Evaluating Transit-Oriented Development in Malaysia: A Comprehensive Analysis of Benefits, Drawbacks and Implementation Challenges

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ABSTRACT

This critical review explores the implementation of Transit-Oriented Development (TOD) in Malaysia, highlighting its benefits, drawbacks, and implementation challenges. As urbanization in Malaysia accelerates, the need for sustainable urban planning becomes increasingly urgent, particularly in addressing issues such as pollution, traffic congestion, and inadequate public facilities. TOD, which promotes dense, mixed-use developments centred around public transit options, offers promising solutions by enhancing accessibility, reducing reliance on personal vehicles, and fostering healthier community interactions. The review outlines the favourable impacts of TOD on the quality of life, economic opportunities, and improved public amenities, citing successful examples such as Kuala Lumpur Sentral and Bandar Sunway. However, it also identifies significant challenges including land availability, zoning regulations, funding constraints, and low community engagement, which hinder effective TOD implementation. Recommendations are offered to overcome these obstacles, including policy reforms and enhanced public-private partnerships. Ultimately, this review emphasizes the potential of TOD as a transformative framework for sustainable urban development in Malaysia, calling for collaborative efforts among policymakers, researchers, and communities to realize its full benefits.

Keywords: Transit-Oriented Development (TOD), mixed-use developments, sustainable development, accessibility

INTRODUCTION

Transit-Oriented Development (TOD) has gained significant traction in Malaysia as a strategic urban planning approach aimed at promoting sustainable urban growth and efficient public transportation systems. Furthermore, the Malaysian economy has improved remarkably through urbanization, but this has come with social vices such as increasing traffic jams, pollution, and lacking public facilities. Solving these problems entails using new planning concepts such as TOD that coordinates transportation and land use planning to develop livable communities effectively. The core principle of TOD is to create compact, walkable communities centred around transit stations, thereby reducing reliance on private vehicles and fostering a more sustainable urban environment Gomez et al., 2019). This approach aligns with Malaysia's broader goals of enhancing urban mobility and addressing the challenges posed by rapid urbanization, such as traffic congestion and environmental degradation (Apriansyah, 2019; Endangsih et al., 2022). According to Saadatian et al. (2012), the Malaysian urban environment must meet the requirements of the contemporary world as much as improve residents' quality of life.

Research indicates that TOD can lead to significant reductions in traffic congestion and air pollution, making urban areas more sustainable and resilient to climate change (Apriansyah, 2019; bhaumik, 2021). Moreover, the emphasis on pedestrian-friendly environments within TOD frameworks aligns with global sustainability goals, making it a viable strategy for addressing urban environmental challenges (Alias et al., 2023). TOD best

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represents new urbanism by increasing the density of residential and commercial properties near transit centres, lowering the number of people who rely on their personal cars to commute, and improving the quality of neighbourhoods. Given the growing interest in implementing TOD since its inception, gaps associated with implementation methods, stakeholders, and the overall absorption of public utilities have not been well addressed in prior studies. Consequently, the following discussion aims to systematically explain the role of TOD in Malaysia by incorporating more implicit assumptions and drawing on examples from related practices. Transit-oriented development (TOD) holds immense promise for revolutionizing urban planning in Malaysia by improving public amenities, a prospect this review critically examines through existing research, addressing gaps with comparative insights and additional case studies.

METHODOLOGY

The methodology utilized in this research paper employs a qualitative research approach to explore the benefits, drawbacks, and implementation challenges of Transit-Oriented Development (TOD) in Malaysia. This qualitative framework facilitates a thorough analysis and comprehension of the intricate social, financial, and environmental factors associated with TOD. Data collection techniques encompass a comprehensive review of pertinent sources, including statutes, guidelines, regulations, research papers, journals, articles, theses, and electronic materials (J. Yap et al., 2017). These resources provide valuable insights into the current status of TOD and its benefits, drawbacks, and implementation challenges within the Malaysian context. The gathered information is subsequently analysed using qualitative analysis strategies to uncover relationships related to the effectiveness of TOD in Malaysia. This analysis aids in identifying the strengths and weaknesses of TOD implementation and its overall impact in the country, ensuring that its benefits are equitably distributed among all segments of the population (Yap et al., 2021; Ramlan et al., 2021).

Conceptual Framework of Transit-Oriented Development

Transit-oriented development, or integrating light rail transit facilities with land use, is an urban planning concept aiming to create lively centres. The basic strategy of TOD is to develop densely built transit-based stations within walking distance across the global rail transit, excluding car use, while enhancing the demand for rail, bicycle, and pedestrians (Institute for Transportation and Development Policy, 2024). This approach has a positive effect on comfort, on reduction of car traffic and the environment. This is because transit-oriented development mainly involves enhancing the quality of the neighbourhood for the residents. After all, it mainly focuses on developing small and compact neighbourhoods around transport-related facilities (Transit Oriented Development, 2018). In the same studies by Liang et al. (2020), one of the critical objectives of TOD is to promote the utilization of the urban environment given the impacts of environmental deterioration.

Peter Calthorpe's work is largely credited with defining the general principles of Transit-oriented development (TOD), which first appeared in the late 20th century. Calthorpe (1993) stated that the need for new communities is to establish compact mobility-oriented mixed-use communities anchored to transit nodes. This concept was taken around the world, and for Malaysia, there was a phenomenon known as TOD. Azmi et al. (2021) revealed that Malaysia’s implementation of TOD complies with the country’s objectives to manage urbanization and the development of public transportation, particularly the LRT.

Malaysia has embraced transit-oriented development through various national strategies for sustainable urban development. One of the principles of this approach is the National Physical Plan, which works in consonance with the elements of TOD in terms of promoting compact urban form and the integration between transportation and use of the land. Azmi et al. (2021) noted that the plan is about limiting the growth of the city’s fringe area, preserving natural resources, and better provision of management and facilities of public transport, especially in the central business district. These align with the principles of TOD in promoting Malaysia to improve connectivity, mixed-use development, and pedestrian amenities that, in turn, help create more human-friendly, sustainable cities.

Core Principles of TOD

Transit-Oriented Development (TOD) is an urban planning strategy that integrates mixed-use development with public transport systems to create vibrant, sustainable communities. By combining residential,

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commercial, and recreational spaces, TOD enhances public utilities and fosters a lifestyle that minimizes dependence on personal.

At its core, TOD is predicated on several key principles that guide its implementation. These principles include:

Mixed-Use Development

TOD encourages the integration of residential, commercial, and recreational spaces within close proximity to transit stations. This mixed-use approach fosters vibrant communities where residents can live, work, and play without relying heavily on private vehicles. The design of these communities aims to enhance accessibility and convenience, making public transport a more attractive option. Mixed-use developments can also stimulate local economies by providing spaces for small businesses and services that cater to the needs of residents Lutz et al. (2024).

High-Density Development

TOD promotes higher density development around transit hubs to maximize the use of available land and support efficient public transport systems. This densification is essential for creating a critical mass of users that can sustain transit services and reduce reliance on cars. However, it is crucial to manage this densification carefully to avoid negative socio-economic impacts, such as gentrification and displacement of low-income residents. High-density development must be accompanied by adequate infrastructure and services to ensure that it does not lead to overcrowding or strain existing resources (Adeel et al., 2021).

Walkability and Connectivity

A fundamental aspect of TOD is the emphasis on walkability. Well-designed pedestrian pathways, safe crossings, and bicycle lanes are integral to encouraging non-motorized transport modes. This connectivity not only enhances access to transit but also promotes healthier lifestyles by encouraging walking and cycling. The design of public spaces should prioritize pedestrian safety and comfort, making it easier for residents to navigate their neighborhoods without the need for a car (Lee et al., 2015).

In conclusion, the conceptual framework of Transit-Oriented Development provides a comprehensive approach to urban planning that integrates land use, transportation, socio-economic factors, and environmental sustainability. By focusing on mixed-use, high-density development around transit hubs, TOD aims to create vibrant, accessible communities that promote sustainable transportation options. However, the successful implementation of TOD requires careful consideration of the socio-economic impacts, effective resource management, and robust public engagement strategies. This engagement is essential for building trust and ensuring that the benefits of TOD are equitably distributed among all community members (Gilat & Sussman, 2003). Addressing these challenges will be crucial for realizing the full potential of TOD in fostering sustainable urban growth.

LITERATURE REVIEW

Benefits and Drawbacks of Transit-Oriented Development in Malaysia

Benefits of TOD

Transit-Oriented Development (TOD) is an urban planning strategy that integrates mixed-use development with public transport systems to create vibrant, sustainable communities. By combining residential, commercial, and recreational spaces, TOD enhances public utilities and fosters a lifestyle that minimizes dependence on personal automobiles. As noted by Pozoukidou and Chatziyiannaki, the TOD model is appealing for its ability to contain urban sprawl and revitalize degraded urban centers, thereby enhancing mobility and public safety while promoting a sense of community (Pozoukidou & Chatziyiannaki, 2021).This

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approach not only promotes environmental sustainability but also contributes to the overall well-being of residents.

Successful examples of mixed-use development in Malaysia encompass the Kuala Lumpur Sentral location, a mixture of residential, commercial, and leisure facilities integrated around a transportation hub (Azian et al., 2023). Similarly, the Bandar Utama township in Petaling Jaya gives a well-designed combo of residential, industrial, and recreational factors, which include a vibrant shopping center and a central park (Ju et al., 2011). These examples exhibit the benefits of blended-use improvement in TOD regions, developing dynamic and sustainable communities.

Mixed-Use Development and Community Health

The concept of mixed-use development has historical roots in various European countries, where blending farmland with urban spaces has proven beneficial for community cohesion and health. Mixed-use development, which integrates residential, commercial, and recreational spaces, has been a hallmark of European urban planning for centuries. The historical blending of urban and rural spaces can be traced back to traditional European villages, where agricultural land coexisted with residential areas, fostering a sense of community and social interaction. This integration has been shown to enhance community cohesion, as residents are more likely to engage with their neighbours and participate in local activities when their living environments are designed to facilitate such interactions (Ilieva et al., 2022). This strategy supports the creation of strong, healthy communities where individuals can live, work, and engage in recreational activities within close proximity. The integration of different functions within a single area enhances walkability, reduces reliance on cars, and fosters social interactions among residents. TODs typically encompass a quarter-to-half-mile radius around transit stations, making essential services accessible to pedestrians. Such developments improve access to shops, schools, and parks, significantly enhancing the quality of life for residents.

Kuala Lumpur exemplifies a successful mixed-use development model, particularly around the Kuala Lumpur Sentral Station. This area integrates residential, commercial, and leisure facilities within a one-kilometer radius of major transit corridors, demonstrating how TOD principles can create sustainable communities. Its serves as a pivotal transit hub, linking various modes of transportation, including light rail, commuter trains, and buses. This strategic positioning has facilitated the development of a mixed-use environment that includes hotels, office spaces, retail outlets, and residential units, effectively creating a self-sustaining community. According to Teriman et al., the development around Kuala Lumpur Sentral has been instrumental in promoting urban sustainability and growth management, showcasing how well-planned transit hubs can drive economic development while minimizing environmental impact (Teriman et al., 2009). The integration of the Light Rail Transit (LRT) line alleviates accessibility issues, contributing to a vibrant urban environment that operates effectively both day and night.

Enhancing Accessibility and Reducing Car Dependency

The advantages of mixed-use facilities in urban areas with existing rail systems extend to improved cycling times and overall lifestyle quality for residents. By accommodating work, business, and leisure activities within a compact area, TOD reduces travel distances and enhances transport efficiency, thereby decreasing personal car usage and alleviating traffic congestion. Better accessibility to neighbourhood facilities, including schools and healthcare services, promotes mobility and sustainable living. Areas designed for TOD, where essential services are within walking distance, encourage active transportation modes such as walking and cycling, leading to better health outcomes for residents.

Historically, cities that have successfully implemented mixed-use development models, particularly in Europe, demonstrate the benefits of blending residential, commercial, and recreational spaces within close proximity to public transport. This approach has proven effective in enhancing community cohesion and promoting a lifestyle that minimizes car dependency (Ploeger & Oldenziel, 2022). The Dutch experience illustrates how aligning urban development with public transit can create livable environments that prioritize cycling and walking, thereby reducing the need for private vehicles (Ploeger & Oldenziel, 2022).

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In Southeast Asia, cities like Jakarta are increasingly adopting TOD principles to combat urban sprawl and improve public transport accessibility. Setiawan's analysis of the Lebak Bulus MRT TOD area highlights the importance of convenience orientation in enhancing the user experience of public transport systems (Setiawan, 2022). By focusing on the integration of land use and transportation, TOD can effectively reduce the reliance on cars and promote sustainable mobility options, such as walking and cycling. Different levels of mobility and ownership of passenger transport modes, such as cars, buses, and rail transit, are the outcome of the transportation growth of cities, which frequently occurs within a path dependence (Barter, P.A., 2004).

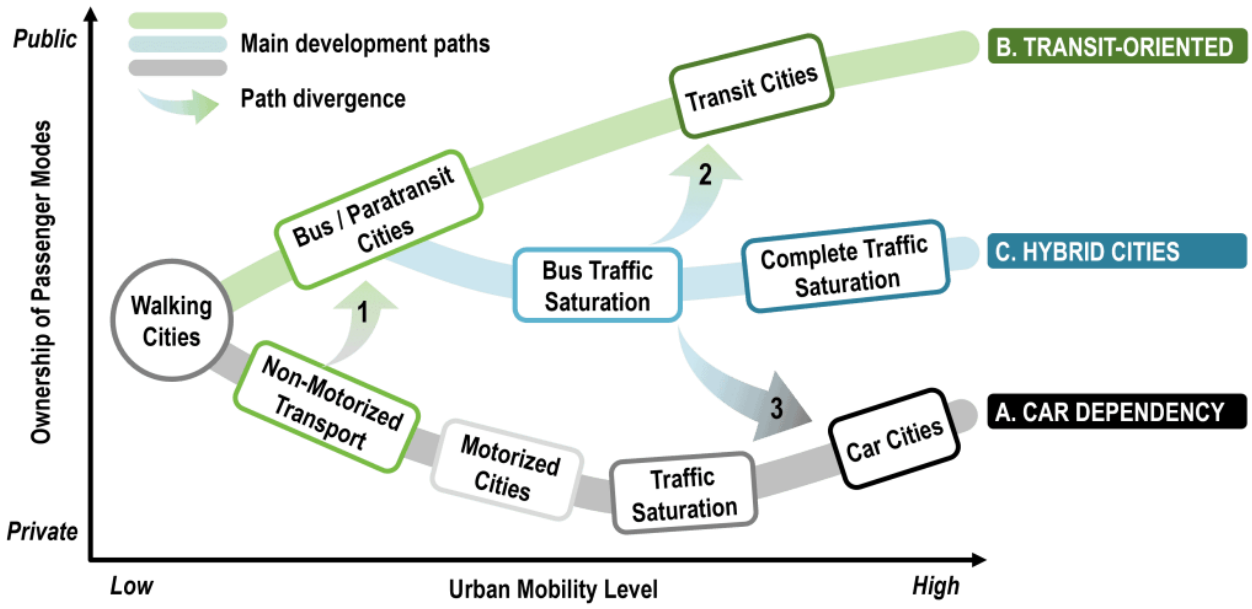

Figure 1 A Broad Perspective on Policy Integration for Low Emissions Urban Transport in Developing Asian Cities (Barter, P.A., 2004)

In addition, the implementation of TOD is not merely a matter of urban design; it also encompasses broader socio-economic considerations. The development of transit villages, as seen in Qatar's Al Sadd area, emphasizes the need for comprehensive planning that ensures mixed-use facilities and public services are centred around multimodal transit stations (Furlan et al., 2020). This holistic approach not only enhances livability but also promotes equity within communities by providing accessible transportation options for all residents.

As cities strive to enhance accessibility and reduce car dependency, the integration of innovative transportation solutions, such as electric and autonomous vehicles, will play a crucial role in shaping the future of urban mobility (Kovačić et al., 2022). However, the successful implementation of these solutions must be accompanied by a commitment to sustainable urban planning practices that prioritize public transport and active transportation modes.

To maximize the benefits of TOD, pedestrian-friendly infrastructure is essential. Safe pedestrian routes, well-designed crossings, and inviting streetscapes enhance mobility and accessibility to parks, schools, and shopping centres. Prioritizing pedestrian infrastructure over vehicular access fosters walking and cycling, which in turn improves urban liveability. A connected pedestrian network enhances social interaction and community engagement, making urban environments more vibrant and inclusive.

Case Studies of Successful Mixed-Use Developments

In Malaysia, several urban areas have adopted environmentally friendly designs that enhance pedestrian accessibility, reflecting a growing commitment to sustainable urban development. One notable example is Bukit Bintang in Kuala Lumpur, where the widening of pedestrian zones has been implemented to accommodate increased foot traffic. This initiative not only facilitates easier movement for pedestrians but also encourages a vibrant street life, fostering social interactions and economic activities. The transformation of

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Bukit Bintang into a pedestrian-friendly environment exemplifies how urban design can prioritize human scale and accessibility, aligning with the principles of TOD (Kim et al., 2024).

Similarly, Ara Damansara has introduced innovative design features such as box junctions to facilitate safer pedestrian crossings. These junctions are designed to improve the flow of pedestrian traffic while minimizing conflicts with vehicles, thereby enhancing safety for those on foot. Such design improvements are crucial for creating pedestrian-friendly environments in TOD areas, as they significantly enhance access to public facilities and contribute to desirable urban settings. The emphasis on safety and accessibility in urban design not only promotes walking as a viable mode of transport but also supports broader public health objectives by encouraging physical activity among residents (Li et al., 2023).

The integration of environmentally friendly designs in urban planning is supported by research that highlights the importance of mixed land use in promoting livable cities. Nieuwenhuijsen emphasizes that urban design plays a critical role in shaping health outcomes, as mixed-use developments can decrease the distance between home, work, and amenities, thereby encouraging walking and reducing reliance on cars (Delgado-Capel & Cariñanos, 2020). This aligns with the goals of TOD, which seeks to create compact, walkable communities that prioritize public transport and active transportation modes.

Moreover, the adoption of sustainable urban design practices in Malaysia is not merely a trend but a necessary response to the challenges posed by rapid urbanization. As cities expand, the demand for efficient transportation systems and pedestrian-friendly environments becomes increasingly pressing. The implementation of such designs can mitigate the adverse effects of urban sprawl, including traffic congestion and environmental degradation. Research indicates that enhancing pedestrian infrastructure is essential for promoting sustainable transportation solutions, as it encourages residents to choose walking or cycling over driving (Zong & Yu, 2024).

In conclusion, Transit-Oriented Development offers numerous benefits, including improved public utilities, enhanced accessibility, and a healthier lifestyle for residents. By integrating mixed-use development with public transport systems, TOD fosters vibrant communities that prioritize walkability and reduce reliance on personal vehicles. Successful examples from Kuala Lumpur and Sunway Bandar illustrate the potential of TOD principles to create sustainable urban environments that enhance the quality of life for residents. As urban areas continue to grow, adopting TOD strategies will be essential for fostering livable, healthy, and economically vibrant communities.

Drawbacks of TOD

The implementation of Transit-Oriented Development (TOD) in Malaysia presents a promising framework for enhancing urban sustainability and improving public transport systems. However, despite its theoretical advantages, several significant disadvantages hinder its effectiveness. Among these challenges are the inadequate integration of multi-modal transport systems, insufficient pedestrian infrastructure, and the complexities of urban planning that do not fully embrace the principles of compact city development.

Inadequate Integration of Multi-Modal Transport Systems

A primary challenge in the realization of TOD benefits in Malaysia is the inadequate integration of multi-modal transport systems. Research by Abdullah et al. emphasizes the importance of integrating land use and transportation planning to facilitate multi-modal connectivity in Malaysian cities. Their study highlights that without a well-coordinated approach to transport planning, the potential for TOD to enhance urban mobility and promote sustainable development is significantly diminished Abdullah et al. (2023). Effective TOD relies on seamless connectivity between various modes of transport, including buses, trains, and non-motorized options like cycling and walking. Research indicates that the lack of a comprehensive planning coordination structure significantly constrains the realization of TOD benefits in Malaysia, leading to poorly designed pedestrian pathways and insufficient connectivity between transport modes (Gomez & Rameson, 2019). This disjunction discourages public participation in transit systems, as potential users find it inconvenient to navigate between different transport options (Febriyanto et al., 2021).

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Moreover, the design of pedestrian pathways is often inadequate, lacking essential features such as wide sidewalks, safe crossings, and amenities that encourage walking and cycling. This situation not only diminishes the attractiveness of public transport but also limits the health benefits associated with active transportation modes. Integrating pedestrian infrastructure into urban development is crucial, as it increases the general population's ability to traverse spaces actively, thereby reducing sedentary behavior and promoting healthier lifestyles (Ali et al., 2021). Furthermore, enhancing pedestrian infrastructure can lead to reduced traffic congestion and lower carbon emissions, contributing to a cleaner environment.

Urban Planning and Densification Challenges

While the potential for densification around transit hubs exists, it is essential to recognize the risks associated with resource management and environmental performance. Rapid population growth in already congested areas places considerable pressure on existing infrastructure, necessitating significant improvements in the built environment (Yu et al., 2024). The existing urban infrastructure often fails to support the high-density, mixed-use development that TOD aims to promote. The principles of compact city development are not fully embraced in Malaysian urban planning, resulting in land use that does not optimize proximity to transit stations (Azmi et al., 2021).

The principles of compact city development, which advocate for higher density and mixed land use to optimize proximity to transit stations, are not fully embraced in Malaysian urban planning. Azmi et al. (2021) argue that the current land use policies often prioritize horizontal expansion over vertical growth, resulting in urban sprawl that undermines the potential benefits of TOD. This lack of adherence to compact city principles means that many transit stations are surrounded by low-density developments, which do not encourage walking, cycling, or the use of public transport. Consequently, the potential for creating vibrant, transit-oriented communities is diminished, as residents may still rely on private vehicles for their daily commutes.

The absence of a cohesive land use strategy that aligns with TOD principles can lead to urban sprawl, contradicting the objectives of TOD aimed at reducing reliance on private vehicles and enhancing public transport usage (Abdullah, 2023). Higher density can also lead to environmental implications for residents, such as overcrowding, inadequate green spaces, and increased pollution levels. If not well managed, the pressure exerted on natural resources may neutralize some of the sustainability benefits associated with densification (Yu et al., 2022). Therefore, it is crucial to design an appropriate mix of increased density and usable infill space to ensure that resources and the environment remain sustainable while facilitating urban living.

Ultimately, while the potential for densification around transit hubs presents an opportunity for enhancing urban living and promoting sustainable transport options, it is essential to recognize the associated risks related to resource management and environmental performance. Rapid population growth in congested areas necessitates significant improvements in the built environment to support high-density, mixed-use development effectively. The current shortcomings in Malaysian urban planning, particularly the failure to fully embrace compact city principles, hinder the optimization of land use around transit stations. To realize the full potential of TOD, a comprehensive approach that integrates infrastructure improvements, sustainable resource management, and environmental considerations is essential.

Public Perception of Public Transport

One of the most significant socio-economic barriers to TOD in Malaysia is the public's perception of public transport as unreliable and inconvenient. Research indicates that the effectiveness of public transport systems is often judged by their reliability, frequency, and overall user experience (Abdullah et al., 2022; Yap & Goh, 2017). In Malaysia, inconsistent service quality, characterized by delays, overcrowding, and inadequate coverage, has led to a pervasive scepticism among potential users. This perception is deeply rooted in the experiences of commuters who often face challenges related to the quality and consistency of public transport services. Borhan et al. emphasize that factors such as punctuality and frequency are crucial in determining the attractiveness of public transport options. Their study on the public bus system in Putrajaya reveals that perceived unreliability significantly deters potential users from opting for public transport, thereby limiting the

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effectiveness of TOD initiatives Borhan et al. (2017). The findings suggest that improving the reliability of public transport services is essential for changing public perceptions and encouraging greater use of these systems. This scepticism is compounded by a historical reliance on private vehicles, which are perceived as more convenient and reliable than public transport options.

Furthermore, Ong's research highlights the direct correlation between service quality and customer satisfaction in Malaysia's public transport sector. The study indicates that passengers often lose trust in public transport services due to issues like long wait times and irregular service, which contribute to a negative perception of public transport as an inconvenient option (Ong, 2022). This dissatisfaction not only affects current users but also discourages potential users from utilizing public transport, thereby undermining the goals of TOD, which aims to promote public transport as a viable alternative to private vehicle use.

The lack of trust in transit systems significantly affects ridership levels. Low ridership undermines the financial viability of transit projects, creating a vicious cycle where insufficient revenue leads to further deterioration of service quality. Consequently, this situation makes it challenging to justify further investments in TOD initiatives, as stakeholders may perceive these projects as financially unfeasible (Abdullah et al., 2022; Yap & Goh, 2017). The public's reluctance to embrace public transport not only limits the potential success of TOD but also exacerbates traffic congestion and environmental degradation, counteracting the very goals that TOD seeks to achieve.

Political and Regulatory Landscape

In addition to public perception issues, the political and regulatory landscape in Malaysia presents significant challenges to the effective implementation of TOD. A notable concern is the lack of political will and commitment to enforce policies that support TOD. Policymakers may prioritize short-term economic gains over long-term sustainable urban planning, leading to fragmented efforts that fail to integrate TOD principles into broader urban development strategies (Abdullah, 2023; Yap & Goh, 2017).

The insufficiency of funding for necessary infrastructure improvements further complicates the situation. Without adequate financial resources, projects that could enhance public transport infrastructure—such as the expansion of rail networks or the improvement of bus services—are often delayed or abandoned. This lack of investment not only hampers the development of a robust public transport system but also discourages private sector participation in TOD initiatives.

Moreover, the complexity of coordinating between various government agencies and stakeholders poses additional challenges. Effective TOD requires collaboration among multiple entities, including local governments, transport authorities, and private developers. However, the bureaucratic nature of these organizations can lead to inefficiencies, miscommunication, and delays in project execution (Gomez & Rameson, 2019; Abdullah, 2023). The absence of a cohesive strategy that aligns the interests of all stakeholders can result in disjointed efforts that fail to achieve the intended outcomes of TOD.

In conclusion, the implementation of Transit-Oriented Development in Malaysia faces several significant challenges, including inadequate integration of multi-modal transport systems, insufficient pedestrian infrastructure, and urban planning practices that do not fully support TOD principles. To address the above challenges, policymakers, stakeholders and urban planners must work together to develop a comprehensive strategy that improves connectivity, promotes active transportation, and optimizes land use near transit hubs. By overcoming these barriers, Malaysia can harness the potential of TOD to foster sustainable urban development and improve the quality of life for its residents.

Challenges in Tod Implementation in Malaysia

Accessibility is a key factor in successful TOD implementation, but land availability and zoning issues present major obstacles in Malaysia. Finding proper locations to acquire areas for development near transit nodes may not be easy because of the space availability in the urban centers (Rodrigue, 2024). However, current zoning laws can also be a problem as they should incorporate elements of the TOD concept, which makes it

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challenging to create multifunctional zones. According to Azmi et al. (2021), such legal and regulatory challenges limit the necessary policies enabling the execution of TOD projects. These issues will obligate policy changes, enhanced land use planning, and combined government and private sector efforts to formulate less rigid zoning ordinances for TOD. Additionally, the "one-size-fits-all" approach to TOD implementation often overlooks the unique socio-economic contexts of different regions, leading to ineffective planning outcomes (Thomas et al., 2018). The lack of comprehensive policies and frameworks to support TOD initiatives can hinder their success, as evidenced by inconsistent application across various urban areas (bhaumik, 2021).

The implementation of TOD in Malaysia is fraught with challenges and potential drawbacks. One significant concern is the risk of transit-induced gentrification, where rising property values and rents in transit-oriented areas may displace lower-income residents (Kim, 2020). This phenomenon can exacerbate social inequalities and undermine the inclusive objectives of TOD, leading to community fragmentation and social unrest. A notable element barriers to achieving the goals and objectives of TOD implementation is how to access adequate funding for infrastructure. According to Zainuddin et al., the construction sector in Malaysia faces numerous issues, including delays in project completion and cost overruns, which are exacerbated by inadequate funding mechanisms (Zainuddin et al., 2024). These financial constraints can severely limit the scope and scale of TOD projects, preventing them from achieving their intended objectives of enhancing urban mobility and sustainability. The reliance on traditional funding sources, which may not be sufficient to cover the comprehensive infrastructure needs of TOD, further complicates the situation (Zainuddin et al., 2024). Developing and expanding the structure of transportation and other infrastructure facilities require a sizeable investment. In response, Public-Private Partnership (PPP) are inevitable.

PPPs are widely understood as a mechanism through which government can contract out the financing or delivery of public assets or services with private capital and skills (The World Bank Group, 2020). Due to these partnerships, the costs for implementing the TOD projects are divided equally between the government and various private developers, which makes the projects financially sustainable. According to Khaderi et al. (2021), PPPs can facilitate capital for large investors to fund infrastructural developments. At the same time, they guarantee conformity to public needs and private benefits, resulting in enhanced and sustainable urban development.

One of the significant areas of concern relating to the implementation of TOD is low public sensitization and lack of community participation. Most people require sufficient information on the opportunities associated with TOD, which results in opposition to and poor support for these projects. The community needs to be involved in planning to ensure that planned and executed TOD meets the community's needs and gains public approval through comments (C40 Cities Climate Leadership Group, Inc., 2024). Slotterback (2010) said that it is crucial to help encourage the public's participation to enhance the level of trust, dispel their worries, and give ownership of the projects to the residents so that they can adequately implement the TOD projects. Public participation is crucial in the sustainability of the urban planning projects.

FINDINGS AND RECOMMENDATIONS

Transit-Oriented Development (TOD) has emerged as a transformative strategy in urban planning, particularly within the Malaysian context, where it has significantly enhanced public amenities and accessibility. This approach emphasizes the integration of transportation systems with urban development, promoting higher density, mixed-use environments that prioritize public transit accessibility. The success of TOD is contingent upon the availability of adequate infrastructure and services to support increased population density. In many Malaysian cities, existing public transport systems may not be sufficiently developed to accommodate the anticipated growth in ridership associated with TOD (Setiawan, 2022). The integration of land use planning with transportation planning is crucial; however, this integration is often lacking in practice, leading to fragmented development that fails to realize the full potential of TOD (Abdullah et al., 2023; Jamme et al., 2019). As a result, TOD not only improves public amenities—such as parks, recreational facilities, and commercial spaces—but also fosters a culture of sustainable living among urban residents. The proximity of these amenities to transit stations encourages public engagement and reduces reliance on private vehicles, contributing to lower carbon emissions and improved air quality.

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Moreover, the implementation of TOD has played a crucial role in raising public awareness regarding sustainable living practices. The integration of land use planning with transportation planning is crucial; however, this integration is often lacking in practice, leading to fragmented development that fails to realize the full potential of TOD. Public awareness and acceptance of TOD principles are essential for its success, yet there remains a general lack of understanding among the public regarding the benefits of TOD and sustainable urban living (Gumano, 2020). As communities become more integrated with public transport systems, residents are more likely to adopt sustainable behaviours, such as using public transport, cycling, and walking. Educational initiatives and community engagement programs associated with TOD projects further enhance this awareness, promoting a culture of sustainability that aligns with national objectives for environmental conservation.

Despite the numerous benefits associated with TOD, significant challenges remain, particularly concerning land availability and zoning regulations. Mathur and Gatdula (2023) identify these issues as critical hindrances to the successful implementation of TOD in Malaysia. The scarcity of land in urban areas often leads to competition among various stakeholders, complicating the development process. Furthermore, existing zoning laws may not adequately support the mixed-use developments characteristic of TOD, necessitating a re-evaluation of these regulations.

To address these challenges, it is imperative to rationalize procedural mechanisms and revise zoning norms. The existing zoning regulations often create barriers to effective urban development, necessitating a re-evaluation of these frameworks to promote efficiency and adaptability in urban planning practices. Fischel's work highlights the importance of understanding property rights within municipal zoning, suggesting that a more efficient zoning process can lead to better equity outcomes, although it also raises concerns about the distribution of property rights (Fischel, 1978). This indicates that rationalizing procedural mechanisms can enhance the effectiveness of zoning laws, thereby facilitating smoother urban development processes. Streamlining the approval processes for TOD projects can facilitate quicker implementation and encourage private sector investment. Additionally, updating zoning regulations to accommodate mixed-use developments will enable a more flexible approach to urban planning, allowing for the integration of residential, commercial, and recreational spaces within close proximity to transit facilities. The emphasis on revising zoning norms to accommodate mixed-use developments is supported by the notion that such flexibility can lead to more integrated urban environments, where residential, commercial, and recreational spaces coexist harmoniously (Walsh et al., 2018).

Enhancing collaboration between government entities and private developers is also essential for the successful implementation of TOD. Establishing clear communication channels and partnerships can lead to more effective planning and execution of TOD projects. This collaboration can foster innovation in urban design and sustainability practices, ensuring that developments meet the evolving needs of Malaysian society.

Looking ahead, future studies should focus on the sustainability of the TOD approach and its applicability in various Malaysian cities. Research should explore how TOD can be tailored to different urban contexts, considering factors such as population density, cultural diversity, and economic conditions. Additionally, longitudinal studies assessing the long-term impacts of TOD on urban living conditions and environmental sustainability will provide valuable insights for policymakers and urban planners.

CONCLUSION

Transit-oriented development (TOD) presents the prospect of radically enhancing Malaysian cities in terms of their overall growth and creating better public access. The advantages of TOD are discussed in this study with examples. An examination of the existing research has also been done, and this study has presented a comprehensive view of the pros and cons of TOD. Therefore, using case examples, with a specific focus on issues such as the availability of land and funding, provides essential information about the effects of TOD. However, the implementation of TOD in Malaysia is not without its challenges. The review identifies critical barriers such as land availability, restrictive zoning regulations, funding limitations, and insufficient community engagement. These obstacles necessitate a concerted effort from various stakeholders, including government entities, private sector participants, and local communities, to devise effective strategies for

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overcoming them. The recommendations provided in this review, such as advocating for policy reforms and fostering public-private partnerships, are essential steps toward facilitating the successful implementation of TOD initiatives.

Ultimately, the realization of TOD's full potential in Malaysia hinges on collaborative efforts that prioritize sustainable urban development. Policymakers must engage with researchers and communities to create an inclusive planning process that addresses the diverse needs of urban populations. By embracing TOD as a framework for urban development, Malaysia can not only mitigate the adverse effects of rapid urbanization but also pave the way for a more sustainable, equitable, and prosperous future. The findings of this review serve as a call to action for all stakeholders to harness the transformative power of TOD in shaping the urban landscapes of Malaysia. Subsequently, to fully leverage the potential of TOD for efficient and sustainable urban mobility and improved quality of life, close collaboration between researchers, policymakers, and the community is crucial.

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