Economic Impacts of APM Development in Commercial Centers

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Abstract

As automated people movers (APMs) begin to be considered in commercial areas it becomes important to consider how the increased circulation afforded by the APMs affects the local economy. The economic potential of commercial centers is limited by the number of people that can move through the center. When access to a retail store is limited, sales and profits of that business are similarly limited. When access to an office building is difficult, or when traveling from an office to other nearby activity centers is difficult, then it becomes harder to attract tenants. In as much as APMs can ease travel between activity centers within a commercial area, then they can probably increase economic activity within that area. If the economic value of this increased activity is sufficient, then commercial property owners, merchants and businesses should be willing to invest in the development of the APM.

This paper investigates to potential for APMs to create economic value within commercial centers. It reviews strategies real estate developers have employed to use APMs directly to increase property values. It then looks at economic activity associated with several circulation systems, automated and manual, throughout the United States, in an attempt to draw some conclusions about the impact of improved transit on commercial growth. The paper attempts to quantify economic impacts, and identify conditions for successful commercial center APM development.

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Real Estate Value Increases

Automated people movers (APMs) have yet to display their true potential as value generators for real estate. A maxim of the real estate industry is that the value of real estate depends upon three things: Location, location and location. What is meant by this, is that the value of real estate is dependent upon its access to certain resources. Some resources are inherent to the fixed location of a piece of property. Adjacent rivers, nearby beach shoreline, and year-round summers are examples of resources that cannot be altered. Other resources can be developed. For example, access to highways, water pipelines, electric lines have an impact on the value of property. As far as the landowner can influence or invest in the development of these resources, the value of their property will rise.

For commercial real estate, the most valued of all resources is the access to people. Retail developers understand that customers will spend $40 to $50 during a typical visit to a shopping center. If a new highway means that a shopping center will be able attract 50 percent more people that means that sales will be 50 percent higher. The value of the land, directly related to the revenue produced from store rents, will also increase by 50 percent. Likewise, office developers sell the location of their office buildings in terms of regional access, and access to local amenities. Developers express the relationship between income and value using the following equation:

$$\text{Value} = \text{Income} \div \text{Capitalization Rate}$$

The key for transportation advocates is to recognize that transportation is a by-product of the human desire to exchange products, services and ideas. In commercial centers, any transportation system proposed must simplify such exchanges, adding value to consumers, merchants, office workers and businesses. The value it adds must be greater than its cost. This makes it important to define the value a transportation system can add, so that a window of economic viability can be defined. (Parker, 1990) This will aid the transportation development team in proposing appropriate technological solutions.

Pittsburgh - 1984: Three Rivers Corporate Center

A 1984 real estate development proposal for the City of Pittsburgh was based on the potential value an APM could bring to property values. A team of developers responded to the City's plan to redevelop the parking lots around Three Rivers Stadium and connect them to the downtown with an APM across the Allegheny River. While land downtown was selling for $200 to $300 per square foot, land across the river near the stadium was selling for about $15 per square foot. By connecting the property to the downtown with the APM, the developers thought they might double, or triple the value of the land around the stadium.

Although the developers were not successful in building the project, they reached the following conclusions about the use of APMs to serve commercial real estate markets. (Parker, 1989) The first conclusion was that while people movers might influence the location of a development, they do not contribute toward the overall real estate market condition. In part, this conclusion explains the limited success of the Los Colinas people mover, near Dallas. During the 1993 International APM Conference it could be observed that many office buildings were nearly empty. For a few years the people mover had to be shut down. Now that office vacancies have declined, the people mover is again able to run on a limited lunch time schedule. If you build transit, *they* will not come. *They* already have to be there.

An important conclusion the developers reached is concerned with potential value capture, concerning land prices. In Pittsburgh, downtown land prices were $7.50 per building-foot of land. (If zoning laws allow an 80,000 square foot building to be developed on a 20,000 square foot piece of land selling for $40 per square foot, then the land is valued at $10 per building-foot of land, since four square feet of building is allowed for each square foot of land.) Land across the river was valued at $2.00 per building foot of land. Even if the developers could realize new land values equal to those in the downtown, the increase would only be $5.50 per building-foot. To achieve significant land value increases using APMs, without zoning law changes, it may be necessary to develop projects in locations where building-foot of land prices are $50 or greater. Figure 1 contrasts the Pittsburgh example with a theoretical 50 percent land value increase for a property in Washington, D.C. Although the percentage increase in Pittsburgh is greater, the likelihood that a land value increase can pay for an APM is higher in Washington.

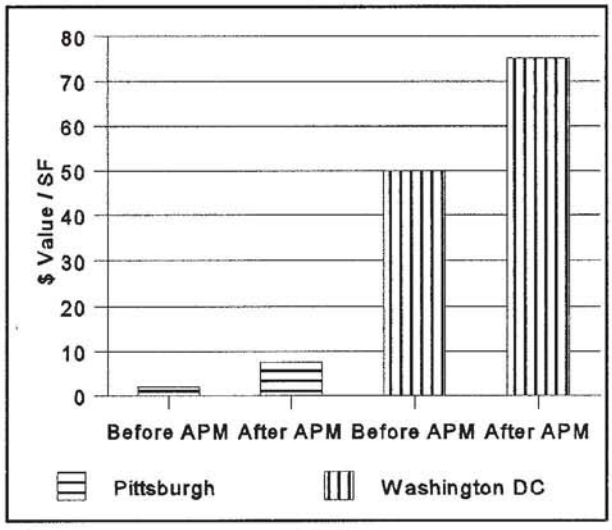

Figure 1. Land Value Impacts

Economic Activity

The economic value created by APM service within a commercial center is also related to the additional economic activity the people mover generates. In theory, any improved level of transit service will create additional economic activity, as it promotes the circulation of shoppers, diners, visitors and workers within the area. The value of transit to expanded economic opportunities for businesses has been recognized in general terms. (Urban Land Institute, 1995) While studies on regional economic impacts have been conducted, there is little research on local economic impacts. Such a study requires

that changes in local economic activity be measured and isolated from changes that would have occurred without the introduction of transit. Changes in economic activity can be measured by changes in retail sales, and a limited amount of this information is generally available. If the retail sales revenues in an area served by a new transit service increased faster than the revenues for the entire metropolitan area, it can be presumed that the transit was responsible for the additional growth. This holds if no other factors, such as the opening of a major shopping center, can be identified.

Three cities were chosen to test this hypothesis. The cities were St. Louis, Denver and Miami. St. Louis recently began light-rail service, parts of which serves the downtown. Denver also has a new light-rail line, serving its downtown. Miami's downtown is served by the MetroMover, an APM system. Detroit, also served by a downtown APM, was not included in this study because several large downtown stores closed just before the APM's opening. The store closings were unrelated to the development of the APM, and were due to economic conditions at the time.

While corresponding information is not available for office leases, it can be presumed that if the transit services made areas more desirable to shop in, that similar increases in desirability would occur in office properties. Hotel properties should be similarly affected. If an APM can create 12% more economic activity than would otherwise occur, then the values of the properties served by the people mover should increase by 12%. If the net cost of the APM to those properties was 4% of their value, then the APM would generate a return of three to one, were the properties to invest in the people mover.

St. Louis: MetroLink

The MetroLink light-rail system was developed by the Bi-State Development Agency, serving the St. Louis region. While not an automated system, exploring the potential economic impact MetroLink may have had on commercial areas is still useful. Bi-State does assert that the light-rail system can be a significant impetus for community and economic development efforts, and is examining community and economic development opportunities at select MetroLink stations. MetroLink service began in July 1993, paid for in the most part with federal highway funds. The system has an alignment that brings it from East St. Louis, in Illinois, across the Mississippi River through downtown St. Louis, and then west to St. Louis International Airport. It serves a total of eighteen stations. During peak travel times, the system runs on eight-minute headways, otherwise it operates on fifteen-minute headways.

As part of an integration of transit within commercial areas, Bi-State has developed MetroRide, a one stop, self-service transportation center opened in the heart of downtown St.Louis. MetroRide is found in St. Louis Centre, a downtown shopping mall. More than 8,000 transit customers visit MetroRide each month to purchase transit tickets or passes, pick up schedules or ask about various transit services. Reportedly,

the light-rail line has lowered demand for downtown parking facilities, suggesting a measure of success in attracting automobile users for downtown commuting and shopping trips. Initial year ridership for the entire MetroLink system was 21,000 passengers per day. An estimated 7,000 passengers per day used the system for travel to and within downtown St. Louis the first year. Second year downtown ridership is estimated at 10,000 passengers.

In 1994, MetroLink provided free midday service to passengers traveling within the downtown. Merchants reported that the MetroLink service had improved their business by an estimated 5 percent. Economic activity in downtown St. Louis was measured before and after July 1993 using economic census and market demographic statistics. The same statistics were gathered for the entire St. Louis metropolitan area. From the information available, it appears that downtown economic activity increased by 12% following the introduction of transit service. During the same period economic activity in the region increased by 8%. If no other significant reasons for the difference in growth rates can be determined, it appears that transit had a net 4% positive impact on economic growth in downtown St. Louis, a figure consistent with the appraisal of downtown merchants.

Denver: Downtown Light-Rail and the 16th Street Mall Shuttle

In downtown Denver, light-rail transit began operations in October 1994. The 8.4-kilometer (5.3 miles) Central Corridor light rail line was designed to connect future light-rail corridors to the downtown. It connects to the 16th Street Mall Shuttle, a low floor bus service shuttles passengers between two transit bus terminals. The Shuttle is a free service, and is especially busy during lunch time and in the early evening hours. The light-rail operates on six-minute headways and the shuttle operates with headways of ninety seconds. The light-rail's current fleet of 11 vehicles carries an average of 13,000 passengers per day, and operates from about 4:30 a.m. until about 1:30 a.m.. One-car trains suffice during off-peak hours; some two-car trains operate during the rush hours. To provide more convenient service for downtown offices, cultural centers, hotels, shopping, restaurants and entertainment, the light-rail line uses California and Stout Streets to form a loop between 14th & 19th streets. Northbound trains use California and southbound use Stout, with stops at 14th, the 16th Street Mall and 18th Street.

To promote transit usage the Denver Regional Transportation District (RTD) works with organizations like the Downtown Denver Partnership, Inc., to special event shuttles to the downtown. These express shuttles take event-goers directly to Market Street and Civic Center Station in Downtown. The 16th Street Mall Shuttle and light rail service is then relied upon to transport passengers to the events.

Economic activity in downtown Denver was measured before and after October 1994 using economic census and market demographic statistics. The same statistics were

gathered for the entire Denver metropolitan area. From the information available, it appears that downtown economic activity increased by 12% following the introduction of transit service. During the same period economic activity in the region increased by 4%. If no other significant reasons for the difference in growth rates can be determined, it appears that transit had a net 8% positive impact on economic growth in downtown Denver.

Miami: MetroMover

The Miami Metromover is an APM operating within downtown Miami, serving as a circulator for trips between hotels, retail facilities, convention facilities and parking areas. The initial system was a three kilometer (1.9 miles) elevated double-loop, serving ten stations. Two of those stations are integrated into office buildings. In May 1994, two extensions were opened. The 2.25 kilometer (1.4 miles) Omni extension to the north serves six stations in and near a major shopping center. The 1.75 kilometer (1.1 miles) Brickell extension to the south serves six stations in Miami's financial district. The extensions add an additional twelve stations and four kilometers (2.5 miles) of track to the existing system. The Metromover is in operation from 6:00 a.m. to midnight every day. The cars run at intervals as short as 90 seconds, and travels at an average speed of 19 kph (12 mph). About 12,000 people per day ride the system. The largest volume of passengers carried by Metromover is reported to be 38,000 when it moved people to and from a New Year's Eve King Orange Jamboree parade. Ridership has been forecast to reach 43,000 by the year 2000.

All routes connect with Metrorail at the Government Center station. Metrorail is a 34-kilometer (21 miles) regional heavy rail line. As part of the Metropolitan Dade County Transportation Improvement Program, the Metromover was built to provide a means for downtown circulation and serve as a downtown feeder for Metrorail. Construction began in June 1983, and the system opened in May 1986 as the first APM in a downtown setting. The total initial system cost in 1986 dollars was $159 million. The extension cost $248 million. Many new buildings have been built in downtown Miami since the opening of the Metromover and it is generally agreed that it has had a positive influence on property development decisions.

Economic activity in downtown Miami was measured before and after May 1986 using economic census and market demographic statistics. The same statistics were gathered for the entire Miami metropolitan area. From the information available, it appears that downtown economic activity increased by 6% following the introduction of transit service. During the same period economic activity in the region increased by 5%. If no other significant reasons for the difference in growth rates can be determined, it appears that transit had a net 1% positive impact on economic growth in downtown Miami.

Summary: Economic Activity

Retail sales revenue trends for the three sample transit projects suggest that economic activity increases with the introduction of new transit services. The economic impact for each location is shown in Table 1. Retail sales revenues for each location were compared with increases in the entire metropolitan area of each location. In each case, new transit service location increases were higher than the general metropolitan area revenue increases. The difference between the local revenue increase (t_l), and the metropolitan revenue increase (t_m) yield a factor ascribed to the economic impact of the new transit service (E).

Table 1. Economic Impacts

Location	E
St. Louis	3.60%
Denver	8.10%
Miami	0.80%

$$t_l - t_m = E$$

Retail sales revenue increases varied in the three locations surveyed. An attempt was made to decide what factors may have influenced these variations. Transit ridership (r) was compared against total commercial space in that location (sf). This comparison yielded a transit-impact factor (TI), correlating to the relative number of people in the area that used the transit service.

$$r \div sf = TI$$

Table 2 identifies the transit-impact factor (TI : 1) for each location. Miami, which had a low transit-impact factor, also had the lowest local sales tax revenue increase. Presumably, a correlation exists between transit-impact factors and the economic impact of that transit service, called the economic constant (C).

Table 2. Economic Impacts

Location	TI : 1	TI : 2
St. Louis	0.00089	6.2
Denver	0.00135	17.5
Miami	0.00049	2.0

Formula 1: $C = (E \div TI)_{avg} = 39$

An analysis of the data from the three cities yields a wide range of numbers, with the highest nearly three times the value of the lowest, as illustrated in Figure 2. However, a modification of the transit-impact calculation yields more consistent results.

$$r^2 \div sf = TI$$

The revised transit impact values for each location are found in Table 2. (TI : 2) Using those values, the new transit-impact equation results in the following.

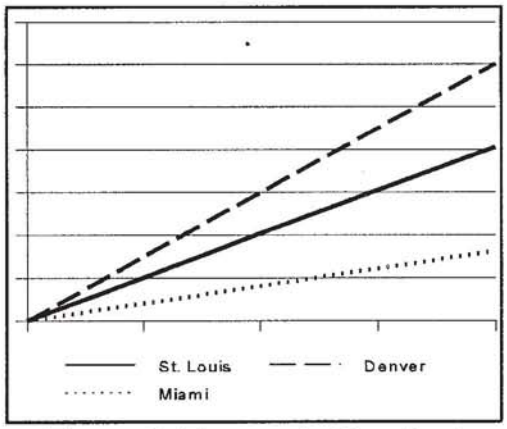

Figure 2. Economic Constant Curves, Formula 1

Formula 2: $C = (E \div TI)_{avg} = .005$

As illustrated in Figure 3, the variances among the three locations are much less using the second transit-impact equation.

While the data represents a small sampling, some preliminary conclusions can be drawn. These conclusions can form some basic hypotheses, to be tested as transit is introduced into additional commercial areas. An equation, based on ridership estimates, can be developed to help predict the increase in economic activity generated by a planned transit system.

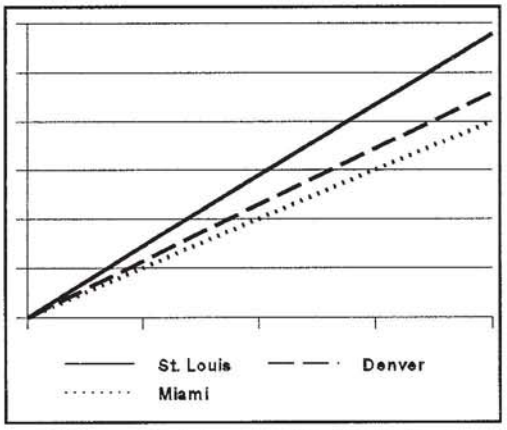

Figure 3. Economic Constant Curves, Formula 2

$$(r^2 \div sf) \times .005 = E$$

Applying this formula to a proposed project in northern San Diego, the University City Shuttle (Richert, 1997), it could be expected that the project will generate an additional 33% in economic activity.

$$(20{,}000^2 \div 6{,}000{,}000) \times .005 = 33\%$$

This translates into $200 million in additional annual retail sales, $20 million in additional annual hotel revenue, and $36 million in additional office rental income, for an APM with annual costs budgeted at $10 million, including debt service. This type of result is not likely without additional commercial development, suggesting that the initial transit-impact equation may still better approximate economic results.

Applying the initial transit-impact equation to the University City Shuttle project still generates an additional 13% in economic activity.

$$(20{,}000 \div 6{,}000{,}000) \times 39 = 13\%$$

This translates into $78 million in additional annual retail sales, $8 million in additional annual hotel revenue, and $15 million in additional office rental income, for an APM with annual costs budgeted at $10 million, including debt service. These types of projections will allow property owners and merchants to decide whether to pursue building privately financed APM systems. Successful demonstrations of the validity of these types of projections should promote a much wider employment of APMs in commercial centers.

Conclusion

Automobile use is beginning to overwhelm our commercial centers. Between 1969 and 1990, the average annual miles driven increased 46 percent among male drivers, and 76 percent among female drivers. (Urban Land Institute, 1996) Census information shows that even in areas of the United States where the population has declined, urban travel has increased, exceeding the growth rate of commercial development. Many suburban centers in the United States are being choked by highway systems that cannot support the increased traffic. As commercial centers become more congested, they will become less competitive with alternative methods of transacting business. Store merchants already compete with mail order catalogs, television shopping networks and internet malls. Office building owners compete with telecommuting concepts, and hoteliers compete with teleconferencing options.

Real estate developers and owners can take some comfort in knowing that telecommuting, teleconferencing and teleshopping cannot completely replace personal, face-to-face commerce. Improving mobility within a commercial center is an important step in maintaining a competitive edge in the marketplace. APMs will be important tools in improving mobility, because they improve access and increase pedestrian circulation.

Property owners evaluating the use of APMs to improve their property values need to consider the following issues. If access to a particular site is poor, it might be improved through a connection to a more accessible site. The increase in property value might be sufficient to justify the investment in the people mover. As discovered in the Pittsburgh experience, this is more likely in locations with high property values. If traffic conditions and land use patterns within a commercial district restrict fast, convenient travel between various activity centers, a people mover network will improve mobility within the commercial center. As suggested by retail sales increases in Miami, St. Louis and Denver, the introduction of transit service into an area does increase commercial activity. Additional retail sales, hotel stays and office rentals serve to increase property values. Depending upon the cost of the people mover, increases in commercial activity

of 5% to 10% could be sufficient to justify private investment in the people mover.

APMs have the potential to serve private markets, in a way previous transit technologies have been unable to accomplish, only if costs are managed so that they do not exceed the benefits of the APM. By effectively limiting APM costs, engineers, suppliers and manufacturers will find that private sector markets will provide opportunities far exceeding those yet to be found in the public sector. By working with the private sector, municipalities will discover a far more effective manner of resolving local transportation problems and issues.

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