A PRIMER:

Customer-Driven Benchmarking for Highway Maintenance
By the end of the 1990s, a significant change had occurred in the way organizations gauged the success of providing services and producing products. Maintenance organizations used to focus on internal measures of performance—outputs, inputs, and aspects of their business processes. Now, increasingly they are focusing on customer outcomes, satisfaction, and value.

Evaluating success is relevant to maintenance workers because there is a direct link between their work and the characteristics of roads important to the motoring public.

Maintenance workers, who are on the front lines of meeting road users’ demands—

- Keep roadways free of snow and ice and clear of obstacles to provide safety and mobility,
- Refinish the surface to keep it comfortable and safe to drive on,
- Install and replace markings and signs to provide good driver guidance,
- Plant flowers and remove litter to provide attractive roadsides, and
- Perform other activities to preserve the investment in roadways and bridges.

Customer-driven measures define success, not internally focused measures.

Customer outcomes can be measured in at least two ways. The first is to administer a survey to obtain a rating of customer satisfaction. The second is to take a measurement to assess outcomes important to the customer. An example of a measurement is to use a profilometer to determine pavement roughness. Another example is to count the number of vehicles that run off the road at night because edge lines are not visible.

**Outcome Measures**

Customer outcomes are the results, effects, or changes that occur due to delivering a product or service, conducting an activity, or carrying out a business process. For example, an outcome of pavement resurfacing might be smoother pavements. An outcome of striping operations might be more visible edge lines at night.
How can maintenance continually improve customers’ satisfaction and preserve the roadway infrastructure?

Customer-driven benchmarking is an important part of the answer, proven to work in government and the private sector. It is a process to identify, assess, and implement best practices of organizations that are relevant to your agency and have been shown to provide the highest levels of customer-oriented outcomes relative to the resources used. Customer-driven benchmarking involves five steps:

1. Form a partnership with other agencies to compare performances and practices.
2. Establish customer-oriented measures for maintenance products or services.
3. Measure performance using agreed-on measures and share results.
4. Sort best performances by controlling for such factors as weather, terrain, and traffic. Identify practices associated with the best performances.
5. Implement the “best practices” appropriate to improving the organization’s performance.

There is no best way; customer-driven benchmarking identifies best practices that fit local circumstances.
How do maintenance organizations benefit?

They learn what customers want and how to satisfy customers’ desires and expectations. Other benefits to maintenance organizations are as follows:

- Determining the impact on the customer of performing various activities;
- Saving taxpayers money by using funds more effectively;
- Noticing improvement in the conditions of the assets they maintain; and
- Assessing delays, accidents, and pollution and taking actions to reduce them.

Those participating in customer-driven benchmarking can tap the knowledge of thousands of organizations in the United States and other countries, both private and public, that perform road maintenance. As a result, participants in benchmarking

- Gain ideas on how to improve their performance,
- Save time in discovering better methods of working,
- Continually learn from the accomplishments of others, and
- Do not duplicate the mistakes of others.
Customer-driven benchmarking helps organizations recognize what improved performance levels are possible and practical:

♦ Organizations are better equipped to communicate to the public and to governing bodies their current performance levels and the resources needed to achieve improved levels of performance.

♦ Organizations are better prepared to establish realistic improvement targets.

Maintenance organizations participating in customer-driven benchmarking can more easily involve staff to improve operations by

♦ Continually implementing best practices and keeping the focus on improving work methods and

♦ Thoroughly documenting “best practices” and making them available to all workers.
Change in Perspective

Maintenance requires a new perspective, especially on how it contributes to the current and future experiences of road users and the preservation of infrastructure. In the past, most maintenance organizations have measured performance in terms of production and resources used. Typical measures have been the quantity of work accomplished; the amount of labor, equipment, and materials used; and the output per dollar expended and unit efficiency (i.e., cost/lane mile). In this new perspective, these measures are only part of the success. There is a hierarchy of performance measures with a new focus on the value and outcomes of maintenance that are important to customers.

A major benefit is increased customer support for maintenance and a willingness to increase funding for maintenance when warranted. Customers become convinced that the dollars maintenance organizations spend are producing the conditions and experiences that they want.

**Hierarchy of Performance Measures**

Maintenance needs to know what customers want and how well they are satisfied with what is being delivered.
The maintenance organization is attempting to please many different and sometimes conflicting desires of the public. The customer may wear several hats—driver, taxpayer, and adjacent land owner—each with many different needs and desires. The road user can be categorized into many groups based on the reasons for driving, including commuting, commerce, or pleasure.

Therefore, maintenance organizations need to learn to assess different customer needs and to balance resource usage to optimize the many and sometimes conflicting desires of different customer groups.
Market research is key to understanding the customer and is an integral part of customer-driven benchmarking.

Different groups have different satisfaction and expectations regarding the roads they use. User groups vary depending on typical trip types (goods versus person movement, recreation, and business); demographic factors (age, gender, and income); and the jurisdictions in which they use roads.

Market research plays an essential role for three reasons:

1. To assess customer satisfaction level,
2. To learn their expectations, and
3. To learn how their satisfaction and expectations differ among groups of customers.

Useful types of market research include focus groups to gain insights regarding how to meet the needs and satisfy the desires of different customer groups and statistically valid surveys with sample sizes large enough to achieve desired levels of accuracy and confidence.

In customer-driven benchmarking, market research is a part of the continuous improvement process.
What does a maintenance organization do to perform customer-driven benchmarking?

**Select Partners**
- Determine whether you will benchmark internally or externally. Benchmarking internally is easier, but external benchmarking will expose you to more new ideas.
- If you decide to benchmark externally, identify organizations willing to make a firm commitment to work together for at least two years. Establish a lead benchmarking agency.
- Enter into an agreement with each benchmarking partner. A written agreement is best. Tentatively agree on what you plan to benchmark, the types of measures you will use, and the level of each organization at which you will benchmark.

**Establish Measures**
- Identify the attributes of highway assets or maintenance activities that customers recognize or can rate.

**WORKSHEET 4. FIGURING OUT YOUR PRODUCTS AND SERVICES**

<table>
<thead>
<tr>
<th>Attributes by Category</th>
<th>Product/Service Name</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Road comfort</td>
<td>Clear Roadways</td>
<td></td>
</tr>
<tr>
<td>b. Edge of unplanned obstructions</td>
<td>Smooth Pavement</td>
<td></td>
</tr>
<tr>
<td>c. Clear of ice and snow</td>
<td>Available Bridges</td>
<td></td>
</tr>
<tr>
<td>d. Plowing frequency during snowfall</td>
<td>Safe Guidance</td>
<td></td>
</tr>
<tr>
<td>e. Clear of unplanned obstructions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Night time visibility of signs and markings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. Legibility of signs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. Signpost condition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**WORKSHEET 6. IDENTIFYING MEASURES FOR ATTRIBUTES**

<table>
<thead>
<tr>
<th>Product/Service: Smooth Pavements</th>
<th>Attributes: Ride Comfort</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUTCOME, CONDITION MEASURES</td>
<td>AVAILABLE?</td>
</tr>
<tr>
<td>1. International Roughness Index (IRI)</td>
<td>Yes</td>
</tr>
<tr>
<td>2. Maintenance Road Quality Index</td>
<td>Yes</td>
</tr>
<tr>
<td>3. Longitudinal Profile</td>
<td>Yes</td>
</tr>
<tr>
<td>4. Number of potholes per lane mile</td>
<td>Yes</td>
</tr>
<tr>
<td>5.</td>
<td>Yes</td>
</tr>
<tr>
<td>6.</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OUTCOME, CUSTOMER SURVEY QUESTIONS</th>
<th>AVAILABLE?</th>
<th>PRIORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Satisfaction with pavement smoothness (1 = very unsatisfied, 5 = very satisfied)</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>2. Satisfaction with ride comfort</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

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STEP 1 Select Partners

STEP 2 Establish Measures

STEP 3 Measure Performance

STEP 4 Identify Best Performances and Practices

STEP 5 Implement and Continuously Improve

STEP 6 Identify Measures for Attributes

STEP 7 Establish Measures

STEP 8 Measure Performance

STEP 9 Identify Best Performances and Practices

STEP 10 Implement and Continuously Improve
Define the three to seven primary maintenance products, services, or activities that the organization provides or performs for the public.

Identify the measures of the attributes that best represent what the customer wants, and identify the data required for the measures.

**Measure Performance**

- Plan and schedule measurement activities.
- Develop a database.
- Take measurements and record the results.

**Identify Best Performances and Practices**

- Share performance information results with benchmarking partners.
- Identify best performances using different outcome, resource, and uncontrollable factors.

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**Worksheet 12. Summary of Recommended Measures**

<table>
<thead>
<tr>
<th>MEASURE CODE</th>
<th>MEASURE NAME</th>
<th>DESCRIPTION OF THE MEASURE</th>
<th>UOM</th>
<th>SCALE</th>
<th>SUMMARY STATISTIC</th>
<th>PROTOCOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC.1</td>
<td>ALS</td>
<td>Deviation in the elevation of a pavement from the ideal paving plane.</td>
<td>In or ft</td>
<td>Min Max</td>
<td>90-210</td>
<td>County Mean</td>
</tr>
<tr>
<td>DC.2</td>
<td>Survey Grns (Energy)</td>
<td>Annual usage average energy per mile</td>
<td></td>
<td>Rating</td>
<td>1-6</td>
<td>Mean County</td>
</tr>
<tr>
<td>P.1</td>
<td>Labor</td>
<td>Total hours of labor for activities 155-195</td>
<td>Hrs</td>
<td>Qty</td>
<td>Top Hrs</td>
<td>Mean, Manual</td>
</tr>
<tr>
<td>P.2</td>
<td>Equipment</td>
<td>Total hours of equipment usage, activities 155-195</td>
<td>Hrs</td>
<td>Qty</td>
<td>Top Hrs</td>
<td>Mean, Manual</td>
</tr>
<tr>
<td>P.3</td>
<td>Degree Days</td>
<td>Number of degrees below freezing per year</td>
<td>Degrees</td>
<td>Q</td>
<td>Sum</td>
<td>Mean, Manual</td>
</tr>
<tr>
<td>OP.1</td>
<td>Lane Miles</td>
<td>Total length of lane miles treated with activities 155-195 for the season</td>
<td>Lane Miles</td>
<td>Q</td>
<td>Sum</td>
<td>Mean, Manual</td>
</tr>
</tbody>
</table>

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**Organizational Performance**

Graphing the performance of each organizational unit helps to identify best performers and improvement opportunity.
Flowcharting is an important part of documenting best practices.

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Flowchart:

**Step 1** Select Partners

**Step 2** Establish Measures

**Step 3** Measure Performance

**Step 4** Identify Best Performances and Practices

**Step 5** Implement and Continuously Improve

- Identify improvement opportunities based on performance gaps.
- Document the practices of the best performers and share this information.
- Analyze the difference between your performance and the best performances, and identify differences in the work practices of the best performing organizations from those of your own organization.

**Implement and Continuously Improve**

- Implement those practices that your organization believes will improve performance and will close the gap between your organization’s performance and the performance of the best performing organizations.
- Begin again with measuring results in the next time period.

<table>
<thead>
<tr>
<th>AADT &gt; 10,000</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last Rehab: Crack and Seal or Crack Repair</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Micro Surface</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Chip Seal</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Old Way

New Way
Critical Success Factors

To succeed at customer-driven benchmarking, you need to pay attention to the following critical success factors:

♦ Top management leadership;
♦ Buy-in from those who decide what practices to use;
♦ A champion (and a backup, in case the champion leaves);
♦ Common measures for performance evaluation;
♦ Trust and a desire to improve among benchmarking partners; and
♦ A sense of proportion and common sense.

Time Requirements

Customer-driven benchmarking is a serious commitment of time, staff, and energy.

If you have never benchmarked before and have not formed a benchmarking partnership, plan on the following time commitments:

♦ Two months to form a benchmarking partnership,
♦ Three to twelve months to establish agreed-on measures and measurement protocols,
♦ Three to six months to take measurements,
♦ Three months to identify best performers and best practices,
♦ Two months to document practices, and
♦ Three months to determine adaptability of best practices to your agency.
If you have already formed a benchmarking partnership and the products, services, and measures you plan to use are well established, you can work through the process in twelve to eighteen months. Do not forget, however, that customer-driven benchmarking is a continuous process and should be repeated year after year.

Summary

Clearly, if a maintenance organization is not measuring performance, it is not benchmarking. Furthermore, benchmarking is not just viewing what others are doing or making site visits to your peers.

Customer-driven benchmarking is a management process for achieving continual improvements that will eventually delight the customer. Benchmarking involves assessing and adopting “best” practices that have been shown to lead to higher levels of performance—better products and services to customers achieved with the least resources—that are applicable to a particular environmental setting.

Customer-driven benchmarking is motivated by people who desire to better serve customers and to continuously find better ways to perform. Workers in top-performing organizations want their organizations to be the best that they can be.

For more information, please see NCHRP Report 511: Guide for Customer-Driven Benchmarking of Maintenance Activities and NCHRP Web Document 58: Research for Customer-Driven Benchmarking of Maintenance Activities, both of which are available through NCHRP.
Acknowledgments

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