

Analytic Approaches to Optimizing Use of Taxis

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Why Taxis?

- Huge budgetary cost pressure on transit systems
- Translates to cost pressure on ADA paratransit systems since ADA service must be provided
- Taxi industry is widely available source of supply whose production costs are relatively low
- Taxi trips for ADA passengers may be less expensive than same trips on dedicated vehicle operations
- Some transit agencies have experimented successfully with diverting trips to taxis

Possible Uses of Taxis

- Divert blocks of trips from dedicated vehicle paratransit operations to taxis
 - Peak periods for DV operations (reduce peaking)
 - Evening service (low density operations)
 - Weekend service (low density, erratic patterns)
- Mini-runs—actually schedule trips for taxis
- Supplement—allow users to choose taxis rather than DV service, although may cost users more and have service restrictions

Determining Cost Impacts of Using Taxis

- Must compare relevant costs of dedicated vehicle (DV) trips and taxi trips
- Average cost per trip for total DV operation is only rarely relevant cost for comparison purposes
- Avoidable cost per trip for DV service is ideal point of comparison
- Will not include certain costs such as call center costs or any relatively fixed administrative costs
- For taxis, meter rates may not be relevant, agency may have to pay higher costs due to quality standards

Determining Cost Impacts of Using Taxis

- When DV trips diverted to taxis, must generate new vehicle deployment schedule for DVs
- If peak trips diverted, flattening of demand may result in more efficient run cut and lower per trip costs
- Must also consider impact of lower demand density if many trips diverted, will probably reduce productivity
- Essential to net out impacts of moving some trips to taxis including recalculating cost per trip for trips remaining on DVs
- Taxi diversion could result in higher overall costs

Analytic Tools for Taxi Options

- TCRP Study B-30 sponsored development of software tool to determine optimal use of non-dedicated vehicles for paratransit operations
- Excel-based tool with basic optimization technology wrapped in VBA application for ease of use
- Useful as sketch planning tool to enable agencies to estimate impact of diverting trips from DVs to taxis
- Can specify what type of trips to divert, tool determines cost and ridership impacts for DV and overall operation

Analytic Tools for Taxi Options

- OptiRun tool developed by DemandTrans Solutions
- Second generation modeling tool, more realistic and accurate than TCRP model (e.g., weekly vs. one day)
- Applied to several private operator and public agency situations
- What it does
 - Optimizes run cuts/driver shift schedules
 - Produces driver schedules that are associated with run cut
 - Allows user to specify taxi diversion and parameters
 - Determines impact of taxi diversion compared to all DVs

Example Application of an Analytic Tool

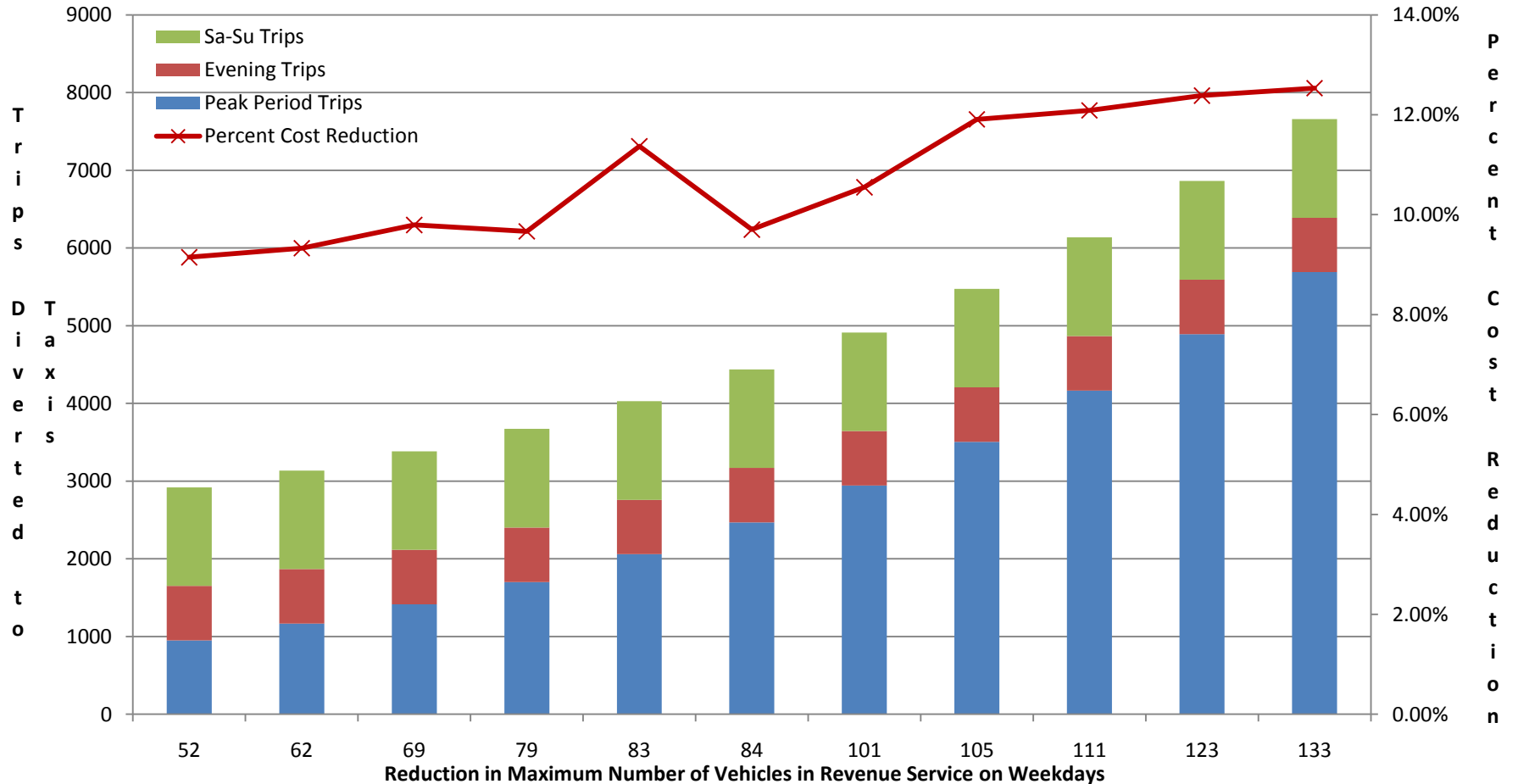
- Call Center Consolidation Study for Large Metro Region
- Combine 3 service zones in Central City into a single service area with centralized scheduling/dispatching
- If implemented, will involve 475 or more dedicated vehicles and 7000+ passenger trips per day
- Used OptiRun tool to determine opportunities for optimizing run structure for consolidated service and for diverting some trips to taxis
- Optimizing run structure alone for dedicated vehicles resulted in predicted 6.5% cost savings

Example Application of an Analytic Tool

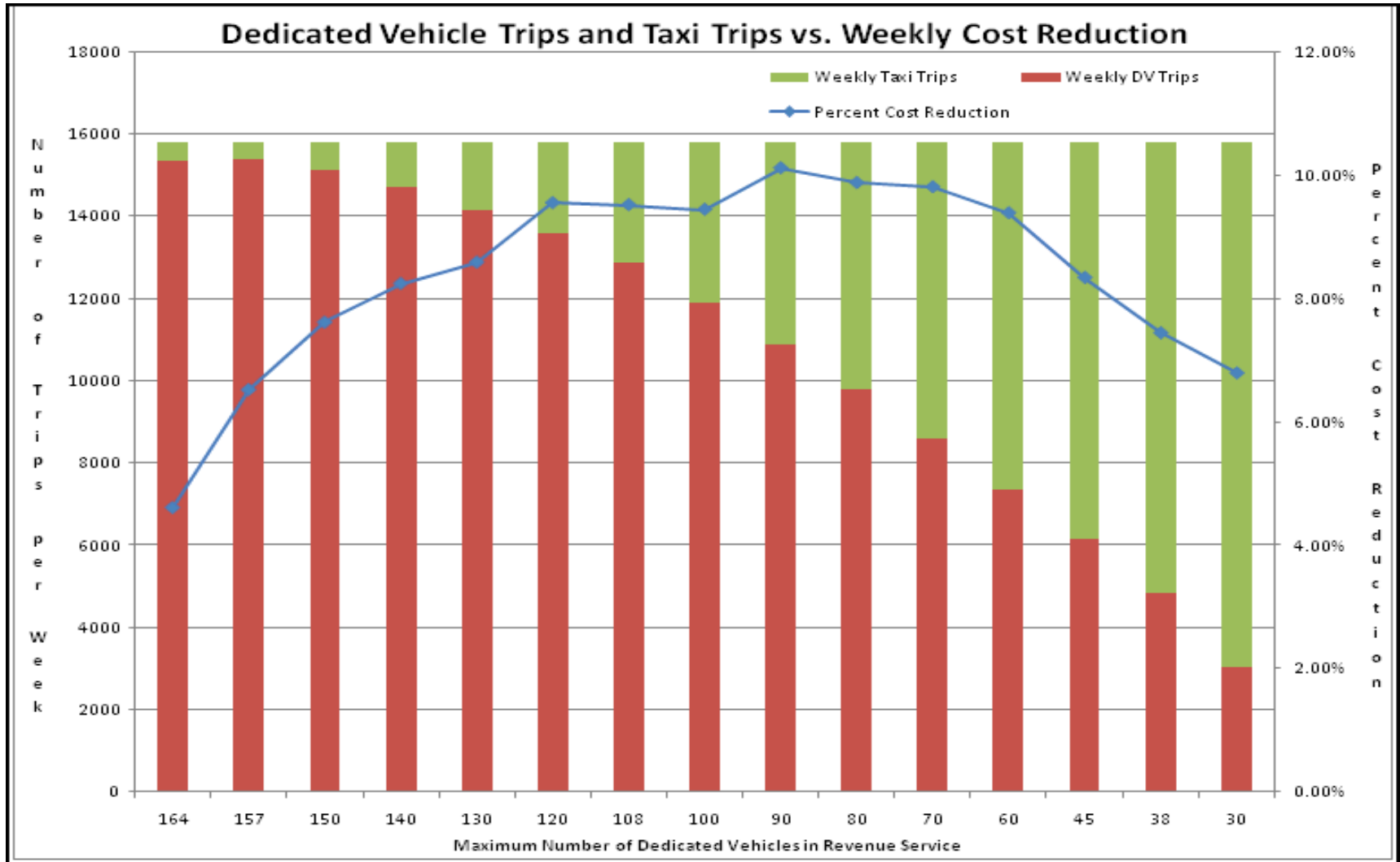
- Evaluated taxi diversion strategies for both peak periods and evening/weekends
- Diverted 200 to 1200 peak trips per day to taxis (3-17%)
- 150 evening trips diverted (28%)
- 1200 weekend trips diverted (16%)
- Total of 7% to 18% of DV trips diverted to taxis
- Cost savings ranged from 9% to 12.5%
- Annual savings of \$7.4 to \$10.2 million, current cost of \$82 million for DV operation

Example Application of an Analytic Tool

Source of Trips Diverted to Taxis vs. Reduction in Maximum Number of Dedicated Vehicles in Revenue Service and Percent Cost Reduction



Another Example Application



Cautions and Concerns about Using Taxis

- Ability of transit agency to manage substantial numbers of taxis and drivers, potentially hundreds
- Driver qualifying—drug & alcohol testing, ability to handle ADA population—use of 3rd parties may be beneficial
- Insuring that taxi supply is adequate at times of day when needed, peak demand periods may overlap
- Insurance coverage limits for ADA service may be greater than for conventional taxi service
- May have to pay above meter rates to attract taxi drivers
- Limited availability of accessible taxi vehicles

Conclusions

- Analytic tools are available for assessing financial impacts of taxi diversion strategies
- When applied to real-life situations, tools indicate that strategies which divert DV trips to taxis are often highly cost-effective, can save substantial sums
- By using both rational planning and analytic tools, transit agencies can determine how to maximize cost savings potential of using taxis while not compromising service quality