Papers in Applied Geography

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RETAIL CHANGE AND LIGHT RAIL: AN EXPLORATION OF BUSINESS LOCATION CHANGES ACCOMPANYING COMMUTER RAIL DEVELOPMENT IN DENTON, TEXAS

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1. INTRODUCTION

The American urban landscape is rapidly changing in response to technological and economic evolution. High automobile usage for commuting in particular has had many contentious effects, including highway congestion, elevated environmental pollution, and urban sprawl. Planners in many cities are looking to commuter rail to mitigate these impacts and, in effect, create more dense and sustainable urban environments. However, research on the impacts of commuter rail development on urban form is still needed.

One aspect of the varied impacts of commuter rail development which is in need of further research relates to business location and development. Construction of new rail lines and stations in an existing urban environment is an important development with sizable impacts. Previous investigation has examined such impacts in regards to commuting (Hsu and Guo, 2006), public and environmental health (Topalovic et al., 2012), land values (Armstrong, 1994; McMillen and McDonald, 2004; Leonard, 2007), and changes in transportation usage (Cottrell 2006). However, little research has been done with regard to the meaning of light rail development for the location of business, especially the retail and service-oriented businesses that might be expected to be drawn to high-traffic areas such as rail stations. The effects of rail development on existing businesses, and the ability of such development to draw new business to an area, deserve further attention.

This paper analyzes the relationship between commuter rail and retail development, with a specific focus on the following central question: what is the impact of the introduction of new commuter rail stations on nearby retail environments? Research that addresses this focal issue can provide private- and public-sector decision-makers with important information of use in assessing future rail development impacts.

This study examines the business impacts associated with the A-Train commuter rail development in Denton County, Texas. The A-Train line is a 21-mile light rail corridor connecting the suburban city of Denton with the light rail system of Dallas. This study specifically focuses on impacts related to the A-Train terminal opening in the center of Denton, addressing the changing location and composition of the business community situated around the terminal and the nearby courthouse square, which is the historical central business district for the City of Denton. While this is an exploratory study, and more work is planned to examine the location dynamics of more stations and business types along Denton County's A-Train line, the findings presented here can be of value in providing some initial guidance for economic development officials, corporate decision-makers, and business geography researchers alike.

2. BACKGROUND

Since the mid-1940s, the urban morphology of cities in America has changed dramatically. A combination of lower transportation costs, massive infrastructure investments, and rising incomes encouraged suburbanization (Neechyba and Walsh, 2004). While before World War 2 central business districts (CBDs) in American cities had the highest population

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densities in each metropolitan region, over the last 60 years the densities of most American urban areas have become much lower at the center (Baum-Snow, 2007).

One major problem associated with this change is the congestion that resulted from longer and more pervasive commuting behaviors (Medda et al., 2003). While congestion may appear to be the issue of greatest concern from a planning standpoint, geographers recognize that increased traffic congestion leads to a complex matrix of impacts, including elevated levels of pollution, stress on commuters, and an overall negative impact on metropolitan standards of living (Cervero and Duncan, 2002).

Since traffic levels have increased in the U.S. throughout most of the last half-century, many urban planners are attempting to encourage a slowing of the growth of urban sprawl. A primary public policy initiative focuses on transit-oriented development through commuter rail construction (Cervero and Duncan, 2002). Research has shown that a negative correlation exists between residential density and automobile use in urban areas (Kitamura et al., 1997). As a result, development that exists near commuter rail stations appears to be more clustered, as more residents want to take advantage of the nearby transportation option. Specifically, many medium sized cities have begun implementing agendas for rail development, making it easier for their citizens to commute to neighboring places (Sakano and Benjamin, 2011). Some cities with bus transit systems are also integrating rail stations and bus stations in one location to promote transit-oriented development and to relieve congestion (Chew, 1999).

Another complementary initiative is the implementation of New Urban design. New Urban designs plan neighborhoods that include mixed-use residential, retail, and office functions in a relatively compact area, resulting in more intensive land use that works to counter the overall contemporary trend toward urban sprawl (Boarnet and Sarmiento, 1998). New Urbanism partners well with commuter rail in promoting a more dense community. In contrast to areas of the city that feature more sprawl, one would expect to find more retail clustering in locations with denser land use (Cervero, 2003).

Implementation of commuter rail is of particular interest to retailers because it enhances the accessibility of areas in close proximity to stations and creates prime conditions for retail clustering. Rail stations often function as nodes of transportation since they are places where people transition from one transportation method to another (Debrezion et al., 2007). Since many people encounter these areas in a day as they travel and since generally these locations include multiple modes of transportation, they are highly accessible. The effects of accessibility are what make the area surrounding stations potentially valuable. A neighborhood’s value is reflected in its use, thus land with higher value will typically feature multifamily housing, upscale one family housing, or retail. These features promote increased density within the neighborhood and clustering of various types of activity (Debrezion et al. 2007).

Retail firms are attracted to increased accessibility, such as is provided by commuter rail development, since heightened access presents businesses with an opportunity to serve a larger market. The retail industry responds to perceived consumer demand by building stores in locations that are accessible to desired markets. Rail is one transport mode of several to consider in the connection of retail to accessibility. Commercial properties that are integrated with rail stations positively affect area market performance, experience lower vacancy rates, and are leased much faster than the surrounding commercial property (Cervero, 2003). This relationship between real estate and rail is, however, contingent upon market density, as local, small-scale retailers require higher customer densities to survive (Turner, 2007). Strategic location relative to automotive, train, walking, and other forms of transportation are essential in building the connection between markets and businesses.

Central Place Theory plays a part as well in explaining the organization of economic activity in space, especially with regard to market access. For a retail location to be successful and capture a given market, it must access the minimum market area, be in location where consumer demands able to be met, and benefit from economies of scale. Research in geography has established a strong relationship between the overall predictions of Central Place Theory and actual retail spatial structure (Bartlett, 2002).
Lastly, retail located near commuter rail can benefit from economies of scale and agglomeration. In particular, businesses offering differentiated products or unique experiences (such as restaurants or bars) benefit from agglomeration since they are less concerned with price competition among rivals. When businesses are clustered, they may benefit by having heightened access to market information. They also gain attraction and consideration from potential customers by being located near competition. In this way, the retail attraction to commuter rail stations is created by both accessibility to transportation options as well as accessibility to nearby retail alternatives: an agglomeration effect (Picone et al., 2009).

In the local context of Denton, the present study's case study venue, the Denton Economic Development Partnership’s Downtown Master Plan outlines the vision the city has planned for future development of the downtown area as the city continues to grow. Their plan is to promote mixed-use development and increase transit usage, in hopes that the downtown area will attain the structure of a dense core relative to the surrounding areas and exhibit a larger degree of retail clustering (Denton Economic Development, 2013). Thus, the introduction of New Urban planning ideals and pedestrian traffic magnets such as commuter rail station development appears to be a good fit for the area. But specific evidence relating to the actual impacts of commuter rail development on business is still lacking, and is needed.

Thus, the overall literature suggests that the inclusion of commuter rail into a community such as Denton should result in the emergence of new clusters of retail and services businesses in locations near new transit stations. Due to the presence of differentiation among business types by market needs and characteristics, retail and service businesses should be expected to have different responses to changes in transportation infrastructure and accessibility, further suggesting that clustering should not be expected to occur uniformly among all retail types. In order to examine this hypothesis, the remainder of this study observes retail and services business changes in the downtown Denton area in the years before and after the opening of the A-Train commuter line and its associated downtown Denton transit terminal.

3. STUDY DESIGN

The business dataset used in this analysis comes from the Denton telephone book listings published by Verizon Communications, the dominant local telephone service provider. The study extracted business listings for 2004 (seven years prior to the A-Train line opening) and 2012 (one year after the A-Train opening). In both years, data were collected exclusively for businesses located in Denton's downtown business community (see Figure 1). Use of data for 2004 and 2012 provides a targeted perspective on business change, focused on the years around the opening of the A-Train line and the downtown Denton light rail terminal. Telephone book listings were used because they provide a readily-available historical record of businesses in Denton and area. While telephone books provide a good historical record of local businesses, this data source is not without potential issues. Most businesses have telephone listings, but not all necessarily do. This may be a particular issue with service-oriented businesses that do much or all of their business in person, and not over the telephone. Also, addresses listed in connection with telephone numbers may or may not be the actual service location of the business; for example, the address of a management office might be listed instead of an actual store location. However, the study takes the businesses with such issues to be a distinct minority. Given the study need for historical business information, use of telephone book data provides a reliable research foundation.

Telephone book data for 2004 and 2012, including business name and address, were manually entered into an Excel spreadsheet for seven business categories: restaurants, bars, specialty food retailers, furniture retail, automotive sales and services, clothing retail, and novelty stores. These major categories were chosen in order to represent a cross-section of

1 The specialty food category includes businesses from the telephone Yellow Pages ice cream, frozen yogurt, coffee, and donut listings. The bar category includes bar, tavern, wine, and beer.
businesses present in downtown Denton, but the aim of this initial study is not to be comprehensive. We expect that some of these categories (restaurants, bars) have grown as a result of rail development, while other services, such as automobile and furniture, have declined. After both datasets were complete, the addresses were geocoded using the Navteq street database that is part of the Maptitude 2012 GIS.

![FIGURE 1
DOWNTOWN DENTON STUDY AREA](image)

4. RESULTS

A first task is to summarize overall trends in downtown Denton’s business change through the 2004-2012 period. Table 1 summarizes the overall business change results for selected, key retail and service sectors over the 2004-2012 study period. The net difference is displayed in the far-right column in the table. As anticipated, some business categories showed growth during the eight-year study period while others showed a marked decline. The table indicates that the restaurant and bar categories showed the most growth, with an increase of three businesses in each. The automobile category, on the other hand, saw the largest net decrease with a loss of seven businesses in the area.

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listings. Lastly, the novelty category includes yellow page business listings from the antiques, books, art, florist, and thrift shop categories.
A second task is to map the distribution of business locations for 2004 and 2012. Figure 2 focuses on businesses in the restaurant sector, one of the two sectors at the top of business expansion from Table 1. Figure 2 is subdivided into two parts: Figure 2a depicts the location of restaurants in 2004, while Figure 2b shows restaurant locations in 2012. The overall 2004 pattern focuses on locations around the courthouse square, with little activity to the east of the square. The 2012 pattern exhibits some substantial change relative to 2004, as a restaurant corridor has become evident to the east of the square.

A third figure combines the maps of Figure 2 to provide a single summary of the spatial change in Denton's downtown restaurants. Figure 3 focuses on the block-by-block change in number of restaurants across the downtown study area. The figure demonstrates a clear pattern of change:

1. A loss of restaurants in several blocks in close proximity to the square
2. A gain in restaurants in several blocks immediately adjacent to East Hickory Street, the major city street that links the courthouse square area with the A-Train terminal.

Most other blocks in the downtown core experienced no change in number of restaurants.

A final figure provides some additional context for the restaurant results of Figure 3 by summarizing the spatial change in another service sector, Denton's automotive sales and service businesses (see Figure 4). Businesses in this sector include car dealerships (almost all in the area being small and featuring used vehicles), repair facilities, and vehicle parts and accessories retailers. Figure 4 illustrates the block-by-block patterns in automotive business gains and losses across the downtown core. This automobile business change map shows this business category left the immediate vicinity of the square between 2004 and 2012. Indeed, only two blocks in the entire downtown area experienced a gain in automotive businesses. Of those blocks that gained automotive businesses, each were located toward the edge of downtown, indicating a spatial reordering of businesses in the downtown area. It appears that the coming of increased restaurant activity was accompanied by the departure of automotive business in much of the East Hickory Street corridor that provides the most direct connection between the A-Train terminal and Denton’s courthouse square district.
a. Restaurant Locations in 2004, Before the A-Train Line Construction

b. Restaurant Locations in 2012, After the A-Train Opening

FIGURE 2
RESTAURANT LOCATIONS IN DOWNTOWN DENTON FOR 2004 AND 2012
5. DISCUSSION, CONCLUSION, AND FUTURE RESEARCH

The study results indicate that the retail landscape of downtown Denton has undergone some important changes in composition between 2004 and 2012. Business growth
and shift has occurred unevenly, however, throughout the area and among the business sectors present in the downtown. Some business categories, such as restaurants and bars, have expanded in the downtown study area. Other business types, including the automobile, clothing, and furniture categories, have reduced their presence in the area. However, beyond these shifts by sector, it is also apparent that an accompanying spatial reordering has begun in the downtown. The study results indicate that the opening of the downtown Denton A-Train terminal has had a meaningful impact on business location in the area.

While the relationship between downtown retail and the introduction of the A-Train cannot be completely specified based on the evidence presented here, it appears there is some relationship between rail development and business change, especially with respect to businesses providing differentiated offerings. The restaurant and bar categories, which have seen the most growth, offer a wide range of fare and dining experiences. The products offered by these businesses are highly varied and might by summarized as entertainment or experiential retail. With the exception of novelty items, all other categories showing growth in the area could be classified as this type of retail. This supports the hypothesis from the literature that differentiated product offerings could be expected to benefit most from the opening of a nearby commuter rail station.

It must also be acknowledged that the attraction of nearby restaurant and entertainment retail can be related to the operation of agglomeration effects, another important theme in the literature (Picone et al., 2009). It becomes difficult, therefore, to say whether new restaurant establishments have been driven by the increased accessibility provided by the commuter rail station, or whether other factors such as growing agglomeration economies are a more explanation. It is likely, however, that commuter rail is having an important impact (the emergence of a restaurant corridor along Hickory Street between the courthouse square and the rail terminal being a strong indication). We conclude that restaurants and bars have been attracted to the increased pedestrian and vehicular traffic generated by the rail terminal opening, and to a growing local cluster of retail and services in a circular and cumulative feedback process (cf. Myrdal, 1957; Pred, 1977).

The automobile, furniture, and clothing categories, on the other hand, have not fared as well in downtown Denton since the rail terminal opening. This relates to at least a couple of factors. First, the economic downturn of 2008-2012 has resulted in broad business decline across the country. Some component of any business decline observed in Denton could be related to broader economic conditions. Secondly, the new rail station, as argued previously, can be conceived as having a differential impact on a variety of business types. The opening of the A-Train station has altered the local real estate environment. Business types that do not benefit from increased, rail-related traffic thus experience an incentive through increased land costs to relocate, in turn opening up these properties for other businesses to relocate and convert rail-accessible locations into increased sales and profits. We would argue that both the restaurant and automotive shifts observed in this paper could be explained from this perspective.

There is a need for further research to follow up on selected questions and issues raised here. Future research is needed to focus on land values across the downtown Denton study area. This can provide more evidence to examine the differential impact ideas advanced above. Also, pursuit of similar business location and property value analysis in proximity to other A-Train stations, along the Denton-Dallas corridor, can provide more insight into the relationship between rail and retail. This is especially important, as each station exists within a different regional context, with some being located in high-density zones while others have been developed on greenfield sites. Provision of more evidence relating business change to rail development promises to provide public- and private-sector policy-makers with important insights that can drive better investment decisions.
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