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## Cross-town bus routes as a solution for decentralized travel: a cost-benefit analysis for Monterrey, Mexico

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Travel patterns have become more decentralized as employment has dispersed throughout metropolitan areas and has become less highly concentrated in central business districts (CBD). Decentralized travel patterns have lead several transit authorities to complement traditional radial networks, where all transit routes radiate from the CBD, with cross-town transit routes from one suburb to another. The main characteristic of cross-town routes is that neither end of the bus line originates in the CBD. Peripheral cross-town routes totally bypass the CBD.

The objective of this article is to use an urban transportation planning (UTP) model to simulate the productivity gains or losses in the transit system in Monterrey, Mexico following the introduction of 16 new cross-town routes. The study analyzes the financial productivity of the transit lines as well as their economic viability by measuring welfare gains and losses to bus users, automobile users and bus operators. Monterrey, capital city of the state of Nuevo Leone in Mexico, is used as a case study because it is typical of a large number of developing cities in many respects, particularly, the high rates of growth in population and auto ownership, and the limited road capacity. Tripmakers, particularly, those traveling to the CBD or passing through it, continue to face high and increasing levels of congestion.

The following section provides a background of the bus routes in Monterrey both prior to the introduction of the cross-town routes and after their introduction. Section 2 provides a conceptual discussion of the nature of gains and losses associated with the new policy. Sections 3–5 present the methodology used, the simulation results and the conclusions, respectively.

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## 1. Monterrey's public transport system <sup>1</sup>

### 1.1. Radial system (prior to introduction of cross-town bus routes)

Monterrey's bus system consisted mainly of 114 bus routes prior to the introduction of the 16 cross-town routes. Almost all the old routes were CBD-oriented but they were not exclusively of the typical radial kind that has one end of the line in the CBD. A few routes could be classified as cross-town routes in that they intersected, or totally bypassed, the CBD. With the exception of the few routes that offered cross-town travel, under the radial system, a passenger wishing to travel from one outlying area to another had to transfer at, or close to, the CBD with full bus fare.

The 114 routes, constituting the radial network, can be broadly divided into four categories. Category I consists of pure radial lines that have one end in the CBD, and Category II includes downtown routes that are entirely limited to the CBD. Categories III and IV may be classified as cross-town routes. Category III consists of cross-town lines passing through the CBD but having neither line end in it, and Category IV includes cross-town routes that do not pass through the CBD. Table 1 presents the number of routes, line frequencies and lengths for each of the four categories.

### 1.2. Cross-town routes

In January 1993, the Monterrey State Council for Transportation (MSCT) introduced 16 cross-town bus routes to accommodate the increasing demand for suburban travel. Buses required to serve the cross-town routes were obtained from the radial routes. In other words, there was no new investment in buses to accommodate the new service and its introduction only resulted in a reallocation of buses among all routes. Consequently, the total number of operating hours by buses and the total operating costs did not change as a result of the new service.

The new routes can be classified on the basis of their orientation to the CBD into four categories as shown in Table 2 and Fig. 1. Category A includes pure circumferential routes: these routes travel close to the periphery of the city with route ends on one side of the CBD and the entire route alignment relatively far from the CBD. Category B consists of routes that cross from one side of the CBD to another, but do not pass through the CBD. Category C includes routes that pass through, or on the border of, the CBD, while Category D includes transit lines that have a radial orientation tending toward the CBD but stopping short of it. Fig. 1 provides a schematic representation of the four route categories, and Table 2 presents frequencies and lengths for the cross-town routes.

Most of the cross-town routes are substantially longer than the average route in the radial network due, in large part, to the inherent nature of cross-town travel which typically entails covering longer distances. The long length is also because many of these lines involve more travel

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<sup>1</sup> Data for this section were obtained through interviews with members of the Monterrey State Council for Transportation (MSCT; Consejo Estatal Del Transporte) between 1993 and 1996 and from two reports by MSCT; Consejo Estatal Del Transporte (1992, 1993).

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