

Transit-Oriented Development

Subjects: Architecture And Design

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Transit-oriented Development (TOD) is an urban design model that aims at integrating land use and multimodal transport systems around compact, mixed-use transit villages located around transit stations. TOD is envisioned as a sustainable development model in response to the updated environmental and ecological debate on the contemporary global challenge of climate change in response to city planning and urban design.

Keywords: transit-oriented development (TOD) ; Sustainable Urbanism ; Sustainable City ; Urbanism ; Urban Planning ; Urban Design ; Transportation ; Green Urbanism

1. Introduction

In the 21st century, the practice of urban regeneration occupies an increasingly significant role as a mechanism for leading and managing “environmentally sustainable developments”, requiring urban planners and architects to confront the metropolitan growth that occurred in the past century without effective consideration of the threats, constraints, and pressures of rapid population growth, urbanization and intensification, resource consumption, and climate change. Despite urban regeneration being a widely experienced phenomenon, there is no single theoretical explanation or physical model that can be adopted to address all urban problems and/or provide effective solutions. Therefore, effective and lasting urban regeneration intervention must comprehensively consider local circumstances.

Furthermore, since greenfield housing development continues to be the low-density dominant mode of urban expansion, a consistent challenge for urban planners and architects is the containment of urban sprawl, which is considered a major problem. Therefore, practitioners are targeting “infill” housing development—houses built on previously developed land—in an attempt to redirect population and housing investments inwards to avoid urban sprawl from occurring on greenfield sites in the outer suburbs.

At the same time, urban regeneration projects extend beyond an individual or a group of buildings. They also incorporate the re-creation or regeneration of precincts and/or activity centers, comprising parcels of properties and the associated public realm and urban infrastructure. Activity centers are associated with concentrations of residential, retail, commercial, and leisure activities at levels ranging from the central business district (CBD) scale to peripheral villages. This spatial configuration responds to the need to minimize the travel times of the resident population within the central activity node (the poly-centered city—city of cities—the “20 min city”) to diminish the use of private vehicles. The focus is on intensified mixed-use development, integrated with multimodal transport systems such as trains, buses, taxis, walking, cycling, and others. This model is what defines transit-oriented development or TOD as an activity center: a clustered mixture of land uses and housing at a higher density alongside public spaces around high-quality public transport services configured as the core of the enlarged community. TOD is envisioned as a sustainable development model in response to the updated environmental and ecological debate on the contemporary global challenge of climate change in response to city planning and design ^{[1][2][3]}.

2. Applications of TOD

A TOD is a compact pedestrian-friendly settlement serving a set of compact mixed uses that can be conveniently traversable on foot while also being served by public transport. Calthorpe (2011) defined three key criteria known by their initials as the “three Ds”: (i) density, (ii) diversity of land use, and (iii) design of urban spaces ^[2]. The three Ds are critical for successful metropolitan developments around transit stations. In addition, Ewing and Cervero (2010) among other researchers identified additional “three Ds,” which are (iv) distance to transit, (v) destination accessibility, and (vi) demand management ^{[4][5][6][7]}. The TOD model has increasingly been adopted for the regeneration of urban communities, promoting higher standards of urban living and representing a tool for reducing uncontrolled urban sprawl, traffic congestion, and urban fragmentation. Moreover, the TOD model creates compact and mixed-use eco-communities that are both walkable and well-served by public transportation.

Significantly, TOD leads to the resilient, adaptive creation of communities based on flexibility for targeting ever-changing demographic, environmental, and socio-economical challenges [8]. Adaptive communities ensure that both individual and community development can be pursued, following the “place” methodology that advocates proactive planning and an interdisciplinary approach based on community consensus [9][10]. Enriching existing land use plans and evaluation methods by incorporating a transit accessibility measure is a popular tool in the process of place making [11][12][13]. The concept of adaptive communities is intertwined with TOD, defined as settlements of a central rail or bus hub bordered by high-density and mixed-use development [14]. TOD settlements prioritize connectivity, walkability, street attractiveness, parking management, adequate facilities, and socio-economic capital, integrated in a comprehensive urban design scheme [15].

Historically, the TOD model has evolved by responding to low-density and sprawling development, which still facilitates its contribution as a workable tool in the process of the smart growth and sustainable urbanism of cities in the 21st century. When a comprehensive land-use planning scheme is provided, TOD can significantly contribute to the (i) sustainable adaptation of declining neighborhoods, (ii) a reduction in automobile use (emission of gas, fuel consumption, and traffic congestion), (iii) the formation of compact districts, and (iv) the enhancement of pedestrian satisfaction and standards of urban living [16][17][18].

Globally, cities like Stockholm, Singapore, and Tokyo showcase the successful implementation of TOD strategies, where the introduction of rail systems has positively influenced standards of urban living. Such cities are referred to in the literature as adaptive cities, which have “created a compact, mixed-use, walking-friendly built form that has enabled high-quality, high-capacity public transit services to thrive” [19]. In the city-state of Singapore, for instance, a national Constellation Plan is guiding its urban development through implementing a sustainable transit system. According to Cervero, this plan consists of “constellation of satellite ‘planets’, or new towns, that orbit the central core, interspersed by protective greenbelts and interlaced by high-capacity, high performance rail transit” [20]. Light rail transit (LRT) systems were recently developed as part of the Constellation Plan, with secondary transport facilities such as bus and park and ride (P&R) networks.

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