# Transit Operating Decisions[1]

## Objectives

- Understand the concept of decision based transit planning
- Understand the role of performance indicators in transit decision making
- Understanding of the use of geographic data for transit decisions

### Transit Decisions

The purpose of transit planning is to make decisions. It is essential to clearly define the decisions that will need to be made. A clear definition of the problem will help in determining the scope and direction of the study, and the research method to be used. The following questions should be asked:

- What is the decision in a narrow sense?, i.e. commit money, approve, go to the next step?
- Who makes the decision?
- Who else is involved?
- When must it be made?
- What has to be decided now vs. later?
- What information will be needed to make the decision?
- What criteria will be used to make the decision?
- What are your cost criteria?
- What are your performance criteria?
- What impacts are you concerned with?
- What techniques will be needed to provide the information for the decision?

Despite the massive public financing and operation of urban transit systems, they remain an enterprise which requires considerable field data to be successful. Historically, transit data collection to drive operating decisions has been very labor intensive, requiring a cadre of filed observers and data analysts in the office. In 1947, the American Transit Association, predecessor of the American Public Transit Association sponsored a study of traffic checking to prepare transit schedules. While the data collection practices have changed dramatically, this manual, reprinted by the Federal Transit Administration in 1982, contains considerable insight into the use of operating data. The primary author of the study Walter S. Rainville, the ATA Director of Research, eloquently summarized the need for data collection in the introductory paragraph.

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[1] Portions of this material is adapted from a NTI course "Improving Transit System Performance: Using Information Based Strategies" developed at the University of Wisconsin-Milwaukee 1996-98. This material was written by Jack Reilly of the Capital District Transportation Authority (Albany, N.Y.), Edward Beimborn or UWM and Robert Schmitt of RTR Associates in Pittsburg.

*There are perhaps no more important elements of transit operations than the function of traffic checking and schedule preparation. The comfort and convenience of the public, the compensation and working conditions of company employees, and the economic welfare of the company itself are all directly and significantly affected by transit schedules.*

The table below lists a number of operating decision which face transit management and the desirable data necessary to drive the decision.

## Table 1.1 Operating Decisions and Data Requirements

| Operating Decision | Required Data |
|---|---|
| Service frequency and vehicle assignment | customers at maximum load point<br>average duration of standing |
| Service span | customer boardings by trip |
| Bus stop and shelter placement | customer boardings by stop,<br>access routes to the stop<br>land use at stop |
| Running time | travel time between timepoints<br>street patterns<br>traffic control |
| Route alignment | customer boardings by segment<br>transfers by route<br>demographic characteristics of people along route<br>location of major trip generators |

### Service frequency

The historic method of determining transit frequency was to determine the number of customers on-board a transit route at the so-called maximum load point, a point outside of the central business district at which loads were heaviest. A more sophisticated method is to assign a sufficient number of trips to assure that the percentage of passenger-miles during which customers are standing is less than a specified standard. In any event, making good decisions about appropriate frequency involves the collection of either point-check data at the maximum load point or ride check data to determine the passenger miles by trip. Maximum load data is also useful to determine appropriate vehicle deployment (small vs. large buses). Ridership profiles that show transit ridership along a route are very useful ways to determine where schedules could be modified.

## Service span

The span of service is the time interval between the first morning trip and latest evening trip. A rational for increasing or reducing the span of service is some measure of the performance of trips already operated. For example, if the last evening departure is 8:00PM and its performance is only 10 customer boardings per service hour, it is unlikely that a later trip will carry as many customers as the one scheduled at 8:00PM. Insight into this decision can be obtained through a count of customer boardings by trip.[2]

## Bus stop and shelter placement

The decision about bus stop spacing is a judicious balance between customer access and system speed. Knowing about the level of customer interchanges at the stop per day or per hour provides the insight necessary to ascertain proper stop amenities. Stops and shelters should be placed where there is good local access to the stop location. A good rule is to minimize the distance from the doorway of the vehicle to the doorways of the buildings and locations where trips begin or end.

## Running time

Running time is an essential part of determining appropriate schedules. Field data from repeated observations are essential to prepare schedules which can be operated safely and also assure that buses do not run early or excessively late.

## Route alignment

Determining the proper alignment of a route is as much art as science. Determining if a route should be terminated closer to the downtown or if a particular pattern within a route has outlived its usefulness can be aided by data on the number of boardings and alightings by stop or route segment. A large number of transfers between routes might be a signal that through-routing may be appropriate.

Geographic information such as demographic characteristics of the population along the route is very useful in these decisions. Transit usage depends on market size, the number of persons who could potentially use a transit service and market share, the portion of those users who actually use the service. If there is a low potential market size, there will be low use no matter how attractive the service is. Good GIS information can help define market size and be used to locate services that have the best potential.

[2] The span may be looked at as a social decision rather than a business decision. For example a transit system may have a standard that communities with densities grater than 20 households per acre will have evening bus service until 10:00PM. If this is the decision basis, then geographic information systems with census data is a more appropriate tool.

## Table 1.2 Examples of Secondary Information Sources

1. U. S. Census

    Socioeconomic, demographic and housing data are available in census tracts or block groups, always aggregated, sometimes incomplete.
    Critical Information
    1. Location of place of work
    2. Income distribution
    3. Automobile availability
    4. Mode to work
    5. Age distribution

    Available from planning agency or the U.S. Bureau of the census directly.

2. Planning Agencies

    Current Land Use Plan
    Current Zoning
    Raw Data
    1. Employment Locations
    2. Centers of Commercial Activity Sales Tax Data

    Locations of Special Trip Generators
    1. Elderly Housing
    2. Medical Facilities
    3. Schools
    4. Employment
    5. Shopping

3. Traffic Department

    Traffic Volumes/Capacity
    Intersection Geometry/Control
    Parking and Other Regulations
    Construction Plans

4. In-House Data Collection

    Running Time Information
        Time Between Check Points
        Schedule Adherence
        Running Time on Alternative Routes
    Passenger Comments/Complaints
    Driver Comments/Complaints
    Ridership Counts
        Rate Revenue

Off-On Counts
# of Transfers Issued/Accepted

5. Community Sources

   Political Leaders
   Other Community Leaders/Knowledgeable Persons
      Informal Contacts
      Task Forces
   Public Hearings

6. Private Sources

   Utility Records and Surveys
   Newspaper Surveys and Market Information
   Chamber of Commerce Surveys, Local Area Promotional Information

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