Arthatama
Journal of Business Management and Accounting
ISSN: 2655-786x (p), 2774-5678 (e)

Vol. 9, No. 1 (2025), pp. 173-186

Optimizing ESG-Based TOD Implementation to Foster Inclusive and Sustainable Economic Growth

Muhammad Fadhil Athallah[1*], Nefia Nur Fitri[2]

[1] Universitas Diponegoro, Semarang, Indonesia
[2] Bintari Foundation, Semarang, Indonesia
athallahfadhil92@gmail.com

Abstract

Transit-Oriented Development (TOD) serves as a tangible example of Environmental, Social, and Governance (ESG) implementation through integrated spatial planning approaches. This study explores the correlation between TOD and ESG principles in supporting inclusive and sustainable economic growth, particularly within the context of rapidly urbanizing cities in developing countries. Utilizing a Systematic Literature Review (SLR) method, the research examines various scholarly publications to assess both the potential and challenges of TOD aligned with ESG criteria. The findings indicate that ESG-based TOD can enhance land use efficiency, reduce environmental degradation, support social inclusion, and promote economic productivity. However, practical implementation often faces obstacles such as high investment requirements, the reduction of urban green spaces, and limited cross-sectoral coordination. In response to these challenges, this study proposes the Economic Environmental, Social, and Governance (EESG) framework to address the underrepresentation of economic dimensions in current ESG assessments. By integrating economic factors alongside environmental, social, and governance considerations, EESG-oriented TOD offers a comprehensive planning strategy to accelerate sustainable urban development in emerging economies.

Keywords

Transit-Oriented Development, ESG, EESG, Urban Planning

1. Introduction

The rapid expansion of cities in developing countries is largely driven by intensifying urbanization, which refers to the migration process of population from rural to urban centers in the matter of improved economic opportunities. Central Bureau of Indonesia stated this trend through the increasing number of populations residing in urban areas. Approximately, 56,7% Indonesia's inhabitants lived in urban areas in 2020, which is a notable increase from 49,8% in 2010 with projections indicating a further upscale to 66,6% by 2035. It directly amplifies the demand for basic infrastructures, especially in transportation and housing. As cities continue to grow, they are becoming more complex, making greater challenges for the application of traditional urban planning approaches (Horelli, 2017). Without comprehensive and sustainable planning, this growth has the potential to cause a range of challenges, including traffic congestion, high reliance on private vehicles, uncontrolled expansion of informal settlements, and inefficient land use. Consequently, urban planning needs to be carried out holistically that accounts for intersectional connections, including social, environmental, economic, and cultural dimensions, alongside transportation systems to create a sustainable and inclusive urban framework (Xia et al., 2024). Urban planning methodologies encompass a wide range of approaches that can be applied to varied areas and their distinct characteristics, including Smart City, Green Building, and the emerging concept of Transit-Oriented Development (TOD). This latter concept emphasizes fostering sustainable urban planning and development strategies.

Transit-Oriented Development is the integration of public transport nodes with sustainable land management, while emphasizing environmentally conscious development and strong social foundations. This concept resonates with the goals and implementations of Environmental, Social, and Governance (ESG) principles within urban and infrastructure development. Numerous scholars stated the integration of TOD has a potential approach to promote sustainable economic growth particularly through improved connectivity, reduced environmental impact, and an elevated quality of life (Hasibuan & Mulyani, 2022). In Indonesia, the transportation and warehousing demonstrated notable 13,96% increase in national Gross Domestic Product (GDP) and contributing 5,89% to the total GDP in 2023, making it highest-growing sector of the year (Cucuzzella et al., 2022; Xiao et al., 2025). This positive trajectory continued in 2024, with the sector growing by 8,69% and contributing 6,12 to the total GDP. This expansion indicates the pivotal role of transportation, which is the core concept of TOD, in supporting economic dynamism. Therefore, TOD-based urban planning and development harmonized with ESG criteria is becoming increasingly relevant, particularly within developing countries such as Indonesia.

The implementation of the Transit-Oriented Development concept offers various advantages for individuals, communities, and their surrounding environments (Kamruzzaman et al., 2014). At the micro level, TOD plays a role to

enhanced mobility and broadens transportation alternatives, particularly for those without personal vehicles (Mei et al., 2024). With transport hubs integrated into residential areas, people across all age groups and socio-economic backgrounds can rely on public transit for accessing diverse services. TOD empowers individuals to efficiently and affordably commute to workplaces, healthcare facilities, educational institutions, and public services via public transportation. Pedestrians also benefit from safe, inclusive, and well-connected pedestrian pathways linked to residential areas. At the macro level, TOD fosters efficient land and energy utilisation while mitigating carbon emissions generated by private motor vehicles (Cheng et al., 2022; Pamela & Indrawati, 2022). This approach has been shown to reduce emissions by 43% in Washington, D.C., compared to conventional, low-density urban sprawl. Globally, TOD implementation could save up to $17 trillion in reduced healthcare, congestion, and pollution costs (Haddaoui, 2018). Moreover, TOD tends to appreciate the value of surrounding land due to consumers' growing preference for areas with easy access to transport networks (Cervero & Murakami, 2009; Cervero & Sullivan, 2011; Huang & Wey, 2019; Yang et al., 2024). These advantages indicate that the potential of TOD, when aligned with ESG principles, can serve as an instrument for cultivating inclusive, resilient, and sustainable urban environments. In the theory, the TOD concept aligned with ESG shows great potential; however, its practical implementation frequently encounters obstacles. A study by Venner and Ecola (2007) identified financial and investment as one of the main barriers. TOD requires significant upfront infrastructure investment. In many developing countries, limited financial resources and inefficient allocation present major obstacles. Moreover, strong policy enforcement, public education, and incentives are needed to encourage a shift from private vehicle use to public transit. TOD requires cross-sector collaboration among government agencies, investors, property developers, and communities. This collaborative effort encompasses land acquisition for affected communities, financing construction and operational phases, and ongoing maintenance (Praditya, 2025).

Enhancing TOD aligned with ESG for economic growth must consider various aspects. Land values play a pivotal role in determining whether people can afford to live and work in TOD zones. Although improved transport accessibility can increase the number of suburban commuters seeking employment in TOD areas, experiences in countries such as Thailand reveal governmental shortcomings in providing affordable housing due to skyrocketing land prices in TOD zones. While the concept has also led to improved public facilities, it is often accompanied by a decline in urban green spaces due to extensive development on government-owned land. Despite TOD's contribution as a public transportation mode in mitigating greenhouse gas emissions and environmental impacts, urban green spaces are still needed to purify pollution from vehicles (Ali et al., 2021). Governments must collaborate with the private sector in developing and managing green spaces. Furthermore, commuting expenses must be considered, while transportation

continues to improve, high commuting costs are often unfavorable for many commuters. Several studies suggest that strategic investment in public infrastructure, while considering these aspects can better stimulate economic growth through increased investment and an expanded labour market (Hasibuan & Mulyani, 2022).

The application of the TOD concept not only benefits ecology and society, but also significantly contributes to regional economic growth. Based on this statement, this research aims to understand the correlation between the TOD concept aligned with ESG criteria and its role in supporting regional economic growth. The findings are expected to contribute to future research and to the development of TOD that considers economic, environmental, social, and governance aspects. This study will use a systematic literature review as its research method to explore various TOD practices. The study will address the following questions through a review of literature related to TOD implementation.

2. Literature Review

Transit-Oriented Development (TOD) is an urban planning approach that focuses on the creation of mixed-use, pedestrian-friendly communities located within walking distance of transit nodes and commercial centers. The implementation of this concept encourages the development of various land uses within a walkable radius to the transit hub, including: (1) core commercial areas, (2) residential zones, (3) public facilities, and (4) other supporting uses that reinforce the functionality of the core area. Numerous studies indicate that the primary objective of TOD is to establish sustainable urban environments through the integration of public transportation and land use, to promote modal shift from private vehicles to public transit, to enhance social equity, to provide open and accessible public spaces, and to foster economic development (Saha et al., 2019; Al-Harami & Furlan, 2020; Yen et al., 2024).

The TOD concept is built upon three dimensions, commonly referred to as the "3Ds": (1) Density (higher urban density within a 400–600-meter radius), (2) Diversity (mixed land uses, housing options, and transportation modes), and (3) Design (liveable, walkable, accessible, and well-connected design) (Zaina et al., 2016). Kamruzzaman et al. (2014) further classified TOD into four typologies: activity center TOD, residential TOD, potential TOD, and non-TOD. Incorporating TOD principles into urban planning supports the achievement of Sustainable Development Goals (SDGs), such as Goal 7 (affordable and clean energy), Goal 11 (sustainable cities and communities), and Goal 13 (climate action) (Berawi et al., 2020).

In addition to its focus on enhancing urban space, TOD also emphasizes social equity and residents' well-being, including addressing economic impacts. Social equity has been recognized as a core principle in TOD-oriented transport planning, as evidenced in several cities such as London, Tokyo, New York, and Paris (Ichinose et al., 2023; Ferm et al., 2022; Coucke, 2023). As urbanization accelerates, the

importance of social equity becomes more pronounced, exposing a key shortcoming in traditional TOD models. Consequently, scholars have advocated for the development of an equitable TOD framework that incorporates justice and inclusivity into the planning paradigm. Despite the documented benefits of TOD, its implementation in rapidly urbanizing cities, particularly in developing countries, remains underexplored. These cities face unique challenges, including the proliferation of unplanned informal settlements, socio-economic disparities, and limited public transit infrastructure. These issues necessitate the adoption of new TOD strategies that address connectivity, environmental concerns, economic growth, quality of life, and urban governance (Sukbhan & Hutahulu, 2023; Ali et al., 2025).

Environmental, Social, and Governance (ESG) is a framework employed by corporations to evaluate sustainability performance beyond financial metrics. ESG serves as a benchmark for companies to assess their environmental impact, social responsibility, and governance practices. Originally introduced in the 2004 UN Global Compact report, ESG highlighted the importance of non-financial factors in corporate accountability and has since become an international standard for responsible business conduct. One of the key drivers for ESG adoption is the projected global average annual loss of $1 trillion by 2050 due to social instability and environmental disasters. Additionally, the frequency and cost of disaster-related insurance claims have increased sixfold between 1980 and 2019. In response, the United Nations has proposed an investment of $6 trillion toward sustainable development by 2050, with $4 trillion dedicated to economic development and $2 trillion directed toward achieving ESG-related environmental, social, and governance goals.

The evaluation of a nation's sustainable development trajectory, integrated with ESG principles, has emerged as a critical concern. However, ESG assessments have predominantly focused on corporate performance, often lacking direct linkage to macroeconomic fundamentals. To address this gap, a transformation of ESG into an integrated framework that includes economic dimensions—referred to as ECON-ESG—has been proposed to enrich the assessment of sustainable development outcomes (Işık et al., 2024).

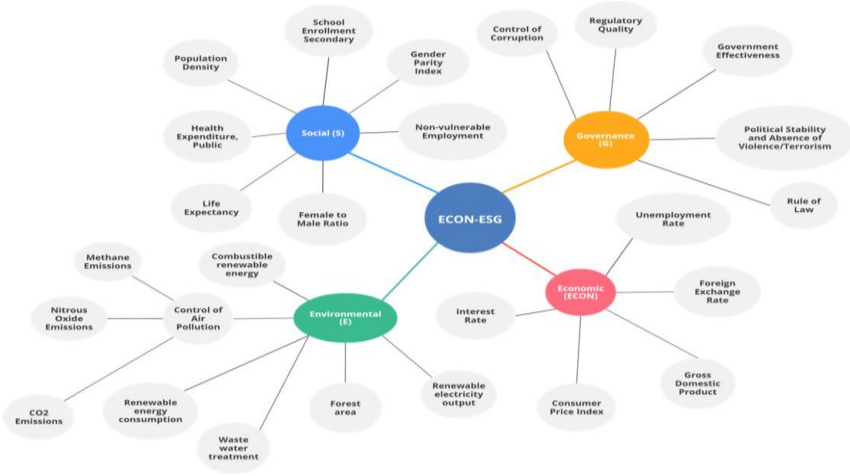

Figure 1: Integrating Economic Dimension into ESG (ECON-ESG)

Based on Figure 1, the parameters used to assess Environmental, Social, and Governance (ESG) performance encompass a diverse range of indicators. The environmental (E) dimension considers factors such as air quality, water resources, forest conservation, and the integration of renewable energy sources. The social (S) dimension considers demographic dynamics, labour force conditions, and efforts toward achieving gender equality. The governance (G) dimension typically includes the evaluation of democratic institutions, and the implementation of policies aimed at ensuring public safety and effective administration. The addition of a fourth pillar—Economy (ECON) introduces further macroeconomic indicators into the ESG framework. These may include Gross Domestic Product (GDP), which reflects economic growth and productivity; the unemployment rate, as a measure of labour market conditions and economic resilience; and the Consumer Price Index (CPI), which captures cost of living and inflationary pressures, among other factors.

One of the development models considered to be well-aligned with the ECON-ESG framework is Transit-Oriented Development (TOD). This model is regarded as highly relevant and prioritized due to its multifaceted benefits. From an environmental perspective, TOD reduces dependence on private vehicles, thereby contributing to lower carbon emissions. In terms of social impact, TOD supports inclusive and equitable urban mobility. Its economic dimension is evident in the stimulation of local business activity and the attraction of labour forces to TOD areas, which in turn enhances economic productivity. Moreover, the ECON-ESG framework provides a comprehensive structure for addressing the challenges associated with TOD implementation, particularly by offering an integrated approach to development across environmental, social, and economic dimensions.

3. Methods

This study aims to examine the application of Environmental, Social, and Governance (ESG) criteria within the framework of Transit-Oriented Development (TOD) and its role in supporting regional economic growth. Ultimately, the research seeks to formulate development strategies that can enhance the financial performance of TOD implementation. In line with this research objective, an extensive literature review will be conducted to explore the current state of knowledge regarding this topic. The literature review will serve to understand the evolution of TOD implementation, assess the core themes and findings of existing research, and identify the intersection between ESG and TOD. This process will provide a general overview of established knowledge, highlight gaps in the application of ESG principles within TOD practices across different regions, and offer insights or conclusions that can inform future studies.

The first phase of this research involves a comprehensive literature search focused on scholarly studies published in English. These studies will be analyzed using keywords that align with the research scope. The selection criteria for the literature include titles, abstracts, and keywords containing terms or phrases such as "Transit-Oriented Development," "Environmental, Social, and Governance," "Economic Growth," "Sustainability," "Public Transit," "TOD Environmental," "TOD Social," "Economy Transit-Oriented Development," and "TOD Governance.

4. Results

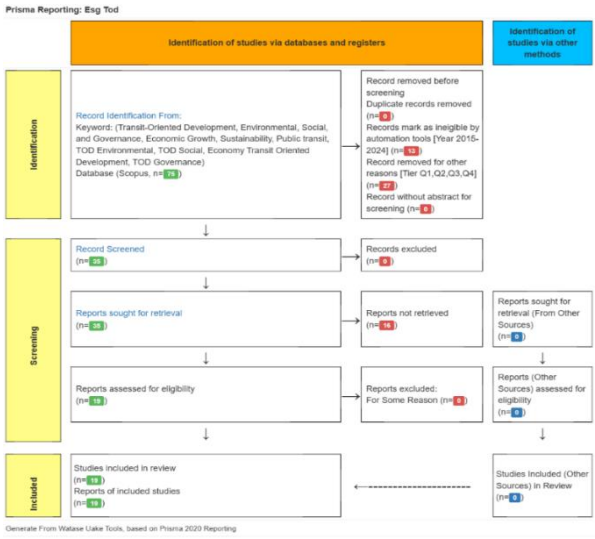

Figure 2: PRISM Analysis Report

Figure 2 shows that literature search was conducted through the Watase Uake database, covering articles indexed in Scopus from quartile rankings Q1 to Q4, within the publication period of 2015 to 2024. This initial search yielded a total of 75 articles. A subsequent inclusion and exclusion screening process was applied. Articles were excluded if they were deemed irrelevant to the topics specifically, studies that did not address the application of ESG principles within the context of Transit-Oriented Development (TOD) in relation to economic growth. Inclusion criteria were focused on selecting studies that explicitly examine the impact and role of ESG criteria in the implementation of TOD. After applying these criteria, a total of 19 articles were identified as valid and suitable for use in this research.

The concept of Transit-Oriented Development (TOD) differs from conventional transport infrastructure projects by its holistic integration of infrastructure, real estate, land utilization strategies, and urban design principles. Fundamentally, TOD prioritizes development concentrated around transportation hubs, thereby fostering active mobility, mixed-use land areas, and reducing reliance on private motorized vehicles. This approach aligns closely with ESG goals, making it a sustainable development approach that contributes to 10 out of 17 Sustainable Development Goals (SDGs). Nevertheless, the pursuit of sustainability and the effective implementation of the TOD concept is not a straightforward decision for many stakeholders, particularly investors and developers. One of the key challenges resides in the current absence of consistent information and standardized frameworks, which can lead to concerns about "greenwashing" practices within ESG-related investments (Mason, 2023).

Based on theory, the alignment between ESG and the TOD concept is indeed promising. However, the practical convergence of these two frameworks encounters several complexities. The implementation of TOD requires strong collaboration and coordination among government institutions, developers, investors, and the community. With multiple stakeholders having different priorities, misalignment often occurs, slowing progress. Furthermore, behavioral change is also a major obstacle, shifting from a car-centric culture to one that embraces active transportation is not easily achieved (Praditya, 2025). Therefore, strong incentives, policy enforcement, and public education are highly essential. Moreover, TOD projects typically require protracted development timelines, spanning 10 to 15 years, with even longer periods required to recoup capital outlays, making them financially unstable in the short-term financial instability.

From an economic perspective, Transit-Oriented Development (TOD) is a strategic approach to urban planning that offers significant potential as a potential to galvanize regional economic expansion. TOD leverages the integration of public transportation networks with land-use planning to create efficient, productive, and sustainable urban environments. A case study in Jiamei, China, illustrates how the diversification of land use for economic activities around transit nodes has led to the

creation of new economic centers. This growth stems not only from local economic but also from escalating investments across the property, commercial, and public service sectors, propelled by enhanced connectivity (Liang et al., 2020). Another implementation study is the "rail + property" strategy implemented in Tiongkok. This approach demonstrates the close relationship between land development and transportation infrastructure, which supports not only housing provision, but also economic activity concentrated around transit interchanges. The consequent increasing in land value has served as crucial funding source for infrastructure development and has further stimulated economic growth within the region (Song et al., 2021). In terms of human resources as pivotal economic actors, workers residing or operating within TOD areas, both within and beyond TOD zone, play a significant role in driving regional economies. TOD tends to enhance labour productivity, particularly within service-oriented sectors such as retail, accommodation, and entertainment. Enhanced spatial accessibility empowers businesses, employees, and consumers to access markets and business partners with greater efficiency (Lyu et al., 2020). For commuters originating from outside TOD zones, the development fosters a reduction in reliance on private vehicles and encourages transit-based commuting, which proves more cost-effective and time-efficient for business (Sung & Eom, 2024). These findings highlight the critical importance of the economic dimension as a vital component alongside Environmental, Social, and Governance (ESG) considerations to achieve truly inclusive and sustainable urban development.

5. Discussion

Based on the findings presented in the previous section, this discussion explores the broader implications of aligning ESG principles with the TOD concept, particularly in the context of urban development in emerging economies. The following analysis interprets the results, identifies gaps in existing frameworks, and proposes a more comprehensive model that addresses both theoretical and practical dimensions of sustainable development. Numerous scholars have explored the Environmental, Social, and Governance (ESG) framework, offering valuable insights into the quantification of ESG performance. However, these studies often exhibit significant limitations. Many of them argue that ESG, as an evaluative criterion, inadequately reflects the foundational role of economic factors in the pursuit of sustainable development. A framework that does not integrate the economic perspective may present greater challenges, particularly for developing nations with limited resources, in effectively promoting sustainable development initiatives.

To mitigate such potential drawbacks, the ESG framework could be expanded by integrating an "Economic + Environment, Social, and Governance" (EESG) model. This expanded framework positions the economic perspective as a central dimension and advocates for a coordinated development strategy that encompasses economic growth, environmental protection, social responsibility, and sound

governance. The systematic integration of these four interconnected aspects underscores the idea that achieving sustainable development requires the positive interaction of all constituent dimensions (Ma et al., 2025). This integrated framework holds promise for developing nations facing resource limitations in understanding the complex relationship between economic growth and ESG. In the context of Transit-Oriented Development (TOD), this approach will be instrumental in ensuring that the evolution of transit-oriented areas not only prioritizes environmental sustainability and social inclusivity, but also demonstrably fosters regional economic growth.

The integration of the EESG (Economy + Environment, Social, and Governance) framework into the TOD concept provides a more holistic approach to planning. By explicitly incorporating the economic dimension into the framework, TOD can evolve beyond a mere spatial planning strategy to become a catalyst for economic development through increased investment, land productivity, job creation, and strengthening of the informal sectors and Micro, Small, and Medium Enterprises (MSMEs) (Ali et al., 2021). The EESG framework also supports the promotion of green economic growth within TOD zones, such as the adoption of electric vehicle technologies, green building, and ecologically responsible infrastructure development (Niri et al., 2024). TOD development that prioritizes energy efficiency and low-emission transportation systems will make a tangible contribution to mitigating the impacts of climate change within urban environments (Chindaprasirt et al., 2024).

Meanwhile, the social dimension strives to ensure the inclusivity of TOD areas through the provision of affordable housing options, seamless connectivity to essential public services, and enhanced quality of life for residents, and the reduction of disparities in access to economic opportunities. The governance dimension is also critical, as it relates to regulation, incentives mechanisms, cross-sectoral partnerships, policy transparency, and legal certainty. The effective implementation of these principles is crucial to foster a collaborative and participatory environment, thereby ensuring that both communities and investors feel secure. By comprehensively integrating these aspects, the application of EESG framework within the context of TOD will not only reinforce but also establish a solid foundation for developing countries to align economic growth with long-term sustainability goals.

6. Conclusion

One of the most tangible intersections between the ESG framework and urban planning is the concept of Transit-Oriented Development (TOD). This study aims to explore the role of ESG implementation in the development of TOD, particularly in supporting sustainable economic growth within TOD areas and the broader surrounding regions. The findings of this study indicate that TOD provides numerous benefits to both local areas and wider communities, including contributions to climate change mitigation, the provision of inclusive urban

environments, and the establishment of legal certainty that fosters safety and comfort. Moreover, TOD brings substantial economic advantages, such as the creation of new economic centers and increased land and property values, ultimately enhancing the overall quality of life. The diversification of land use through a rail + property development model has been found to attract investment financing, thereby generating additional funding sources for infrastructure development within and around TOD areas. This, in turn, creates efficiencies in market access, consumer reach, and business partnerships, facilitating more dynamic economic activity. However, the implementation of TOD in alignment with ESG principles also faces several challenges. These include the governance complexities arising from the involvement of multiple stakeholders, often leading to a loss of focus on primary priorities. Additionally, behavioral adaptation among the public toward active transportation modes remains limited, and from an economic perspective, TOD projects often require long investment recovery periods and may lack sufficient investor appeal. Furthermore, ESG implementation frequently overemphasizes environmental, social, and governance outcomes while underrepresenting economic dimensions. This imbalance poses greater challenges, particularly in developing countries with limited resources.

In response to the challenges observed in integrating ESG principles with TOD development, this study proposes the EESG framework. This extended framework is intended to foster equity across multiple dimensions without overlooking economic benefits alongside environmental, social, and governance objectives. The EESG model is also envisioned as an effective strategic planning tool for cities and nations aiming to achieve sustainability in urban development. Based on the findings of this study and a review of relevant literature, several policy recommendations are presented, particularly for developing countries such as Indonesia. It is recommended that governments adopt innovative policy instruments to achieve a sustainable balance between economic growth and ESG principles. Priority should be placed on promoting economic growth with social protection mechanisms aimed at improving the welfare of vulnerable groups and reducing wealth inequality. Governance-related policies are also necessary to ensure the efficient allocation of resources, especially in the sectors of education, infrastructure, and renewable energy—with the goal of enhancing economic performance. These policies must be tailored to the specific characteristics of each region, including available resources and economic structures. Thus, the integration of EESG into TOD frameworks not only strengthens sustainability outcomes but also paves the way for more inclusive economic development in emerging economies.

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