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Determinants of Success: Lessons to be Learned From Rail Transit System Development in Miami- Dade and Dallas Counties

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**DETERMINANTS OF SUCCESS:
LESSONS TO BE LEARNED FROM RAIL
TRANSIT SYSTEMS DEVELOPMENT
IN MIAMI-DADE AND DALLAS COUNTIES**

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The Miami Metro Transit Authority Master Plan was originated 25 years ago, and its goals remain largely unmet. In approximately the same time period the Dallas Area Rapid Transit Authority has completed its phase one plan. Using a comparative approach, this study seeks to elucidate transportation model outcomes which are suitable to region specific needs. Our investigative intent is twofold. First, our analysis will yield policies that facilitate greater functionality in terms of access and time-efficient methods of transportation. Second, the analysis will reveal policies and factors influencing transportation outcomes in geographically dispersed locales such as Miami Dade County and Dallas County. This analysis will seek to explain the failure or the success of the public transit development with attention paid to political and technical factors. Experiences in these two Sunbelt metropolises will shed light on policies that might enhance public transit development elsewhere.

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Introduction

There is a great debate in the extant literature about rail transit systems. Some authors argue that rail systems are disasters because they cost billions of taxpayers' dollars and produce little in return¹. Rail systems are also considered disasters because they have a negligible impact on traffic congestion.²

On the other hand, there are studies that argue in favor of rail systems. Thus, claims that rail transit systems consume an excessive portion of transportation budgets reveal incomplete analysis. According to a recent study conducted by Todd Litman in 2004, rail transit expenditures equal about 5% of the total automobile facility costs (roads and parking). When referring to traffic congestion, the previous research shows that large US urban areas with well-established rail transit along major travel corridors show a significantly lower rate of congestion growth than cities with smaller or no rail system³. Following the same pattern, a significant part of the costs for rail transit systems are often compensated for by increased property values, business activity and productivity gains.⁴

Most of the studies conducted so far in United States used a multi-comparative approach. In order to make the systems comparable, they came up with different types of classifications for the rail systems. The most frequent type of classification refers to:

- *Light rail*, which may run on exclusive rights-of-way (but sometimes also runs in streets with a speed of 20 miles/hour). Examples of light rail systems: San Diego, Buffalo, Cleveland, Dallas, Pittsburgh, and St. Louis, people movers in Detroit and Miami.
- *Heavy rail*, which runs on exclusive rights-of-way, either subways or elevated and don't intersect with pedestrians or automobiles. US heavy rail systems: New York, Chicago, Boston, Philadelphia, San Francisco, Washington, New Orleans, Atlanta, Miami.
- *Commuter rail*, which usually consists of Diesel-powered trains that often share tracks with freight trains. Examples include systems like: Tri-Rail in Miami-Dade-Broward-West Palm Beach, Trinity in Dallas-Forth Worth areas.

Other classification distinguishes transit systems such as:

- *Large Rail*, where rail transit represent a major component of the transportation system: New York, Washington DC, Boston, San Francisco, Chicago, Philadelphia, Baltimore.
- *Small Rail*, where rail transit is a minor component of the transportation system: Pittsburgh, Seattle, Atlanta, Buffalo, New Orleans, Cleveland, Portland, Los Angeles, St. Louis, Miami, Denver, Dallas, Sacramento, San Diego, San Jose, Salt Lake City.
- *Bus Only*, when a city has no rail transit system.

Last but not least, some types of classification refer to generations of rail transit systems:

- *The first generation*: simultaneous city/transit development, continuous since mid-1800's: Boston, Chicago, Cleveland, New York, Philadelphia
- Mid-1950s to mid-1970s *major region-wide systems*: Toronto (1954), San Francisco (1973), Washington, D.C. (1976)
- *The Third Wave*, late 1970s through 1980s: Atlanta (1979), San Diego (1981), Miami (1984), Buffalo (1985), Pittsburgh (1985), Portland (1986), Vancouver (1986), Baltimore Metro (1987), Sacramento (1987)
- *New Systems* in the 1990s: Los Angeles (1990), San Jose (1991), Baltimore LRT (1992), Detroit (1993), St. Louis (1993), Denver (1994), Dallas (1996)

¹ O'Toole, Randal (2004)

² Downs, Anthony (1992); Cox, Wendell & Creasy Laura (2000); Porter, Douglas R. (2001); O'Toole, Randal (2004)

³ Porter, Douglas R. (2001); Litman, Todd (2004)

⁴ Smith & Gihring (2003)

The present paper is going to use a comparative approach. The suggested counties for comparison will be Miami-Dade and Dallas. The reasons why the two counties have been chosen are that both are considered small rail systems and they both share comparable demographic and geographic characteristics.

Drivers of Success

Previous research⁵ revealed that rail systems should achieve some objectives in order to be successful. These objectives are: achieving high ridership, achieving cost-effectiveness, increasing public transit usage, preventing/solving traffic congestion and improving land-use and urban growth patterns.

Some researchers classified the factors that influence the success of urban rail systems in the following manner: urban factors, socio-economic factors, planning factors, cost factor, operating policies, transport planning policies and urban planning policies.⁶

Other studies identified the rail transit systems as the drivers for economic development. One of the most significant impacts of a rail transit project is considered to be the impact on property values. Transit oriented development tends to increase local property values due to improved accessibility and livability in that area.⁷ But there are always exceptions to the rule. Some studies found that residential property values didn't increase in San Jose, Sacramento and Miami.⁸ The explanation relies on the fact that these rail systems probably didn't achieve high quality or they experienced very low ridership. Other economic development impacts refer to agglomeration efficiencies, increased productivity and community redevelopment.⁹ Therefore, rail transit systems provide economic, social and environmental benefits, benefits which tend to increase as a system expands and matures.¹⁰

Once reviewing the literature, we considered the following factors to form the basis for the comparison of the two counties listed above: ridership, operating costs, farebox recovery ratio and transit oriented development. The analysis also took into consideration structural, political and cultural factors that are rarely addressed in previous research.

Problem Statement

In 1978 the Miami Metro Transit Authority passed a transportation master plan that intended to extend the rapid transit lines from Downtown north to the county line and south to Cutler Ridge. The time frame established for this plan estimated completion of the system was by the year 2000. This however, has not been the case. In fact, in November 2002 Miami Dade County voters approved a new transportation plan named the "People's Transportation Plan". This plan is to be paid for by a half cent sales tax, which is estimated to generate \$150 million annually and to be completed by 2025. The original plan didn't come to completion as did another plan proposed in 1990. Given the failures of these past plans, it is important to identify which were the factors affecting the lack of implementation of these plans. These events address a larger public policy issue regarding implementation of large publicly funded transportation systems.

The argument underlying this inquiry is that analysis will yield policies that facilitate better functionality in terms of access and time efficient methods of transportation. It is also asserted that reliance on alternative methods of transportation is increasingly warranted given the increasing expense of key factor endowments such as fuel price and urban development patterns.

⁵ Edwards & Mackett (1996); Ela Babalik Sutcliffe (2001)

⁶ Ela Babalik Sutcliffe (2001)

⁷ Cockerill, Lee & Stanley, Denise (2002); Diaz , Roderick B. (1999); Smith & Gihring (2003)

⁸ Gatzlaff, Dean & Smith Marc (1993); Cockerill, Lee & Stanley, Denise (2002)

⁹ Litman, Todd (2003)

¹⁰ Litman, Todd (2004)

The research question which drives the present study refers to the identification of the policies and factors which influence a geographically dispersed and efficient rail transit system in Miami Dade and Dallas Counties.

In order to accomplish our goals, we have chosen a triangulated approach for a number of reasons. A majority of transportation studies are quantitatively oriented. This research has shown that there are important variables which cannot be adequately addressed using a purely quantitative methodology. When analyzing the data, it is important to ascertain the context within which these systems evolved. To address this need both a historiography and a content analysis of the local newspapers (The Miami Herald and Dallas Morning News) and local studies was performed. We also included a semi-structured interview (with one of the decision makers in the policy development process of Miami-Dade Metrorail system).

Using data from the US Census and studies of each public transit system, a performance baseline was established. Each county was analyzed in terms of key factors and then, a comparison between the two, at similar stages of development, was made.

Analysis of Key Performance Indicators

As denoted in the introduction there are several factors affecting the success of a light rail public transit systems. Particularly, there are three factors: ridership, operating cost and cost recovery. **Ridership** is most often expressed in terms of passenger trips. **Operating cost** is directly proportional to the age of the system (with older systems tending to have higher operating costs than the new ones). **Cost recovery** is expressed in terms of the fare box recovery ratio.

For obvious reasons ridership is an important factor since it is the most transparent measure for the public. What is perhaps more important than the ridership on a single day month, or even a year, is the long term trend present as the system becomes more established. For example, in a successful system, ridership should increase with system age until it reaches a “tipping point” as denoted by Malcom Gladwell in his work on larger system phenomena.¹¹ After this occurs more lines are needed to accommodate increasing demand from riders.

Operating cost is a fairly transparent factor as well, since it reflects system efficiency as a whole. In particular, the total maintenance expense is a crucial factor in determining system efficiency. As with ridership it is the long term trend that is more important in determining the success of a system. As systems age, the total maintenance expense tend to increase.

Fare box recovery ratio expresses how much of a public transit systems costs are being recovered from the fares of passengers. Typically, for a system to be considered successful the fare box recovery ratio should be at least 50 percent. This would signify that at least half of the operating expenses of the system are being covered by passenger fares.¹²

In order to more accurately assess the performance of these two agencies, the data were analyzed for the first five years of operation of each of these systems. For Miami Dade’s Metrorail system this comprises the years 1985 – 1989. For Dallas’ DART system this comprises the year 1996-2000.

In the case of **Miami-Dade County** and **Metrorail**, the analysis of the data indicates that the highpoint in terms of increasing ridership occurred in the period 1985-1989. During this period passenger trips nearly doubled increasing approximately 180 percent during the period 1985-1989. Figure 1 displays this trend.

¹¹ Gladwell, Malcom (2000)

¹² Sutcliffe, Ela, B. (2005)

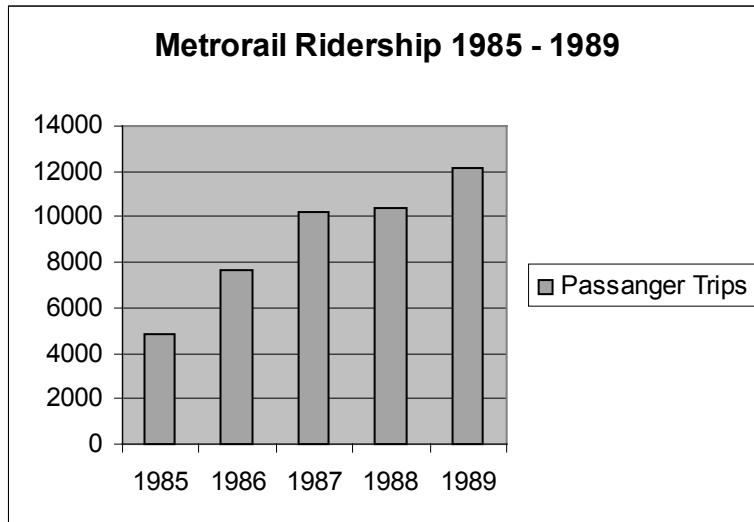


Figure 1

Data gathered from study of Metro Dade Transit Agency done for Metro Dade by outside Consulting Firm completed in 1992. This study can be found in the Central Library of the Miami Dade County Public Library System.

This is especially significant since total operating expenses increased by only 37%. Despite these trends the fare box recovery ratio did not exceed 32% during the period examined. One factor that might explain this is the large increase in maintenance expenses which grew 131% during this period. Figures 2 through 4 depict these trends. Further research is needed to determine additional drives explicating the low fare box recovery ratio present in the Miami-Dade Metrorail system.

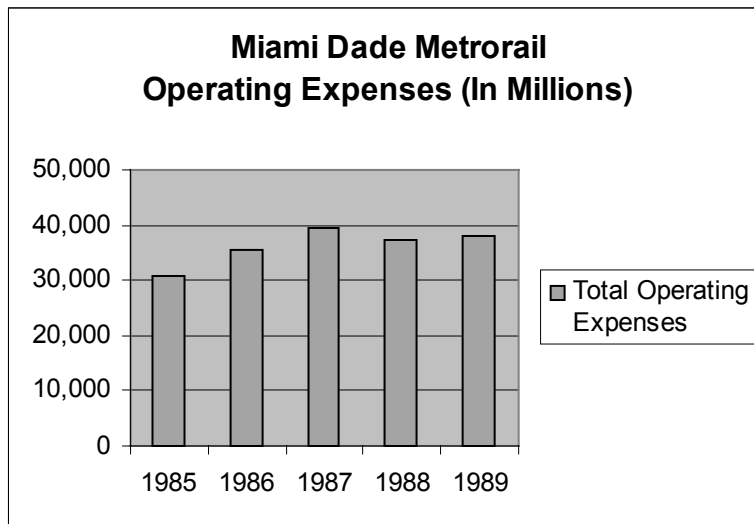


Figure 2

Data gathered from study of Metro Dade Transit Agency done for Metro Dade by outside Consulting Firm completed in 1992. This study can be found in the Central Library of the Miami Dade County Public Library System.

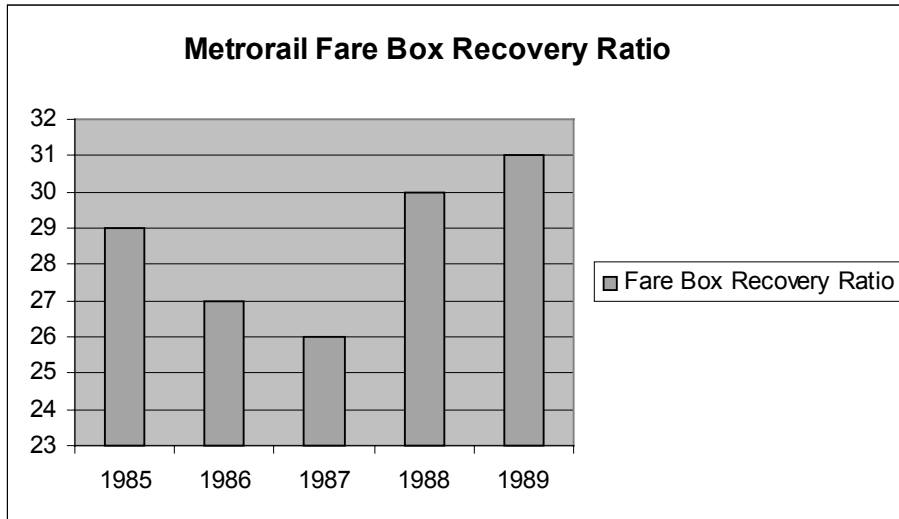


Figure 3

Data gathered from study of Metro Dade Transit Agency done for Metro Dade by outside Consulting Firm completed in 1992. This study can be found in the Central Library of the Miami Dade County Public Library System.

The Dallas Area Rapid Transit Authority (DART)

DART has exceeded expectations in terms of its initial ridership estimates. An estimated 41% of Light Rail Transit (LRT) riders were not “regular users” before the advent of the LRT system.¹³ The following chart details weekday ridership for the first five years that the LRT system was in operation.

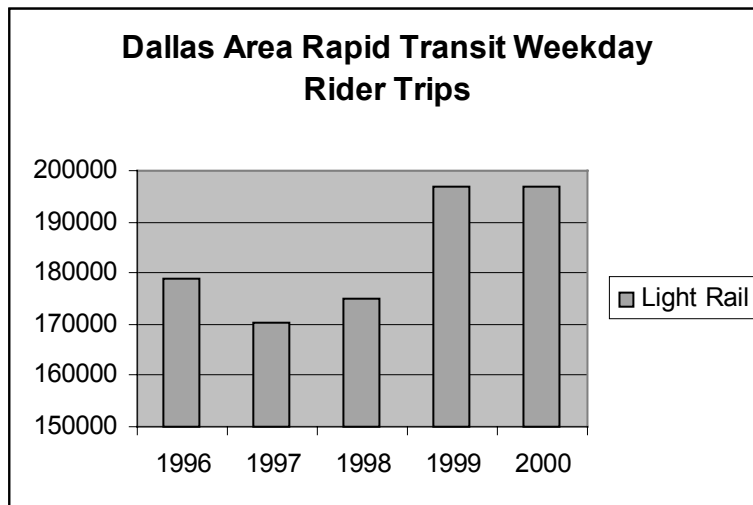


Figure 4

Data for this table were collected from the Federal Transportation Administration’s National Transit Database (FTA/NTD) which can be found at:

The following figure depicts the trend in operating expenses for DART

¹³ Figures compiled from a study conducted by DART in September 2000. From Article entitled, “Dallas Light Rail Opens: First Stations Service Suburban Counties” found at the following website: www.lightrailnow.org/features/f_dal010.htm

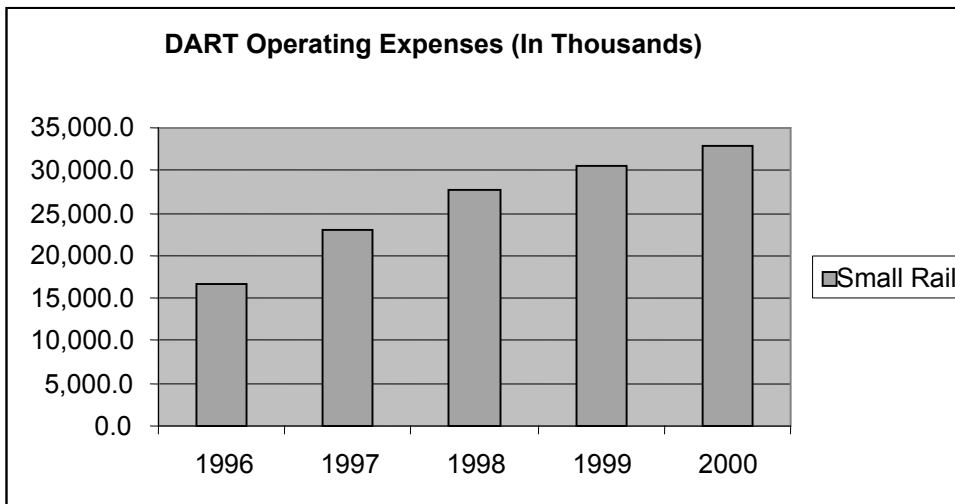


Figure 5

Data for this table were collected from the Federal Transportation Administration's National Transit Database (FTA/NTD) which can be found at:

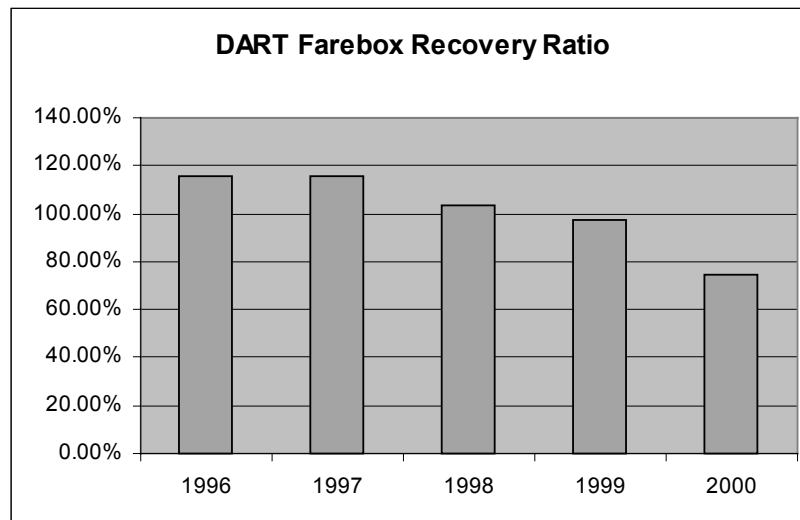


Figure 6

Data for this table were collected from the Federal Transportation Administration's National Transit Database (FTA/NTD)

In summary, all the above performance indicators revealed consistent results. In terms of ridership, Metrorail increased slowly but constantly for the first three years and then almost stagnated. DART experienced a dramatic increase in ridership between the third and the fourth year and then almost stagnated as in the case of Miami. Operating expenses had a different trend: in the case of Metrorail they had a fluctuating trend (increase, decrease and increase again) while DART operating expenses increased constantly. Last but not least, the farebox recovery ratio seems to be the indicator which shows clearly the difference between the two rail systems. While Metrorail never achieved the 50% which would classify the system as a successful one, DART had experienced a farebox recovery ratio of over 70%. Moreover, for the first three years of DART's existence, the farebox recovery ratio exceeded 100%.

As a result of the above key indicators, we can clearly argue that DART light rail system is a successful rail system comparing to Miami's Metrorail. In order to better understand why a system

succeeded and the other didn't, we further performed a qualitative analysis, which revealed the context and the specificity of each rail system.

Metrorail overview

The Miami Metrorail operates on 22.4 miles of elevated track with 22 stations from Dadeland South to Palmetto. The 22 Metrorail stations are about one-mile apart, providing easy access for bus riders, pedestrians, and other passengers. Parking is available at 19 Metrorail stations. The following map depicts the current Metrorail system.



Source: <http://www.co.miami-dade.fl.us/transit>

In the content analysis performed below we present the context in which metrorail project was initiated and completed. We conducted our analysis according to the following factors: financial and budgetary issues, funding sources, the alignment of the system, joint development projects, and its perception in the eyes of both Miami-Dade citizens and the media. Finally, we discussed future plans for extensions of Metrorail

Funding for the Metrorail project was initially provided by **the 1972 Decade of Progress bond issue**. However, the original plan did not come to fruition as did another plan proposed in 1990. Analysis of Metrorail's funding patterns indicated a difference between its proposed and its actual budget. For example, Metrorail's projected budget of \$987 million consisted of 69 per cent federal, 10 per cent state, 21 per cent Hialeah and Dade County - which was estimated to increase in value with 72 million dollars in January 1979, before the construction began due to a slowdown in transit funding schedule from the federal level. The final cost of the 20.5 miles instead of 21.5 miles was \$1.18 billion.¹⁴ In addition to the delay in the federal money and the rate of inflation, there was also Metro's decision to open the south leg of Metrorail before the rest of the 20.5-mile system¹⁵, which had an additional cost of \$134,000.

The largest part of revenues came from the federal level. When seeking money for the second phase of the Metrorail, Miami-Dade encountered opposition at the federal level due to the lack of a dependable source of local revenue to pay a share of future construction and operating costs. Beginning with 1984 the Urban Mass Transportation Administration intended to initiate a tough new rating system that will have cities that wanted to build mass transit system to compete with each other for the available funds. Some of the most important criteria in the selection of the cities were: ridership, efficiency and the presence of a strong local financial backing for construction and operations, preferably from a "dedicated source of revenue" such as a special local gasoline tax or sales tax.¹⁶

Along its history metrorail's **sources of funding** proved to be diverse: one-fifth of the federal gas tax was designated for mass transit projects, the real estate taxes generated on private property developed at Metrorail stations, such as Dadeland South, property taxes, money from airport's budget, hurricane-relief money, highway construction funds, even grants from the Clinton administration's new "empowerment zones" for poor neighborhoods, taking the county's toll roads from state control and using tolls to fund public transportation, pay an extra penny in gas tax and a countywide penny sales tax.

Until 1998, the county has depended largely on federal, state and county gas tax and general fund revenue to advance road and rail projects.

The citizens of Miami-Dade rejected several proposals to increase the sales tax by one penny – in November 1976, November 1990, November 1991, August 1999, thus denying transit officials the dedicated source of funding to finance the transit system.

County Manager Merrett Stierheim argued: "The only way we will pass a 1% sales tax is with political leadership."¹⁷

In November 6, 2002 the county's voters approved a half-penny increase in the local sales tax, from 6.5 cents per dollar to 7 cents, to pay for extensive improvements in the transit system. This decision came really late in the existence of metrorail, considering that the bulk of funding from the federal level had shrunk.

¹⁴ The Miami Herald, (May 19, 1984)

¹⁵ The Miami Herald, (May 21, 1984)

¹⁶ Ralph Stanley, the administrator of the Urban Mass Transportation Administration (UMTA), cited in Miami Herald, (May 19, 1984)

¹⁷ The Miami Herald, (March 5, 1999), *Proposed 1-Cent Sales Tax Fuels Debate*, Author: Bruce T. Seeman

In November 2002 Miami-Dade County voters approved a new transportation plan named the “People’s Transportation Plan”. This plan is to be paid for by a half cent sales tax that is estimated to generate \$150 million annually. The plan estimates completion by 2025.

The **actual alignment** of the system was achieved democratically: numerous meetings were held in different neighborhoods in order to establish a route that satisfied most of the citizens. According to M. Stierheim, this proved to be a mistake: “It would have been better to have the democracy take place in the juxtaposition of stations as opposed to the alignment of the system.”

Metrorail consisted of two steps: the south leg, which is considered a success and the north leg, which is seen as a failure because the ridership has never achieved its potential. When deciding the alignment for the north leg, there was a big struggle with the African-American community and therefore, the County Commission decided the present alignment. The former County Manager of Miami-Dade County, M. Stierheim suggested that the proper alignment was to go right up on I-95 – “there was all the right-of-way and construction cost would have been a lot less.”

Metrorail opened in 1984 in two phases: May 20 Metrorail began south-line service to ten stations from Dadeland South to Overtown Station and December 16 Metrorail’s four-mile second leg up to Okeechobee. A final 1.5-mile extension westward from Okeechobee to Palmetto opened on 30 May 2003.

Today, the trains operate just as they were designed to. They are clean, cool, safe and fast. The problem is that almost nobody rides them. The reason is very well described in Miami Herald: “The trains do not go where people need to go”.

Travel logs collected in 2002 from 5,100 households by the Department of Transportation in Broward, Miami-Dade and Palm Beach counties showed that 73% of people get around by driving a car. In the three-county area other means of commuting are represented by: walking (4%), school buses (2%), transit buses or car pooling (1% each) and the **Metrorail** was below 1%.¹⁸

These facts go along with the national trend. Data from the 2000 census show that 76% of people drive alone to work - up from 64 percent in 1980 and 73 percent in 1990. Nationally, in US public transportation is used by 5% of commuters.

Another element in this analysis that needs consideration refers to the **joint development** projects. During the planning stage for construction of the Metrorail system, the County and numerous municipalities conducted a series of studies called Station Area Design and Development (SADD) which inventoried existing uses around station areas and established guidelines for future development. One project that has been in existence from 1984 is Datran Center at Dadeland South Metrorail Station. This center consists of office buildings, retail space, Marriott Hotel and parking spaces and generated over \$800,000 annually for MDT.¹⁹ The county agreed in 1998 to lease property next to most stations to private developers in order to create destinations for commuters along Metrorail lines. Some examples of recent joint development projects are: Merick Park, Liberty City, Overtown and Douglas Road for Water and Sewer Department.

The fact that there was only one big project by the time Metrorail opened may explain the low ridership figures.

Metrorail was a media event: “there was so much in the media and everybody was making all kinds of accusations.”²⁰ Metrorail project was accused of construction flaws and accused of stealing money. The response was a very detailed report demonstrating the opposite and a press conference in order to respond to accusations in front of the media. The result of these struggles was: “while

¹⁸ The Miami Herald, (October 28, 2002), *South Floridians Simply Love Their Cars*, Author: John Dorschner

¹⁹ http://www.co.miami-dade.fl.us/transit/joint_index.asp

²⁰ Notes from the interview with the former County Manager of Miami-Dade County, Mr. Merret Stierheim

Miami Herald and County Manager Stierheim may never agree on this issue, let's get on and build the railroad!"²¹

One year after the first stage was completed the system was named: "metrofail". The Los Angeles Times called it "a conspicuous failure," a Dallas TV station: "the system from nowhere to nowhere", The Wall Street Journal stated that "almost nobody uses it."

In 1989 even President Reagan argued in his budget document that Metrorail carries only 20 percent of the riders it was supposed to "and recovers only about 25 percent of its operating costs."²²

According to a 1992 report by the Center for Urban Transportation Research²³ metrorail, metromover and metrobus operated at a combined deficit of \$94.6 million a year. This deficit was made up from local tax sources, including sales taxes and, above all, property taxes.

Based on the facts presented in this section, Miami-Dade Metrorail is only at the beginning of a difficult transition, which will require education of its citizens in order to achieve a solution. A new and expanded public-transportation system must be sufficiently comfortable to all drivers in order to use it whenever possible.

DART light rail overview:

DART light rail system operates a 45-mile light rail system with two regular routes: **the Red Line** and the **Blue Line**. The two lines are running at grade along streets that have been converted to pedestrian/transit malls. Both light rail lines serve all downtown Dallas stations. Outside Downtown Dallas they run on their own rights of way. Some sections are elevated, and there is a 3.5-mile tunnel under the Central Expressway. The first stage of the system, consisting of 20-miles opened in 1996 and was completed in 1997, followed by a series of extensions in 2001-2002 which brought the system to its current configuration.

The Texas Electric Railway has an extensive network serving the Dallas area from the early 20th century. Additionally, the Dallas Railway and Terminal Company ran a network of electrified rail lines that served the suburban areas of Dallas up until the late 1950's²⁴. The development of the interstate highway system and the prominence of personal vehicles led to the cessation of the use of the commuter rail system and the demise of the electrified rail lines. However, given the increase traffic congestion and growing fears of pollution, the search for alternative means to improving the public transportation system commenced in the mid 1970's²⁵.

Unfortunately, fears of residents in both the Dallas and Fort Worth areas of subsidizing improvements for their rival's city kept plans of the creation of a rail system linking the two cities at bay. Effective lobbying and public relation effects by Dallas area oil companies, developers and newspapers led to the successful approval by residents of the creation of the Dallas Area Rapid Transit Authority (DART) in 1983. The primary purpose of DART would be to link and improve rail and bus services in the 940-mile metropolis.

DART light rail system was designed at a moment when other 11 US rail system had either completed or were in the completion process. These systems were: Los Angeles, Buffalo, Pittsburgh, Miami, Baltimore, Atlanta, Washington, D.C., Portland, Ore., Detroit, Sacramento and San Jose. This

²¹ id

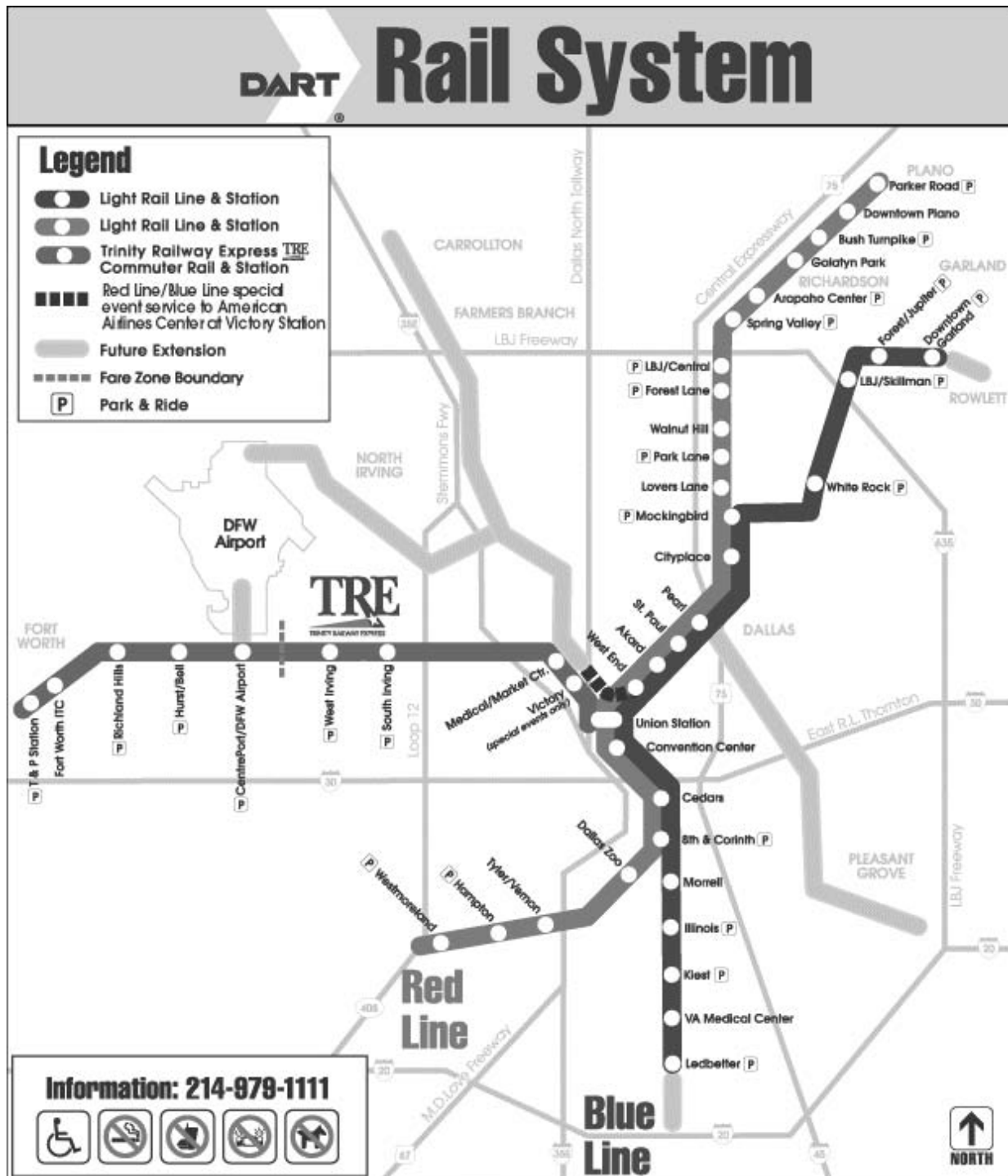
²² The Miami Herald, (January 10, 1989), *Metrorail gets Criticism in Reagan Budget Plan*, Author: Craig Gemoules

²³ The Miami Herald, (May 29, 1994), *Misplaced Priorities Pushed Metrorail Dreams Off Track*, Authors: John Dorschner & Angie Muhs

²⁴ Mastaglia Linda, (2002), "All Aboard" *Commuter Rail: A Growing Alternative in Metro Areas*, On Common Ground, National Association of Realtors, available at http://www.realtor.org/smart_growth.nsf/Pages/ocg_winter2002_all_aboard?OpenDocument

²⁵ Railway Technology, *Dallas DART Light Rail Expansion, USA*, <http://www.railway-technology.com>

was an opportunity for DART to inspire from the experience of the above-mentioned US transit systems experiences.



Source: <http://www.dart.org/maps/printrailmap.asp>

When designing the system, DART opted for a strategy that sprawled the rail system into a number of areas rather than concentrating the first phase construction along a central spine, as in the case of Miami.

Tedesco, the DART Executive Director, was concerned that the DART board will use political considerations in deciding which rail line to build first, rather than factors such as anticipated

ridership that can predict a line's success. He argued that "a political judgment' helped determine the route for an expensive and poorly patronized Miami rail line that has become an embarrassment for that city"²⁶.

The budget of the DART light rail system was 2.9 billion dollars as opposed to projected 2.45 billion dollars. When referring to funding it's very important to state that DART first relied on local funds and only later it applied for federal grants. Funding Dallas Area Rapid Transit was lauded in February 1986 by the administrator of the Urban Mass Transit Administration for its decision to build a system independent of federal funding. "DART has shunned federal mass transit grants in favor of local financing, has subcontracted services that can be provided cheaply by private companies and has developed cooperative planning efforts between the public and private sectors."²⁷

Even though DART had intended to avoid relying on federal grants for the **rail** system, in November 1987 DART officials adopted a different financial plan that sought more than \$900 million in federal funds for its rail system. DART had a better chance for federal aid than most other transit agencies because it asked for only 30% of its \$2.45 billion dollars budget from the Urban Mass Transportation Administration. According to Transportation Secretary Samuel Skinner "the bigger the local share, the more apt they are to get money."²⁸ Beginning with 1992 DART received \$160 million from the federal level over the six-year life of the bill for construction of the South Oak Cliff light rail line.

An interesting fact along DART' existence is that it ended the year 1995 with \$67 million under budget, thanks to operating efficiencies, capital spending delays and an economy that boosted sales tax income \$21 million more than planned, according to Dallas Morning News.

Therefore, DART light rail system got its revenues from the following sources: the voter-approved one-cent sales tax, federal funds, investment income, short- and long-term financing, and fare box revenue fund the operation and ongoing development of DART's multimodal Transit System Plan.

Passenger services commenced on December 1996, thirteen years after the first plans were unveiled. At present the system has 45 miles and is intended to be extended up to 93 miles.

Regarding **citizen perception** of the DART light rail system, there has been a strong support from the public: beginning with the adoption of the one cent increase in the sales tax in 1983 and finishing with \$2.9 billion in long-term bonds for rail expansion approved in 2000. However, DART experienced times when citizens did not back up the light rail system. This was the case in 1988, when citizens rejected long-term bonds for rail construction. The reason was that DART's often controversial first four years have undermined confidence in the agency's ability to deliver on promises made to voters in the 1983 election that created DART. According to Dallas Morning News, Dallas-area residents intended to support future mass transit bond issues if DART could first succeed with the resources it had.²⁹

The last aspect that we would like to consider is the transit oriented development and planning. DART encouraged and facilitated **transit-oriented development** by participating with member cities in rail line and station location and land use planning. Stations are sited in areas that have or are planned to accommodate transit-oriented development. The new communities near the stations include residential, retail and commercial developments totaling approximately \$1.3 billion. According to a research conducted in 2002 by the North Texas Center for Economic Development and Research, residential properties near DART Rail stations increased in value, from 1997 to 2001, on average

²⁶ The Dallas Morning News, (June 11, 1986), *Tedesco Voices Fears for 1st Rail Line* , Author: Terry Maxon

²⁷ The Dallas Morning News, (February 13, 1986), *DART Self-Reliance Praised By federal Mass Transit Chief*, Author: Walter Borges

²⁸ The Dallas Morning News, (May 19, 1989), Rail grant prospects seen as good

²⁹ The Dallas Morning News, (October 26, 1988)

39% more than properties not served by rail. Office buildings near DART rail increased in value 53% more than properties that were not located near rail.

Therefore, it can be concluded that DART light rail system represents a model not only for light rail but also for heavy and commuter rail systems.

Discussion of the results

According to the present analysis, Miami Metrorail and Dart Light Rail systems appeared to have adopted two different and almost opposite approaches.

Miami-Dade County has depended largely on federal, state and county gas tax and general fund revenue to advance road and rail projects. The trend that Metrorail followed was that of relying on federal money and lacking a local dedicated source of funding. This fact had unpleasant consequences: money from the federal level came later than expected, fact which caused higher construction costs.

DART system, on the other hand, first relied on local funds and only later asked for federal grants. DART had a better chance for federal aid than most other transit agencies because it asked for only 30% of its budget.

With respect to the alignment of the system, Metrorail alignment was achieved democratically on the south leg and politically on the north leg. Whereas Metrorail goes along a central spine, DART adopted a strategy that sprawled the rail system into a number of areas. The lesson we learned in this instance is that when deciding which rail line should be built first, factors such as anticipated ridership came into play and predicted a line's success.

DART light rail system had the opportunity of learning from the experience of a large array of US transit systems experiences, while Metrorail didn't.

Public opinion played an important role for the success/failure of the two rail systems as well. If the citizens of Miami-Dade rejected three times the opportunity of having a dedicated source of funding to finance the transit system, in the case of DART there has been a strong support from the public, including the adoption of the one cent increase in the sales tax in 1983 and the adoption of \$2.9 billion in long-term bonds for rail expansion approved in 2000. However, DART experienced times when citizens did not back up the light rail system. One good example was the rejection of long-term bonds for rail construction in 1998 due to the delay to deliver on promises made to voters in the 1983 election that created DART. But delivering a small part of the promised service won the support of the public in order to finish the project.

As it can be seen, in the case of both transit systems, public opinion played a very important role and made a big difference. In the DART case, people endorsed the plan financially and not only because they believed in it. In the Metrorail case, public opinion didn't back up the plan good enough and they didn't believe in it from the beginning.

What lessons are there to be learned? The present study suggested that the success of a rail system can be achieved when following certain patterns: finding a local dedicated source of funding; building a transit system as quickly as possible to earn public support; expanding the system in a timely manner so that public can use it; using joint development/TOD from the moment the system is designed in order to stimulate ridership; choosing the alignment of a system according to ridership projections or a travel corridor instead of community or political decisions; building big parking garages and offering easy access to the rail system by foot; and last but not least, getting a favorable image from the media in order to assure the support of the public opinion.

The present analysis has its own shortcomings. Due to limitations of access and material resources, we only interviewed one person for metrorail and none for DART. Since our primary goal was to try

to confirm the findings from our content analysis with the actual opinions of people who witnessed the life of the two rail systems and to try to explain why the current situation of metrorail exists, more interviews with both decision makers for DART and Metrorail should become the object of future research. Though, the great benefit of this research paper relies in the fact that it contributed to the extent literature with a qualitative approach, which helped explain the actual situation of the two rail systems.

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