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EVALUATION STUDY OF NEW JERSEY TURNPIKE AUTHORITY'S TIME OF DAY PRICING INITIATIVE

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INTRODUCTION

In September 2000, the New Jersey Turnpike Authority (NJTA) introduced E-ZPass technology along with the first stage of its time of day pricing program. The NJTA saw the time of day pricing program as an incentive to alleviate peak hour congestion, by providing reduced toll levels for passenger cars with E-ZPass during off-peak hours. As part of this program, different toll levels were charged to users depending on the time of day. In January 2003, toll levels for each time period and vehicle type were increased as part of the second phase of the NJTA's time of day pricing program. Following the NJTA's time of day pricing initiative, the Federal Highway Administration's Value Pricing Program funded this project, which assessed the impacts produced by time of day pricing. The project was a collaborative effort of the Rutgers University and Rensselaer Polytechnic Institute.

RESEARCH APPROACH

The project had three main focus areas that could be broadly described as: *Traffic Impacts*, *Behavioral Impacts* and *Media and Decision Makers Responses*. Rutgers University was in charge of the first and third area; while the second area was joint responsibility of Rutgers University and The Rensselaer Polytechnic Institute. The research on the *Traffic Impacts* was conducted in two main steps. First, aggregate traffic counts and disaggregate vehicle-by-vehicle traffic and travel time information obtained from NJTA were used to quantify the impacts of the two phases of the time of day pricing program on the time of day choices of the NJ Turnpike users. In the second step, a microscopic simulation model of the NJ Turnpike was developed and calibrated using Paramics simulation software. A detailed toll plaza model was developed which can simulate complex weaving and lane change behavior of vehicles at the toll plazas.

The model was then used to obtain delays and emissions at the toll plazas and mainline separately, and also assess before and after toll plaza and facility-wide throughput.

The second area of the research, *Behavior Impacts*, focused on the analysis of passenger traveler survey data which was gathered by Rutgers University Eagleton Institute by means of computer aided telephone interviews. In the first part of this task, socio economic characteristics of the NJTPK users and the impacts of time of day pricing initiative on the travelers' behavior were investigated and a detailed description of the surveys were given. Using traveler surveys, an econometric value of time and demand elasticity formulations that incorporated the socio-economic and trip related factors of the NJ Turnpike users were developed and estimated,.

The third line of the inquiry focused on *Media and Decision Makers Responses*. This focus area provided the process followed and the key insights how the NJTA implemented time of day pricing program, and reactions of the media and stakeholders to the implementation strategy.

FINDINGS

The key findings from the analyses of the three subjects are summarized below:

Traffic Impacts

- Findings from the average daily traffic data from 2000 to 2003 indicate that there was a statistically significant increase in the NJ Turnpike demand from 2000 through 2003 despite the two phases of time of day pricing program. Combined with the traveler surveys and estimated elasticity values these results provided no evidence of a shift in demand to other modes/routes after time of day pricing.
- Findings from the aggregate level traffic impact analysis indicate that after the first phase of the time of day pricing, percent share of peak period traffic decreased (1.7% for the A.M. peak and 3.7% for the P.M. peak in a statistically significant manner; whereas the percent share of off-peak traffic (1.1%) increased in a statistically significant manner. On the other hand, after the second phase, from 2001 to 2003, the trend in traffic volumes was reversed. Percent share of peak period traffic increased (17% for the A.M. peak and 14% for the P.M. peak period) in a statistically significant manner; whereas percent share of the off-peak traffic reduced (6%) in a statistically significant manner.
- The analyses of the vehicle-by-vehicle disaggregate E-ZPass traffic data indicate that commuters responded more to congestion (lower travel times) than slightly higher tolls (which can be explained by the fact that the toll differentials and absolute value of the tolls were relatively small with respect to the users' value of travel time). Moreover, second phase of the time of day pricing program did not have a statistically significant impact on the traffic patterns of the NJ Turnpike.
- The results from the microsimulation model of the NJ Turnpike indicate that the simultaneous introduction of E-ZPass and the first phase of time of day pricing

program reduced the average trip delay by about 3 -18% and reduced the toll plaza delays by 44-74% between 2000 and 2001. In addition, there was no increase in toll plaza delays despite the increase of traffic volumes from 2001 to 2003. This was due to the increase in the percentage of E-ZPass users over the years.

- Simulation analyses show that between 2000 and 2001 there was a reduction in vehicle emission levels as high as 10.7%. After 2001 a slight increase in emissions was observed due to the increased traffic demand.

Behavior Impacts

- The descriptive analyses of the traveler surveys indicate that:
    1. Only 7% of the individuals (36 out of 513 respondents) changed their travel behavior after the first phase of the time of day pricing program. The main reasons for not changing travel behavior included *no flexibility* (40.2 percent) and *my choice, I go when I want to go* (32.3 percent).
    2. The main reactions to time of day pricing included increased car trips along alternate routes (5.4% of entire sample), and decreased the frequency of travel on Turnpike (5.2% of entire sample).
    3. Although the majority of respondents (64.0%, 303 users) were E-ZPass users, only 10.5% of them were aware of discounts associated with the time of travel.
    4. Current regular users traveled at that time mainly to adapt to their work schedule or avoid congestion rather than to take advantage of cheaper tolls.
    5. Current regular users did not have much flexibility to shift their current time of travel.
- Analyses of the economic value of travel time savings (VOT) indicate that:
    1. Mean VOT values for E-ZPass users ranged between $15/hour and $20/hour depending on the selected period and trip purpose.
    2. VOT values of work related trips ($19.72/hour for peak periods) were higher than leisure related trips ($17.16/hour for peak periods), i.e. users having work trips gave higher value to travel time savings than users having leisure trips.
- Analyses of the traffic demand elasticity indicate that:
    1. Average traffic demand elasticity with respect to toll amount was found to be very inelastic compared to most of other toll facilities in the U.S.
    2. Depending on trip purpose, the elasticities ranged between -0.06 and -0.08 for peak period users and between -0.11 and -0.18 for peak shoulder users.
    3. Elasticity values for work trips (-0.06 for peak periods) were found to be lower compared to elasticity values for leisure trips (-0.08 for peak periods).
    4. Elasticity values for peak periods were found to be lower compared to elasticity values for peak shoulder periods

Media and Decision Makers Responses

- A descriptive analysis of media and decision maker's responses to the time of day pricing program indicate that operationally, the NJTA's time of day pricing was successfully introduced with minimal opposition from the public or various stakeholders.

- Time of day pricing initiative shared media attention with the toll increase and the introduction of E-ZPass, thereby diluting its impact on the public.

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A final report is available online at:
http://www.state.nj.us/transportation/refdata/research/

If you would like a copy of the full report, please FAX the NJDOT, Bureau of Research, Technology Transfer Group at (609) 530-5972 or send an e-mail to NVitillo@cpm.dot.state.nj.us, and ask for:

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