Setting and Evaluating Customer Service Standards

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Project Background

- Mandating of customer service levels by regulators drives capital and operating costs
- Need to determine what *customers* want in view of full costs
- Determine standards in a cost/benefit framework
  - Whole of life costs
  - Externalities
- Aim was to develop a *methodology*, not produce numbers
- Method developed using water system discontinuities as test case
Impact of Changing Standards on Capital Expenditure

Is the value of this... Equal to the cost?
Framework

- Customer Preference
  - Willingness to pay or Accept compensation
  - Whole Life Cost of Assets

SSI

Identification of Attributes

Latitude of Acceptance

Benefits

- What Customers Want
- What Customers will pay

Costs

- What it costs to provide the service

Benefit/cost ratio

Improve the Built Environment
Identifying Attributes of Importance

- Stratified focus groups (residential and commercial)
- Questioned as to:
  - Knowledge
  - Terminology
  - Attributes of Importance (e.g. duration, time, frequency)
  - Willingness to invest (to determine gap between investment and performance)
- Those who had, and had not experienced water system interruptions were included in the sample.
Subjective Social Indicator

- A means of identifying customer dissatisfaction with current levels of government (utility) investment in a service
- Gap between Achieved Level of Service Provision (ASP) and Goal of Service Provision (GSP)
- Tested for embedding effects and found to be robust
- SSI would be used first, and regularly, to test preferences
Example – SSI (Questions)

• The way each service issue is handled could be improved by investing more money to the water system. For the water utility to do this, it could involve some increase in water costs
  – With this in mind,… how wasteful do you think it would be if the water utility increased spending by 30% to specifically improve the way these service issues are handled? (or 10% or generally) (ASP)

• Could you tell me how much you think it is the water utility’s responsibility to provide a good level of service for handling the following water service issues? (To test for Govt. responsibility) (GSP)
SSI Questions

• Levels of water service with regard to water interruptions *were about right*

• No statistically significant gap between ASP and GSP, *regardless of socio-economic group, existence of water tanks or other factors*

• *No need for further investigations!*

• Questionnaire to be administered periodically to determine changes in attitude
Latitude of Acceptance

In modelled example: Reduction in duration from 6 to 4 hours
Reduction in frequency from 2p.a. to 1 p.a.
Key Results

- Strong attitudes not held
- Customers can cope with short interruptions
- Components of interruption deemed important:
  - Duration of the interruption
  - Notification about action taken/to be taken
  - Time of day
  - Number of interruptions per year (planned and unplanned)
  - Compensation not expected
Framework

Customer Preference

What Customers Want

Willingness to pay or Accept compensation

What Customers will pay

Whole Life Cost of Assets

What it costs to provide the service

Choice Modelling

Benefits

Benefit/cost ratio

Costs

Improving the Built Environment
Economic Analysis

Objective:

• to determine customers willingness to pay for the improvements they would value (or WTAC)
Willingness to Pay (or WTAC)

- No market transaction, therefore, non-market valuation techniques required
- Contingent valuation and related approaches flawed (evident embedding effects)
- Choice modelling considered state of the art
- Emphasis is on *unconscious* determination of value (or value of compensation)
Imagine that the water pipes in your area have been breaking unexpectedly – possibly due to expansion of the clay soils after heavy rain. The water supply company is trying to fix the problem and tells you your water supply may be interrupted, without warning, over the next twelve months.

Now, imagine it is a weekday, a water pipe breaks and your water has to be shut off immediately. The interruption occurs at 5:30am on a weekday. In the last 12 months, this has happened once before...

<table>
<thead>
<tr>
<th></th>
<th>Column A Current Practice</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without warning your</td>
<td>5:30 am to 8:30 am</td>
<td>5:30 am</td>
<td>5:30 am to 2:30 pm</td>
</tr>
<tr>
<td>house might be</td>
<td>(i.e. 3 hours)</td>
<td>11:30 am</td>
<td>(i.e. 9 hours)</td>
</tr>
<tr>
<td>without water from…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the last year your</td>
<td>No more times in the</td>
<td>No more</td>
<td>One more time in the</td>
</tr>
<tr>
<td>water supply has been</td>
<td>next 12 months</td>
<td>next 12</td>
<td>next 12 months</td>
</tr>
<tr>
<td>interrupted one. The</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water supply company</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tells you that your</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>water supply might</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>fail…</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>You were advised</td>
<td>A card put in your</td>
<td>A card</td>
<td>If you listened to a radio</td>
</tr>
<tr>
<td>about the interruption</td>
<td>letterbox after the</td>
<td>put in</td>
<td>station that was notified</td>
</tr>
<tr>
<td>by…</td>
<td>interruption</td>
<td>your</td>
<td></td>
</tr>
<tr>
<td>The alternative water</td>
<td>A two litre bottle of</td>
<td>A two</td>
<td>Water provided at a central</td>
</tr>
<tr>
<td>supply arrangements</td>
<td>water to every household</td>
<td>litre</td>
<td>location (water tanker in street)</td>
</tr>
<tr>
<td>offered were…</td>
<td>where someone is home</td>
<td>bottle of</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>water to</td>
<td></td>
</tr>
<tr>
<td>As part of the package</td>
<td>No change to your</td>
<td>A $50</td>
<td></td>
</tr>
<tr>
<td>your water supply</td>
<td>next water bill</td>
<td>once-off</td>
<td>A $25 once-off rebate</td>
</tr>
<tr>
<td>bill…</td>
<td></td>
<td>rebate</td>
<td>on your next water bill</td>
</tr>
<tr>
<td></td>
<td>□ Column A</td>
<td>□ Column</td>
<td>□ Column C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>
Example Result

- For a reduction in duration of 6 hours to 4 hours:
  - $2.35 per customer, per annum
  - $1,175,000 per annum for 500,000 customers
  - $19,583,333 NPV

- For a reduction in frequency of break from 2 p. a. to 1 p.a.
  - $2.20 per customer per annum
  - $1,190,000 per annum for 500,000 customers
  - $18,333,333 NPV
Improving the Built Environment

Framework

- Customer Preference
  - What Customers Want
- Willingness to pay or Accept compensation
  - What Customers will pay
- Whole Life Cost of Assets
  - What it costs to provide the service

Benefits
- Benefit/cost ratio

Costs
- PARMS
- Social Costs

CSIRO

Improving the Built Environment
Social Costs

• Most significant categories:
  – Traffic cost (lost time due to delays)
    » Potential loss in modelled example $1,200 (1 hour duration)
  – Business loss (Lost revenue due to business interruption)
    » Potential loss in modelled example $15,000 (4 hour duration)

• Social cost impact on residences was minor
Pipeline Asset Risk Management System (PARMS)

- Standard curves developed for each pipe material
- Based on 80mm diameter, 60m head, alluvial sand, high traffic
- Standard curves adjusted for relevant characteristics
- Model looks at individual assets rather than cohorts
Standard Failure Curves

- Diameter
- Soil
- Traffic
- Pressure; and
- BLUPs!

Failure Rate (Pipe type x)

Failure Rate (per 100km/p.a.) vs Age

Improving the Built Environment
PARMS Application

- Advance modelling technique to:
  - Determine likelihood of failure of individual pipes
  - Means to determine optimum rehabilitation strategy
  - Means to explore investment and policy options
    » NPV trigger (replacement $ < maintenance $); Failure trigger; Pressure reduction; Shut off block reduction; total budget; discount rate
  - Means to calculate cost of achieving a standard
  - Takes customer preferences into account
Example of Predicted Costs of Standards
## Costs of Adopting 4-hour Standard

<table>
<thead>
<tr>
<th></th>
<th>Maintenance</th>
<th>Replacement</th>
<th>Social Costs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td>56.25</td>
<td>1.68</td>
<td>26.87</td>
<td>84.97</td>
</tr>
<tr>
<td><strong>4 hour max</strong></td>
<td>56.25</td>
<td>1.68</td>
<td>23.14</td>
<td>81.07</td>
</tr>
<tr>
<td><strong>10% rise</strong></td>
<td>61.57</td>
<td>2.00</td>
<td>22.93</td>
<td>86.5</td>
</tr>
<tr>
<td><strong>20% rise</strong></td>
<td>66.84</td>
<td>2.26</td>
<td>22.68</td>
<td>91.77</td>
</tr>
</tbody>
</table>
## Costs of Changed Frequency Standard

<table>
<thead>
<tr>
<th></th>
<th>Maintenance</th>
<th>Replacement</th>
<th>Social costs</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19.10</td>
<td>941.00</td>
<td>40.45</td>
<td>1000.54</td>
</tr>
<tr>
<td>2</td>
<td>46.67</td>
<td>197.86</td>
<td>28.43</td>
<td>272.96</td>
</tr>
<tr>
<td>3</td>
<td>56.27</td>
<td>34.51</td>
<td>27.40</td>
<td>118.18</td>
</tr>
<tr>
<td>5</td>
<td>58.54</td>
<td>0.71</td>
<td>27.68</td>
<td>86.94</td>
</tr>
</tbody>
</table>
# Sample Cost-Benefit Results

## CBA – Duration of Interruptions (6 hrs to 4 hrs)

<table>
<thead>
<tr>
<th>Benefits/Costs (NPV)</th>
<th>Benefit/Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits Derived</td>
<td>$19.6</td>
</tr>
<tr>
<td>Costs of Achievement</td>
<td>$90.2</td>
</tr>
<tr>
<td>Costs of Achievement (10%)</td>
<td>$95.6</td>
</tr>
<tr>
<td>Costs of Achievement (20%)</td>
<td>$101.0</td>
</tr>
</tbody>
</table>

## CBA – Interruption Standard (1 p.a.)

<table>
<thead>
<tr>
<th>Benefits/Costs (NPV)</th>
<th>Benefit/Cost Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benefits Derived</td>
<td>$18.3</td>
</tr>
<tr>
<td>Costs of Achievement</td>
<td>$1,003</td>
</tr>
</tbody>
</table>
Conclusions

• Means developed to:
  – Determine extent to which customers feel further (or less) investment is required (SSI)
  – Determine the service attributes customers feel are important

• Effective and valid means of determining WTP for individual attributes

• Means to determine optimal long term costs of service provision

• Additionally:
  – An insight has been gained into attributes of importance – these appear to differ from the attributes (and standards) frequently regulated
  – SSI ready for adoption
  – Generic failure curves available for calibration to local circumstances
  – Required data format identified
Conclusions (cont.)

- Integrated methodology available – *but need not be fully implemented in each circumstance*
- Results may be transferable between cities – and methodology certainly is
- Activity points to the need for asset models in all water authorities