



## Transit-oriented Development from the View of Traditional City Model

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### Abstract

Several communities have adopted the transit-oriented development (TOD) model to improve the urban form of the city. Through the TOD model, citizens are enabled and encouraged to travel by public transit and live near it, resulting in a compact, walkable city. By emphasizing these principles, cities are able to create a sustainable urban environment that is beneficial to everyone. The purpose of this paper is to explore the relationship between transit-oriented development (TOD) and traditional city models and to promote the TOD model among Middle Eastern planners. Although Peter Calthorpe developed the TOD model in the early 1990s, the elements of TOD have existed in traditional cities for a long time. Literature has not explored the relationship between these two models; therefore, traditional cities and their development have been studied, such as Marrakech and Fes in Morocco. Marrakech and Fes are both examples of traditional cities in Morocco. The two cities have different features, such as *Marrakech's riads*, the old city walls, and the *souks* while Fes is known for its medina, the University of Al-Qarawiyyin, and its tanneries. This research, therefore, aimed to understand the correlation between traditional city models and TOD models by investigating: (a) the concept and diverse types of TOD models; (b) the relationship between TOD and traditional city models, and (c) the presence of TOD elements in traditional cities. This research provided insights into the opportunities and challenges of combining TOD models with traditional city models, in order to achieve more sustainable urban development.

**Keywords:** Transit-oriented development; Traditional city model; Connectivity; Public transportation

### 1 Introduction

Understanding our city's history is crucial to maintaining its identity and knowledge. Trade, commerce, and cultural exchange have always been taken place in cities over the centuries (Ali et al., 2021; Marthya, 2021). Streetcars were developed in the early 20th century by a single owner to serve suburban areas and increase real estate values (Carlton, 2009; Su, 2021). As a result, cities have developed around their transportation modes in the past. As these transit hubs grew into suburbs, urban development concentrated around them (Tamakloe, Hong, & Tak, 2021; Zhou, & Yang, 2021). The transit system was built early in the development of suburbs to serve city growth; therefore, it was known as "development-oriented transit". The suburban model eventually led to "transit-oriented development." (Ebrahimi, Rahimian, & Sahraei, 2013).

A Transit-oriented development (TOD) model is a well-established method for achieving compact and high-density development, using diverse land uses to promote open spaces, improving

accessibility and providing a variety of transportation options (Dong, 2021; Yildirim, & Arefi, 2021). The concept of TOD promotes sustainable development by reducing the use of cars and focusing on pedestrian-oriented development. Additionally, TOD serves as the centre of urban life where people can live, work, play, and socialize (Cervero, & Kockelman, 1997). As a result, long-distance driving becomes less necessary, greenhouse gas emissions from cars are reduced, and traffic congestion is lessened (Zhou, & Yang, 2021; Wey, & Hsu, 2014).

TOD have been used by a variety of city planners to promote the city's urban form in the past few years. In 1980, Peter Calthorpe, leader of the New Urbanist movement, recognized the TOD concept from a variety of perspectives (Hess, & Lombardi, 2004). As described by Calthorpe (1993), TOD typically consists of a mix of commercial, residential, office and public space located between 10-15 minutes (approximately 1 kilometre) from a public transportation stop (Su, 2021). Through TOD, cities become more compact and walkable, encouraging citizens to use public transportation and live near it (Dou et al., 2016). In TOD models, the city is developed around transit hubs, surrounded by markets, bazaars, and residential zones, returning to a traditional suburban and metropolitan centre (Ghasemi, Hamzenejad, & Meshkini, 2019; Mai, Zhan, & Chan, 2021).

To fill the gap in the literature regarding the relationship between traditional cities and TOD, this paper aims to make TOD more accessible to community members and planners in the Middle East. Even though TOD was developed by Peter Calthorpe in the early 1990s, TOD elements existed long before then. Therefore, this paper seeks to bridge the gap in knowledge by offering a better understanding of TOD principles, originating from traditional urban designs to planners and community members in the Middle East.

## **2 Methodology**

Several reviews of recent literature related to transit-oriented development (TOD) were conducted to gain a deeper understanding of the concept. The overall data collection methods were based on an evaluation of literature from a variety of fields that emphasized TOD key factors and traditional city elements. To fill the gap between TOD and traditional city models, similarities and differences in their elements were identified. A meta-analysis was used to identify and analyze the various components of TOD and traditional city models, identifying relevant high-quality data sources and integrating findings to draw conclusions, allowing a broader and more systematic understanding of these two models. Through this analysis, it was possible to determine how various elements of TOD and traditional city models overlap and contrast, providing insights for future development. By utilizing a meta-analysis, it was possible to gain a deeper understanding of the differences and similarities between TOD and traditional city models, providing valuable insights for urban planners and decision-makers. This, in turn, could aid urban planners and decision-makers in formulating more effective urban and transport policies that incorporate the benefits of both TOD and traditional city models. Finally, it was possible to identify gaps in the existing literature, as well as opportunities for future research.

## **3 TOD Model**

Several studies related to TOD at local, regional, and international levels were reviewed to gain greater insight into the concept. The TOD strategy has been widely recognized as an effective urban planning strategy in recent years. TOD promotes mixed land use, compact cities, walkability, and public transportation use and living (Mirmoghtadaee, & Abdi, 2021).

The concept of TOD has been discussed in numerous ways by urban and transport planners. However,

it is widely attributed to Peter Calthorpe, one of the leading figures of the New Urbanism movement. In 1993, Peter developed the TOD phrase, which was widely used in “The Next American Metropolis” book. TOD is defined by Calthorpe as “a mixed-use development in close proximity to a central public transportation stop, which is approximately 10-15 minutes’ walk or cycle ride away (Su, et al., 2021). In TOD, pedestrian paths are integrated into mixed-use developments, which include residences, offices, public spaces and public transportation, encouraging citizens and employees to take public transportation, walk, cycle or drive” (Abdi, 2021) (see Figure 1).

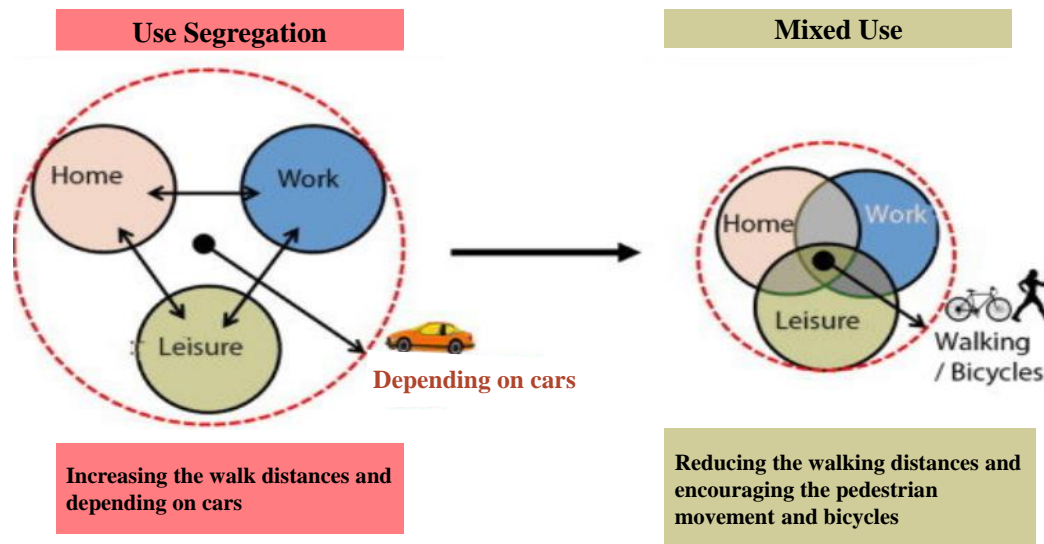


Fig. 1: Use segregation vs mixed use (Kamyar, & Spourezi, 2019)

### 3.1 Distinct types of transit-oriented development

The first type is single-node TOD (see Figure 2). This type is based on a single neighborhood centered on railway stations. It can be located in an urban or suburban area. Development is carried out in a circular pattern centered on a train station. There are a variety of radiuses ranging from 0.5 km (for pedestrian access) to 2-3 km (for bicycle access) (Zhang, 2022).

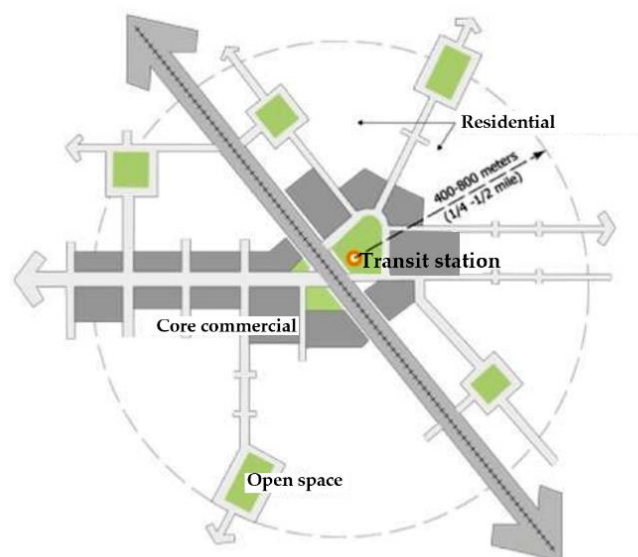
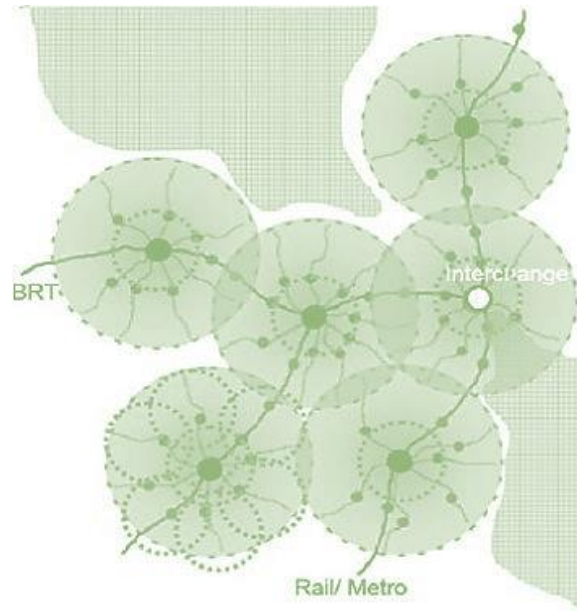


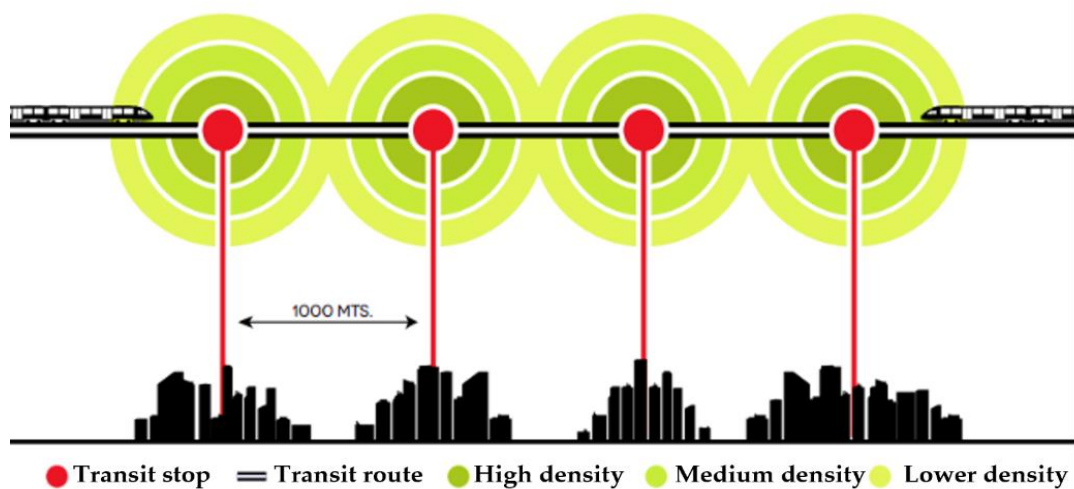
Fig. 2: Single-node TOD (Abdi, 2021)

The second type of TOD is multi-node TOD (see Figure 3). The purpose of this type is to create a regional network of nodes around railway stations, similar to single-node TOD. There are two types of nodes: circular and semicircular. TOD nodes are typically arranged in the form of “beads-in-a-string.” TOD of this type aims to realign entire urban regions around rail transportation and away from automobiles (Abdi, 2021).



**Fig. 3:** Multi-node TOD (Kamyar, & Spouezi, 2019)

The third type of TOD is corridor TOD (see Figure 4). This type occurs in cities and is based around light rail or Bus Rapid Transit (BRT) stops. Due to the proximity of nodes along the transit line(s), the development pattern is linear or ribbon-like. TOD corridors can be used in existing urban areas as well as those that are being planned.

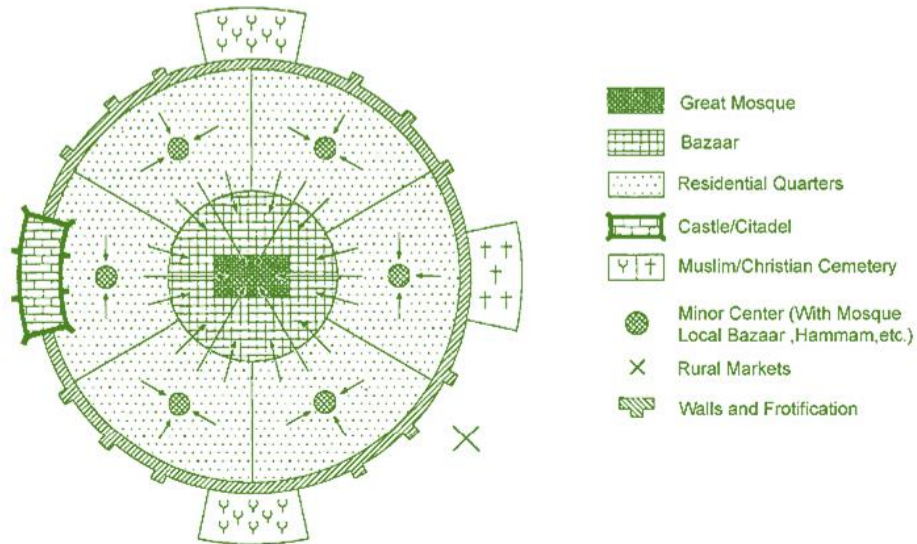


**Fig. 4:** Corridor TOD (Dabbour, 2021)

## 4 The Presence of TOD Features in Traditional Cities

### 4.1 The Traditional City Model

In 1969, the German geologist Dettman developed the traditional city model (Dabbour, 2021). City development was centered around the great mosque, with a bazaar, market, and residential areas surrounding it. The traditional city model emphasized the importance of the great mosque as the nucleus of the city, with all other activities deriving from it (see Figure 5).



**Fig. 5:** Dettman Islamic City Model (Al-Harami, & Furlan, 2020)

A second German geographer, Ehlers, has developed a design for traditional cities. He identifies the characteristics of a traditional city as (a) Newly built streets that undo the ancient urban consistency of the bazaar area and disrupt the cohesion of the bazaar. (b) A new external area of the city that reflects the surrounding environment and has a patterned order (Calthorpe, 1993). Ehlers emphasizes that this new external area should be well integrated with the environment, providing a sense of continuity with the city's past. To ensure this continuity, Ehlers proposed that the design of this external area should incorporate elements of the surrounding environment, including the use of local materials and traditional patterns. As a result, Ehlers stressed the importance of creating a design that is both aesthetically pleasing and respectful of the city's cultural heritage (Al-Harami, & Furlan, 2020) (see Figure 6).



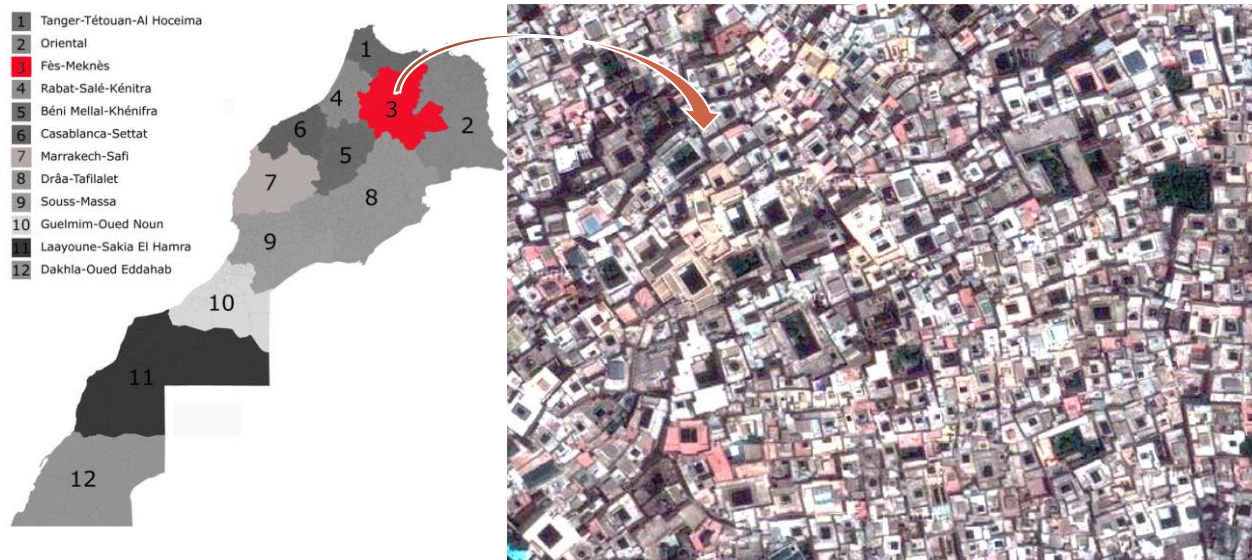
**Fig. 6:** Ehlers Traditional City Model (Al-Harami, & Furlan, 2020)



### 4.1.1 Connectivity and Compact City

The traditional city consists of residences, palaces, and public spaces such as mosques, hospitals, madrasas, and residential areas (Rogers, 2020). Most houses are internally oriented, segregated from the “outside” world by walls, or through hierarchically arranged streets. A street often runs from a major public road to a cul-de-sac and finally to a private parcel. There are very few connections between the various districts of the city. Returning to the major street is the only way to get from one sector to another (Caset, et al., 2020).

The image below shows Fes compact city, the cultural heart of Morocco. It is one of the oldest cities in the world. The area is one of the world’s largest urban car-free areas and is listed as a UNESCO World Heritage Site. The city consists of two old Medina quarters, Fes el Bali and Fes el Jdid, and the modern Ville Nouvelle, built during the French colonial period (1912-1956) (Zhang, 2022). Fes is renowned for its traditional city layout, with its narrow alleyways, winding streets, and intricate architecture, which reflect its centuries-old history. These features, combined with the rich culture and vibrant atmosphere (see Figure 7 and 8).



**Fig. 7:** Fes compact city, the cultural heart of Morocco



**Fig. 8:** Close interaction between the souq, mosque, alleyways, and surrounding residences (Zhang, 2022)



In the city of Fez, the area was divided according to professions, such as tanneries, copper craftsmen spice sellers. Chouara Tannery is one of the oldest tanneries in the entire city, in addition to being the largest. Located near the Saffarin Madrasa on the Oued Fes (also called the Oued Bou Khrareb), it is the oldest Medina quarter of the city (see Figure 9). Throughout the city’s history, the tanning industry continued to operate in the same manner as it was in the early centuries. In modern day, the tanning industry is considered one of the main tourist attractions in the city (Zhang, 2022; Nafi, et al., 2021).



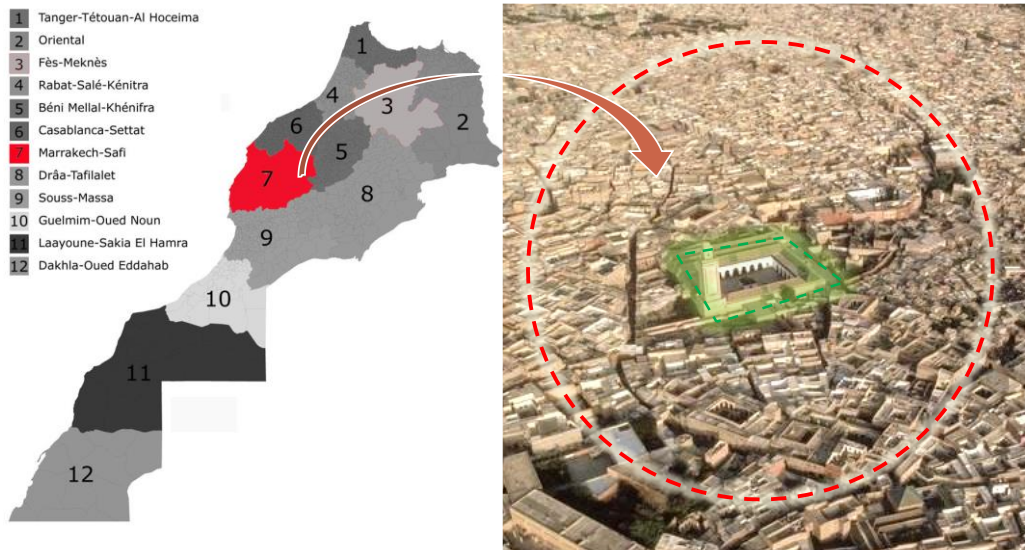
**Fig. 9:** Chouara Tannery in Fes (Nafi, et al., 2021)

#### **4.1.2 Public Realm**

Plazas, souks, parks, squares, and leisure areas are all examples of public realms that contribute to social cohesion. Low levels of pollution and a sense of safety contribute to a more comfortable living environment (Ehlers, & Floor, 1993). The public realm is an important component of a community’s social life, contributing to community interaction, social cohesion, and a sense of belonging (Hakim, 2008). TOD includes public spaces in which people can determine their own cultural identities, participate in communities, and engage in social activities (Marthya, et al., 2021; Budiman, 2019).

Similarly, to TOD, the traditional city has a “Barahat,” an open area around the houses where traditional performances are held. There are several Barahat scattered throughout the old city neighbourhood. In addition to covering residents’ needs, Barahat provides a comfortable, secure atmosphere for them (Rogers, 1998). A compact outdoor park, for example, was located near schools. There is also a public Majlis near mosques (Calthorpe, 1993).

In comparison to Fes, Marrakech in Morocco was once one of the most significant trading centres for Atlas Mountain tribes, and it remains so today (Figure 10). The souks are located to the north, while the Koutoubia Mosque and Gardens are to the west. To the south lies the Kasbah area which is home to the Saadian Tombs, Bahia Palace, and El Badi Palace. Within the city, visitors can explore the spice markets at Souk el-Attarin, the blacksmith markets at Souk Haddadine, and the slipper markets at Souk Smata. The buildings have large open spaces and courtyards that enhance the sense of place. (Figure 10 & 11).



**Fig. 10:** Marrakech, Morocco



**Fig. 11:** Jemaa el Fna Square, Marrakech (Zhang, 2022)

### 4.1.3 Diversity and Density

Studies have shown that the TOD model promotes a mix of commercial, residential, recreational, and educational land uses, along with high pedestrian activity (29). A transit stop is usually surrounded by commercial buildings and public amenities, while the rest of the land is used for other purposes (Benzakour, 2020). The TOD approach also promotes compact development of moderate to high-density cities, allowing pedestrians to move easily within them (Yildirim, & Arefi, 2021; Al Saeed, & Furlan, 2019; Lamour, Morelli, & Marins, 2019; Mukhamedjanov, et al., 2021).

For the traditional city model, it promotes a compact development of a variety of land uses, including the bazaar (market), the madrasah (school), the mosque, the guesthouse, the hammam, the library, the cultural center, and residential buildings (Mirmoghtadaee, & Abdi, 2021). Typically, the central mosque is surrounded by a bazaar, a library, and schools. On the other hand, the traditional city model integrates these land uses with traditional spaces and maintains them (Calthorpe, 1993; Caset, et al., 2020).

## 5 Discussion

The concept of TOD and its different subtypes were examined. By comparing TOD with traditional city plans, as well as analyzing the similarities between their principles, it was demonstrated that



TOD elements are also found in traditional city plans. The results of this comparison provide insight into how TOD can be incorporated into traditional city plans to create more sustainable, efficient, and livable environments. This comparison, thus, suggests that TOD can be used to supplement traditional city plans, creating a more holistic approach to urban design and development.

The results show that TOD is a top-down, centrally planned process created by city planners, whereas the traditional city model is a bottom-up, collectively planned process determined by contextual conditions and society. Traditional cities created places for commerce and economic centers. However, the TOD model operates more as a commodity and a service to society to improve the quality of life. This has resulted in the TOD model becoming a popular approach to developing cities, offering a balance between economic and social needs, while also promoting a more sustainable and equitable urban environment.

Traditional cities were built on destination-based activities. Attractive destination to engage in activities and interactions. This is because traditional cities are designed from a human-centric perspective, where the focus is on providing places for people to gather and interact. In contrast, TOD is designed from a transportation-centric perspective, which focuses on providing efficient transportation to move people from one place to another. Therefore, even though TOD has its own distinct features, there are still elements of traditional city planning that are present.

Today, cities are increasingly organized around activities that are generated within the city itself, such as work, recreation, and entertainment. For instance, in many cities, the downtown area has become a hub of activity with people commuting there for work and entertainment, rather than just for shopping or business. A traditional city is a city that has developed organically over time, through the organic growth and expansion of its population. A TOD city is a city that has been designed and planned from the ground up to be a more efficient and sustainable place to live (see Figure 12).

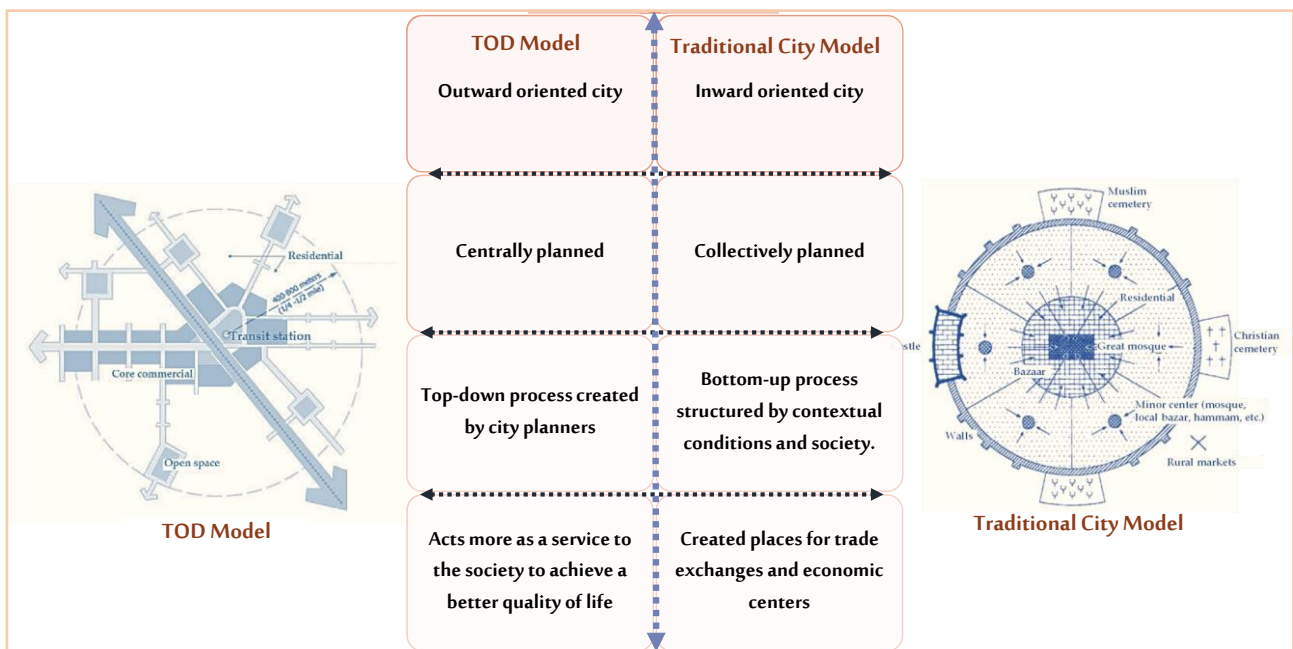


Fig. 12: Comparison between the traditional city and TOD model

## 6 Conclusion

Through high-quality transit, TOD promotes sprawl-free development and improves urban mobility. TOD enhances wealth building, improves opportunities for residents, and reduces air pollution by

promoting neighborhood diversity, walkability, and compact development near transit hubs. Although TOD is a more academically structured concept than traditional forms of city planning, the paper attempts to demonstrate that it is not a very new concept. By establishing a link between TOD and traditional city development, this paper aims to strengthen the concept of TOD in non-Western cities. This planning will not only preserve the traditional city but also enhance the newly urbanized areas as well. It is necessary to maintain traditional neighborhoods that contain elements of TOD while enhancing these elements to meet the needs of 21st-century residents. This paper argues that cities in non-Western countries can benefit from combining traditional city development with TOD. This will ensure that the traditional city is preserved and create new, modern spaces that can accommodate the needs of a modern society. The paper aims to establish a connection between these two concepts and show how they can be used together to create a sustainable urban environment.

Scholars, urban and transportation planners can benefit from the study for formulating TOD strategies in Middle Eastern cities while maintaining vernacular city structures and urban identity. For example, planners can use the findings of the study in order to design pedestrian-friendly streets that preserve the traditional urban fabric, as well as create dynamic public spaces for leisure and social activities. Furthermore, planners can use the results of the study to develop strategies that promote walkability and green infrastructure, while also preserving the unique character of Middle Eastern cities.

Finally, to achieve successful TOD planning that takes Middle Eastern culture, climate, and geography into account, efficient interaction and coordination between policymakers, planners, and stakeholder groups is essential. Long-term regional coordination would lead to more cohesive strategies and tools as well as stronger organizational links. Moreover, decision-makers and local planners will be better able to develop a consistent regional vision based on broader theories related to TOD. For TOD to be implemented successfully, the general population must be involved in decision-making processes. Therefore, it is essential to create a participatory approach to TOD planning, ensuring that the public is included in conversations concerning regional development.

### **Acknowledgements:**

This study was created as part of my PhD thesis at Qatar University in Urban Planning. Thanks to Qatar University's assistance, the authors were able to conduct this type of research.

### **Funding:**

This publication was made possible by an Award [GSRA7-1-0502-20030] from Qatar National Research Fund (a member of Qatar Foundation). The contents herein are solely the responsibility of the authors.

### **References**

- Abdi, M. H. (2021). What the newcomers to transit-oriented development are confronted with? Evidence from Iranian policy and planning. *Journal of Transport Geography*, 92, 103005.
- Alattar, D. A. & Furlan, R. (2017). Urban Regeneration in Qatar: A Comprehensive Planning Strategy for the Transport Oriented Development (TOD) of Al-Waab.
- Al Saeed, M. & Furlan, R. (2019). Transit-oriented development in West Bay, Business District of Doha, State of Qatar: A strategy for enhancing liveability and sense of place. *Journal of Cultural Heritage Management and Sustainable Development*, 9(3): 394-429.

- Al-Harami, A. & Furlan, R. (2020). Qatar National Museum-Transit oriented development: The masterplan for the urban regeneration of a 'green TOD'. *Journal of Urban Management*, 9(1): 115-136.
- Ali, L., et al. (2021). Dynamics of Transit Oriented Development, Role of Greenhouse Gases and Urban Environment: A Study for Management and Policy. *Sustainability*, 13(5).
- Benzakour, S. (2020). "Guide Fez: Time Trip," <https://bahaarofficial.com/en/blogs/infos/carnets-de-voyage-decouvrez-les-merveilles-du-maroc-avec-bahaar>.
- Budiman, H. (2019). Istanbul, The Development of Islamic City Thinking. *MATEC Web of Conferences*, 280, 02005.
- Calthorpe, P. (1993). *The Next American Metropolis: Ecology, Community, and the American Dream*. New York: Princeton Architectural Press., ed. 10003. Vol. 1., Canada: Princeton Architectural Press. 175.
- Carlton, I. (2009). Histories of transit-oriented development: Perspectives on the development of the TOD. Institute of Urban and Regional Development, University of California, Berkeley, 02(2009).
- Cervero, R. & K. Kockelman (1997). Travel demand and the 3Ds: Density, diversity, and design. *Transportation Research Part D: Transport and Environment*, 2(3): 199-219.
- Dabbour, L.M. (2021). Morphology of quarters in traditional Arab Islamic city: A case of the traditional city of Damascus. *Frontiers of Architectural Research*, 10(1): 50-65.
- Dong, H. (2021). Evaluating the impacts of transit-oriented developments (TODs) on household transportation expenditures in California. *Journal of Transport Geography*, 90, 102946.
- Dou, et al. (2016). An empirical study on transit-oriented low-carbon urban land use planning: Exploratory Spatial Data Analysis (ESDA) on Shanghai, China. *Habitat International*, 53, 379-389.
- Ebrahimi, A., Rahimian, F. P. & Sahraei, M. (2013). Impacts of urban passages on formation of iranian bazaars: Case study of the historic bazaar of Tabriz. *International Journal of Architectural Research (IJAR)*, 61, 61-75.
- Ehlers, E. & Floor, W. (1993). Urban Change in Iran, 1920-1941. *Iranian Studies*, 26(3/4): 251-275.
- Ghasemi, K., M. Hamzenejad & Meshkini, A. (2019). The livability of Iranian and Islamic cities considering the nature of traditional land uses in the city and the rules of their settlement. *Habitat International*, 90, 102006.
- Hakim, B.S. (2008). *Arabic-islamic cities: building and planning principles*. Kegan Paul International Limited. 197.
- Hess, D. & Lombardi, P. (2004). Policy Support for and Barriers to Transit-Oriented Development in the Inner City: Literature Review. *Journal of Transportation Research Board*.
- Kamyar, M. & Spouezi, Z. J. (2019). Representing Iranian-Islamic Identity in Iranian Contemporary Cities Structure. *Journal of Contemporary Urban Affairs*, 3(2): 55-62.
- Lamour, Q., Morelli, A. M. & Marins, K. R. D. C. (2019). Improving walkability in a TOD context: Spatial strategies that enhance walking in the Belém neighbourhood, in São Paulo, Brazil. *Case Studies on Transport Policy*, 7(2): 280-292.
- Liang, et al. (2020). Planning for urban life: A new approach of sustainable land use plan based on transit-oriented development. *Evaluation and Program Planning*, 80, 101811.
- Mai, X., Zhan, C. & Chan, R. C. K. (2021). The nexus between (re)production of space and economic resilience: An analysis of Chinese cities. *Habitat International*, 109, 102326.
- McCarty, C. (2021). "Imperial Cities of Morocco", 2021 Feb. 18, 2021 [cited 2023 Feb. 11]; <https://www.kimkim.com/c/imperial-cities-of-morocco-7-day-itinerary>.
- Marthya, K., et al. (2021). Place-Making of Transit Towns in Qatar: The Case of Qatar National Museum-Souq Waqif Corridor. *Designs*, 5(1).
- Mukhamedjanov, A., et al. (2021). Reshaping the concept of transit-oriented development in response to public space overheating near the transit nodes of Tokyo. *Cities*, 116, 103240.
- Nafi, S. (2021). Transit-Oriented Development in Doha: The Case of the Al Sadd Neighborhood and Hamad Hospital Metro Station. *Designs*, 5(4): 61.



- Su, S., et al. (2021). Unraveling the impact of TOD on housing rental prices and implications on spatial planning: A comparative analysis of five Chinese megacities. *Habitat International*, 107, 102309.
- Tamakloe, R., Hong, J. & Tak, J. (2021). Determinants of transit-oriented development efficiency focusing on an integrated subway, bus and shared-bicycle system: Application of Simar-Wilson's two-stage approach. *Cities*, 108, 102988.
- Tong, et al. (2018). Correlation between Transit-Oriented Development (TOD), Land Use Catchment Areas, and Local Environmental Transformation. *Sustainability*, 10(12): 4622.
- Wey, W. M. & J., Hsu (2014). New Urbanism and Smart Growth: Toward achieving a smart National Taipei University District. *Habitat International*, 42, 164-174.
- Yildirim, Y. & Arefi, M. (2021). How does mixed-use urbanization affect noise? Empirical research on transit-oriented developments (TODs). *Habitat International*, 107, 102297.
- Zhou, J. & Y. Yang. (2021). Transit-based accessibility and urban development: An exploratory study of Shenzhen based on big and/or open data. *Cities*, 110, 102990.
- Zhang, M. (2022). Chapter Eleven - Corridor transit oriented development: Concept, practice, and research needs, in *Advances in Transport Policy and Planning*, X.J. Cao, C. Ding, and J. Yang, Editors. *Academic Press*, 277-299.

**Cite as:** Nafi S. & Ouahrani D., "Transit-oriented Development from the View of Traditional City Model", *The 2<sup>nd</sup> International Conference on Civil Infrastructure and Construction (CIC 2023)*, Doha, Qatar, 5-8 February 2023, DOI: <https://doi.org/10.29117/cic.2023.0126>