportation Master Plan (Phase 1);
 - Draft Tricycle Route Plan;
 - Draft Pedicab Route Plan; and
 - National policies and literature on transport-oriented development, integrated land use planning, and sustainable urban mobility.
- These documents provided information on land use patterns, transportation systems, accessibility, infrastructure development, institutional arrangements, and future urban development strategies.

D. Data Collection

A systematic review of the selected planning documents was undertaken to identify information relevant to transportation, land use, accessibility, multimodal connectivity, sustainable mobility, and governance. Data from individual documents were extracted, compared, and synthesized to determine areas of convergence, complementarity, and planning gaps.

The analysis was guided by established principles of Transit-Oriented Development (TOD), adapted to the multimodal transportation context of Butuan City. Six analytical dimensions were used to evaluate the City's planning framework:

- 1) Land use integration;
- 2) Accessibility;
- 3) Public transport connectivity;
- 4) First- and last-mile connectivity;
- 5) Sustainable mobility; and
- 6) Institutional and policy support.

These dimensions served as the basis for assessing the extent to which existing planning instruments collectively support transport-oriented planning and sustainable urban development.

E. Analytical Framework

Figure 1 presents the analytical framework adopted in the study. Existing planning documents were subjected to qualitative document analysis using the six transport-oriented planning dimensions. The analysis identified planning strengths, gaps, and opportunities, which informed the development of strategic recommendations for integrating transportation and land use planning in Butuan City.

Figure 1. Conceptual Framework



III. RESULTS AND DISCUSSION

A. Urban Development and Transportation Context

As the regional center of the Caraga Region, Butuan City continues to experience rapid urbanization driven by population growth, expanding commercial activities, institutional development, and public infrastructure investments. These developments have increased travel demand and intensified pressure on the City's transportation network. The Ecological Profile (2024) indicates that urban growth has concentrated within the city's urban barangays, where government offices, educational institutions, healthcare facilities, and commercial establishments generate substantial daily travel. At the same time, continued residential expansion toward peripheral areas has increased commuting distances and reinforced the need for efficient transportation systems that connect emerging communities with major activity centers.

The City's long-term spatial development is guided by the Comprehensive Land Use Plan (CLUP) 2019–2028, which identifies urban growth areas, zoning classifications, and development corridors to accommodate future expansion while protecting environmentally sensitive areas and productive agricultural lands. Complementing the CLUP, the Master Plan for Sustainable Urban Infrastructure Development (MPSUID) identifies strategic infrastructure investments intended to improve mobility, public services, disaster resilience, and regional competitiveness. Together, these planning instruments recognize transportation infrastructure as a key driver of economic development and urban accessibility.

Transportation planning is further supported by the Draft 10-Year Transportation Master Plan, which establishes a hierarchical road network consisting of national, city, and barangay roads connected through primary, secondary, and tertiary transport corridors. Public transportation is primarily provided through public utility jeepneys, buses, tricycles, and pedicabs, forming a multimodal system that serves both urban and peri-urban communities. The preparation of dedicated Tricycle and Pedicab Route Plans reflects the City's efforts to rationalize local transport operations and strengthen neighborhood accessibility through structured first- and last-mile services. Despite these planning initiatives, transportation challenges remain evident. Increasing traffic congestion along major corridors, expanding suburban development, and growing dependence on road-based transportation continue to place pressure on existing infrastructure. These conditions highlight the need for stronger coordination between transportation investments and land use planning to ensure that future urban growth remains accessible, efficient, and environmentally sustainable.

B. Assessment of Transport-Oriented Planning

1) Land Use Integration and Accessibility

The documentary analysis indicates that Butuan City has established a strong policy foundation for integrating transportation and land use planning. The CLUP directs urban expansion through designated growth areas and zoning policies, while the Transportation Master Plan recognizes that transportation corridors influence future development patterns.

However, the two planning instruments remain largely complementary rather than fully integrated. Although both acknowledge the relationship between mobility and urban development, neither explicitly identifies transport-oriented growth areas where higher-density, mixed-use development is intentionally concentrated around major public transport corridors or terminals.

Accessibility within the existing urban core is generally favorable due to the concentration of government services, educational institutions, commercial establishments, and healthcare facilities. Nevertheless, continued residential expansion toward suburban areas has increased travel distances and strengthened dependence on motorized transportation. The Pedicab Route Plan partially addresses this challenge by introducing neighborhood feeder services that improve access between interior communities and higher-capacity transport routes. These initiatives demonstrate that accessibility planning has extended beyond road expansion to include localized mobility improvements; however, future development will require stronger integration between new residential growth areas and public transportation infrastructure.

2) *Multimodal Transportation and Sustainable Mobility*

The City's transportation planning demonstrates a gradual transition toward a multimodal mobility framework. The Transportation Master Plan identifies buses, public utility jeeps, tricycles, and pedicabs as complementary components of the public transportation system rather than independent modes. Similarly, the Tricycle Route Plan rationalizes local transport operations by reducing route conflicts and improving service coverage, while the Pedicab Route Plan formalizes neighborhood feeder services that strengthen first- and last-mile connectivity.

These planning initiatives collectively improve network efficiency and provide a stronger institutional basis for multimodal transportation. Rather than treating local transport modes as competing services, the City increasingly recognizes their complementary functions in supporting accessibility across different travel distances.

Despite these positive developments, opportunities remain to strengthen sustainable mobility. Existing planning documents place comparatively less emphasis on active transportation infrastructure, including continuous sidewalks, protected bicycle lanes, universally accessible pedestrian facilities, and complete street designs. Since transport-oriented planning extends beyond public transportation to include safe and convenient walking and cycling environments, future infrastructure investments should prioritize active transport facilities alongside road improvements. Such investments would improve accessibility while reducing dependence on private vehicles and contributing to healthier and more environmentally sustainable urban communities.

3) *Institutional Readiness for Transport-Oriented Planning*

The findings suggest that Butuan City possesses a relatively high level of institutional readiness for transport-oriented planning. Existing planning instruments—including the CLUP, MPSUID, Transportation Master Plan, Tricycle Route Plan, and Pedicab Route Plan—collectively provide policy directions for transportation, land use, and infrastructure development. In addition, the DHSUD Transit-Oriented Development Policy Framework provides national guidance that supports the integration of transportation and land use planning at the local level.

Nevertheless, planning responsibilities remain distributed across multiple government offices with varying planning horizons and implementation priorities. Although each planning document contributes to urban development, stronger institutional coordination is necessary to ensure consistency in infrastructure investment, transportation planning, and spatial development. Integrating transport-oriented planning principles into future revisions of the CLUP, Comprehensive Development Plan, and sectoral plans would provide a common strategic framework for coordinating urban growth and transportation investments.

Overall, the assessment indicates that Butuan City demonstrates moderate to high readiness for transport-oriented planning. Rather than requiring new planning mechanisms, the City would benefit primarily from improving coordination among existing planning instruments and strengthening the integration of transportation and land use policies.

C. *Planning Gaps, Opportunities, and Overall Readiness*

The analysis identified three major planning gaps. First, transportation and land use planning continue to be implemented through separate planning instruments, limiting the ability of transportation investments to proactively shape urban growth. Second, while public transportation planning has advanced through route rationalization and multimodal initiatives, active transportation infrastructure remains limited. Continuous pedestrian networks, bicycle facilities, and universally accessible public spaces require greater attention to support sustainable mobility. Third, ongoing suburban expansion increases travel demand and infrastructure costs, underscoring the need for more compact and transit-supportive urban development.

These challenges also present significant opportunities. The City's existing planning framework already demonstrates a strong commitment to multimodal transportation through the Transportation Master Plan, Tricycle Route Plan, and Pedicab Route Plan. Likewise, the MPSUID provides opportunities to align future infrastructure investments with land use objectives. Rather than creating additional planning documents, future initiatives should prioritize the integration of existing plans under a common transport-oriented planning framework.

Table 1 summarizes the overall assessment of Butuan City's readiness for transport-oriented planning.

Table 1. Summary Assessment of Transport-Oriented Planning Readiness

Planning Dimension	Assessment	Key Observation
Land Use Integration	Moderate-High	Strong spatial framework, but closer coordination with transport investments is needed.
Accessibility	High	Urban centers are generally accessible, although suburban expansion requires improved connectivity.
Public Transport Connectivity	High	Existing public transport modes provide a strong multimodal foundation.
First- and Last-Mile Connectivity	High	Tricycle and Pedicab Route Plans significantly improve neighborhood accessibility.
Sustainable Mobility	Moderate	Additional investments in walking, cycling, and complete streets are needed.
Institutional Support	High	Comprehensive planning instruments exist, but stronger inter-agency coordination is necessary.
Overall Readiness	Moderate-High	Existing planning mechanisms provide a solid foundation for implementing Transport-Oriented Planning.

The findings demonstrate that Butuan City has already established many of the institutional and technical conditions necessary to support transport-oriented planning. The principal challenge is no longer the preparation of additional plans but the effective integration of transportation, land use, and infrastructure planning into a unified urban development strategy. Aligning future investments with transport-oriented planning principles would strengthen accessibility, encourage compact and mixed-use development, and enhance the City's long-term sustainability and regional competitiveness.

IV. CONCLUSION

This study assessed the readiness of Butuan City to adopt Transport-Oriented Planning (TOP) by examining the integration of transportation and land use planning through the City's existing planning instruments. Using documentary analysis of the Comprehensive Land Use Plan (CLUP), Ecological Profile, Master Plan for Sustainable Urban Infrastructure Development (MPSUID), Transportation Master Plan, Tricycle Route Plan, Pedicab Route Plan, and relevant national policies, the study evaluated the City's planning framework based on land use integration, accessibility, multimodal connectivity, sustainable mobility, and institutional support. The findings reveal that Butuan City has established a comprehensive planning foundation that supports the principles of transport-oriented planning. Existing policies recognize the importance of integrating transportation infrastructure with urban development, while multimodal transportation initiatives—including the preparation of the Transportation Master Plan and the rationalization of tricycle and pedicab operations—demonstrate the City's commitment to improving mobility and accessibility. These planning efforts position Butuan City favorably to accommodate future urban growth while promoting more efficient movement of people and goods. Despite these strengths, several challenges remain. Transportation and land use planning continue to be implemented through separate planning instruments, limiting opportunities to fully coordinate infrastructure investments with future urban development. In addition, expanding suburban development, increasing traffic demand, and limited active transportation infrastructure indicate the need for stronger policy integration and greater emphasis on walking, cycling, and complete street design.

Overall, the study concludes that Butuan City demonstrates moderate to high readiness for implementing Transport-Oriented Planning. Rather than requiring entirely new planning frameworks, the City would benefit from strengthening coordination among existing plans, integrating transport-oriented planning principles into future planning updates, and prioritizing sustainable mobility initiatives. By aligning transportation investments with land use planning, Butuan City can promote a more connected, inclusive, resilient, and sustainable urban environment.

V. RECOMMENDATION

Based on the findings, the following recommendations are proposed to strengthen the implementation of Transport-Oriented Planning in Butuan City:

A. *Integrate Transport-Oriented Planning into Future Planning Documents*

Future revisions of the Comprehensive Land Use Plan (CLUP), Comprehensive Development Plan (CDP), Transportation Master Plan, and other sectoral plans should explicitly incorporate transport-oriented planning principles. This includes identifying priority transport corridors, promoting compact and mixed-use development, and coordinating infrastructure investments with projected urban growth areas.

B. *Strengthen Multimodal Transportation and Active Mobility*

The City should continue improving its multimodal transportation network by strengthening the integration of buses, public utility jeepneys, tricycles, and pedicabs while expanding infrastructure for walking and cycling. Investments in continuous sidewalks, protected bicycle lanes, pedestrian crossings, traffic-calming measures, and universally accessible facilities will improve mobility, reduce dependence on private vehicles, and support healthier urban communities.

C. *Enhance Institutional Coordination and Planning Integration*

Effective transport-oriented planning requires stronger collaboration among the City Planning and Development Department, City Engineering Office, Traffic Management Office, transport regulatory agencies, and other stakeholders. Establishing a coordinated planning mechanism and integrating transportation and land use considerations into project evaluation and investment programming will improve policy consistency and implementation efficiency.

D. *Establish a Monitoring and Evaluation Framework*

A monitoring and evaluation framework should be developed to assess the implementation of transport-oriented planning initiatives. Performance indicators may include accessibility to public transportation, modal share, pedestrian and bicycle infrastructure coverage, traffic congestion levels, land use efficiency, and greenhouse gas emissions from the transport sector. Regular monitoring will enable the City Government to evaluate progress, identify implementation gaps, and support evidence-based planning decisions.

REFERENCES

- [1] Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40. <https://doi.org/10.3316/QRJ0902027>
- [2] Butuan City Government. (2019). Comprehensive Land Use Plan of Butuan City 2019–2028. City Planning and Development Department.
- [3] Butuan City Government. (2024). Ecological Profile of Butuan City. City Planning and Development Department.
- [4] Butuan City Government. (2024). Master Plan for Sustainable Urban Infrastructure Development (MPSUID). National Economic and Development Authority
- [5] Calthorpe, P. (1993). *The next American metropolis: Ecology, community, and the American dream*. Princeton Architectural Press.
- [6] Cervero, R., & Kockelman, K. (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, 2(3), 199–219. [https://doi.org/10.1016/S1361-9209\(97\)00009-6](https://doi.org/10.1016/S1361-9209(97)00009-6)
- [7] City Transportation and Traffic Management Department. (2025). Draft 10-Year Transportation Master Plan (Phase 1). Butuan City Government.
- [8] City Transportation and Traffic Management Department. (2025). Draft Pedicab Route Plan. Butuan City Government.
- [9] City Transportation and Traffic Management Department. (2025). Draft Tricycle Route Plan. Butuan City Government.
- [10] Creswell, J. W., & Creswell, J. D. (2023). *Research design: Qualitative, quantitative, and mixed methods approach* (6th ed.). SAGE Publications.
- [11] Department of Human Settlements and Urban Development. (2022). *Transit-Oriented Development Policy Framework*. Government of the Philippines.
- [12] Institute for Transportation and Development Policy. (2017). *TOD Standard* (3rd ed.). Institute for Transportation and Development Policy.
- [13] United Nations Department of Economic and Social Affairs, Population Division. (2019). *World urbanization prospects 2018: Highlights* (ST/ESA/SER.A/421). United Nations.
- [14] Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.



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