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TOD (TRANSIT-ORIENTED DEVELOPMENT) MODEL: AN INTERNATIONAL APPROACH AND IMPLEMENTATION PROCESS

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I. INTRODUCTION

In order to improve the intense and complex relationships between land uses and transport demand, in the last decades it has been developed several sort of urban developments. One of them has been TOD (Transit-Oriented Development), which consists of concentrating urban development around the stations in order to support transit use, and developing transit systems to connect existing and planned concentrations of development (Renne, 2009).

Therefore, the purpose of this article is to present the application of the TOD model in an international scale through its conditions, results, advantages and difficulties, whose information has been obtained from desk research, stays and field work.

Next items, it is showed several cases in USA, The Netherlands and Germany, which can serve as examples of learning to implement this model in Spain.

II. THE CASE OF OTHELLO STATION, SEATTLE (USA)

Othello station is located in Martin Luther King/New Holly neighborhood, 10 km away from Seattle. The station was inaugurated in 2009 whereas the neighborhood in 2005.

The TOD idea was envisioned by Seattle Town Hall, Sound Transit (regional company which manages the regional public transport) and Seattle House Authority (SHA -Real Estate Local Authority-) at the end of the nineties and the project tried to link urban development with mobility (Department of Transportation Seattle Government, 2014).

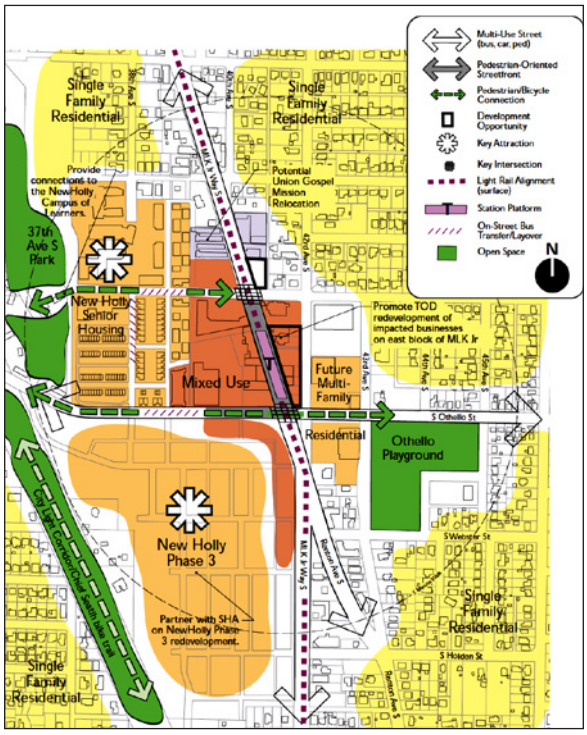
Before the intervention, 4.000 residents lived around Othello station, occupying the residential use 60% of the land, followed by vacant (17%) and retail (13%). The 1999 median

income for this station area was 62 % of Seattle metropolitan area and, on the other hand, 1.200 daily travellers were estimated for the Light Rail (BAE, Pittman & Hames, 1999).

The plan consisted of mix uses (housing, restaurants, entertainment uses and facilities) that are pedestrian-oriented around the station (Fig. 1). SHA has built about 1.400 houses, both for owners and renters with different income family levels. Recently (2014), 108 housing has been awarded for low family incomes, with 720 m^2 of retailing and 50 park lots, less than half lot per housing, clearly under the average of the Metropolitan Area. Currently, the number of daily boarding exceeds 2.000, almost twofold the estimations (Sound Transit, 2014).

In the light of the above, the results of the intervention have been positive and the high quality of the public space and buildings was checked out through the field work.

Figure 1
URBAN DESIGN CONCEPT FOR OTHELLO TRAMWAY STATION



Source: City of Seattle (2014).

III. THE CASE OF OHLONE-CHYNOWETH COMMONS, SAN JOSE (USA)

Ohlone-Chynoweth station was put in service in 1991 and is situated 10 km on the South of the city of San Jose (Santa Clara County, California), next to the intersection of two highways.

The most remarkable of this intervention was the substitution of a park&ride linked to this crossroad for a TOD option with mix uses taking advantage of the tramway station.

Thus, most of the land including in the park&ride, whose occupancy was only 25% in peak hours (300 park lots out of 1.100), was transformed for housing, retail and facilities, accompanied by the Ohlone station. As Othello station case, there was a strong support, not only in planning but in financial –grants, subsidies, etc. – by the Valley Transportation Authority and San Jose Town Hall (National Research Council, 2002 and 2004).

The project consisted of 195 below-market-rate housing, 400 m^2 for retailing and a nursery, which was developed by a non-profit developer, Eden Housing. The project was dealing with the opposition of the nearest residents, who did not want to fill the area of social housing, but thanks to the upholding of many associations, finally was built (Breznau, 2004).

Currently, both the housing and retail are fully occupied and regarding the mobility, the average of cars per family was 2.07 whereas in the rest of the metropolitan area reached 2,31, and the number of miles travelled by cars per family was 21.213 and 24.235 respectively (Department of Transportation California Government, 2014).

IV. THE CASE OF PORTLAND (USA)

Portland is a paradigmatic example in USA (600.000 residents in the municipality and more than 2 millions in the metropolitan area) due to, unlike most of American cities, its streets are vibrant, full of activity, and coexist pedestrians, cyclists, buses, tramways and cars.

A perfectly defined urban limit favours compactness, a green belt and a liveable city. The Portland transformation started in 1973 with the proposal of containing the growing urban sprawl and preserve natural areas (Gibson y Abbott, 2002; Putters, 2008).

In the nineties, the idea of linking urban planning and transport, especially around the already and stations, was conceived by Metro (Regional Agency for land use development and transit) in «2040 Growth Concept» (Oregon Metro, 2011). Likewise, there are more than 85 light rail stations compared to 30 ten years before, about 3.000 new houses for any kind of family incomes has been built, and 20.000 m^2 of offices and 12.000 m^2 for retailing has been developed around the stations. As a result, more than 50% of the trips correspond with public transport. In addition, these projects only occupied 19 ha, whereas a development following urban sprawl model had been implied 196 ha (Oregon Metro, 2014).

Some emblematic light rail stations for their learning (difficulties, implementation phases, changes of the original project, results, etc.) are Centre Commons and «The Round», both in the outskirts of Portland.

V. THE CASE OF ZUID-HOLLAND (LOW COUNTRIES)

The project called Stedenbaan, a City Line extended between Leiden and Dordrecht along 150 km of existing railway line, was born in 2004 in response to the mismatch between the dynamics of urbanization and transport development in the last few years in the South Province in the Netherlands. It was supported by the South Wing Administrative Platform -BPZ- a partnership of the local and regional authorities in the Zuid-Holland

provincial council (Zuid Province, five City Regions of the Province, municipalities of The Hague and Rotterdam, NS -railway company- and prorail -infrastructure provider) (Atelier, 2007):

The most relevant of the project was the voluntary agreement to implement TOD which basically consists of (Casabella and Frenay, 2009):

- On the one hand, BPZ will build 40,000 houses and 1.2 million m2 of offices around the railway stations, which is respectively one third and two thirds of the total urbanization target by the BPZ and agreed by the central government.
- On the other hand, NS compromise to increase the train frequency services, from 15' to 10'.

Although in general terms the project can be considered as successful -in 2011 the number of cities involved increased from 11 to 47-, the economic crisis has radically changed the demand for new housing and office locations which asks for a critical assessment of the spatial development perspectives. Moreover, real estate agents are important stakeholders but not partners in the programme. Hedonic model study analysis showed that different alternatives for rail frequency increases have moderate (about 1% to 2%) effects on real estate prices of StedenbaanPlus railway station areas, but it is the question if this is sufficient to convince real estate managers (Geurs et al., 2012).

VI. THE CASE OF KARLSRUHE (GERMANY)

The tram model *Das Karlsruher Modell* is located in the city of Karlsruhe, 300.000 inhabitants, on the southwest of Germany in Baden-Wutenberg. It is a train-tram system that runs along existing railway infrastructure of regional trains although has a dual function along its trajectory: it works as a conventional train in the city centre of Karlsruhe, with a minimum speed of 30km/h up to 100km/h when circulates out from the city centre. This system was developed as a solution of the crowded traffic in the city centre (Bugarín y Rodríguez, 2008).

Consequently, this first innovating system train-tram has changed the configuration and urban design of the city. Since the first line was opened in 1992, an urban-mobility plan has been developed. One example of this masterplan can be found in Nordstadt-Neureut borough which is the most recently borough of the 27 residential areas of Karlsruhe (Engehausen y Bräunche, 2008).

After the line 3 of the train-tram was opened, 5,000 dwellings were built along the train-tram line which has 3.1 km length. These dwellings are orientated to the railway mainline, following the principles of the TOD concept. Different residential typologies have been established, considering the mix of land uses (Christoffel y Glaser, 2008).

VII. CONCLUSIONS

Several circumstances has made possible to develop several TOD case studies which has been described along this article: public sector commitment (local and regional development agencies), public and private transport operator companies and development agencies. Spain

case study appears as a great opportunity to rewrite the guidance of land planning in urban areas. In addition, local and regional public bodies should play a key role on land planning, with more restrict regulations regarding planning applications as other countries in has done successfully.

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