

# Maintenance Management from the Customer's Viewpoint

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Technicians in the maintenance operation field must start thinking like their customers and use measurements to meet the customer's expectations. In 1991 the Minnesota Department of Transportation (MnDOT) began developing a business plan to improve its customer orientation. MnDOT's maintenance staff developed a mission statement, and to guide it in defining maintenance products and services were defined as outcomes. These outcomes include smooth pavement, roadways clear of obstructions, pleasing roadsides, highly visible signs and stripes, and the availability of motorist services. Pilot tests have been implemented through the district offices of MnDOT to assess products and services and methods of evaluating those services. This is in addition to the measurement of inputs and activities within the present maintenance management system. Customer research has also been initiated to further define products and services and to help MnDOT evaluate its response to customer concerns.

**T**he problems we face today seem to have always been with us: increasing public demands, increasing operational costs, decreasing budgets, deteriorating infrastructure, increasing traffic congestion, and increasing traffic volumes. Legislators and other leaders are telling us to cut costs, to make the equipment last longer, to reduce the work force, to take on new programs without adequate funding, and to measure outcomes that really make a difference to the public.

In 1991 the Minnesota Department of Transportation maintenance staff reviewed these customer issues. We already had a maintenance management system that seemed to measure everything related to maintenance, such as tons, miles, number of signs, and overtime hours. We also had a cost-accounting system that could generate a lot of numbers. But these systems would not help us manage all the issues confronting us.

We started looking at maintenance activities from the customer's viewpoint. Customers can and will tell us if we are successful in maintaining the transportation system they use. They can determine whether we stay in the maintenance business or whether budget and prioritization pressures will prompt them to try someone else.

The following story illustrates the point of this paper. The state maintenance engineer received a telephone call from a citizen who owns a house along the state highway. She stated that her house shook due to the potholes.

The state maintenance engineer called the district engineer, who notified the appropriate maintenance crews. The maintenance crews repaired the potholes quickly.

A week later the lady called the state maintenance engineer saying the maintenance crews were out and filled the potholes but her house still shook when the semis went by. The maintenance crew had fixed the problem the normal way by leaving the material high. The crew was sent back with the message to make it smooth.

Our usual way of doing business, whose success is measured by the number of filled potholes, was not what the customer wanted. The customer measured our performance by smooth pavement.

Here is another example: during a major snowstorm, we gather and monitor information on the tons of salt and sand used, dollars spent, overtime costs and hours, number of trucks deployed, and so forth. These are not the direct concerns of our customers. When the customer calls, he or she wants information on when the roadway will be safe at a normal driving speed, whether it is safe to drive now, how long it will be before ice and snow are completely cleared, and the roadway and weather conditions here and at the destination.

With the customer's viewpoint in mind, MnDOT decided to develop a business plan. We hired a consultant to help us in this process.

Our typical way of doing business was for the customers through the legislature and governor to supply the funding. The maintenance department used the money on its activities. More money meant more activities. At the end of each fiscal year, legally our budget must be zeroed out. We have to spend it. Thus, we have focused our resource management on making our expenses equal our available funds.

But the customers' viewpoint is that for their taxes, maintenance has to provide value in the form of products and services. They see the results by their interaction with the transportation system. The expense to us is the same (taxes, people, material, equipment, resources). But customers want to know if expenditures result in maintenance they value.

Highway maintenance professionals must both balance the budget and determine the value of our activities to the customer (see Figure 1).

The transformation model (see Figure 2) illustrates how MnDOT's maintenance process works. The funding buys inputs such as people power, equipment, materials, and money to perform maintenance activities. Maintenance personnel determine how to get the job done. Outputs are accomplishments measured in quantifiable terms, such as the number of acres mowed, miles overlaid, tons of mix used, tons of salt and sand, and number of signs replaced. Results or outcomes that our customers use to evaluate our performances include smoothness, ability to see, and visibility of signs and markers.

As a beginning step in the business plan effort, MnDOT's maintenance staff developed a mission statement. It reads, "Our maintenance function mission is to ensure that Minnesota's existing highway system is structurally sound, safe, convenient to use, and attractively maintained." Three paragraphs following the mission sentence dealt with the need to keep up with technology, serve the customer, and develop our work force:

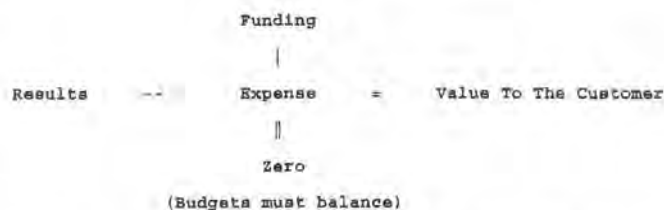


FIGURE 1 Combining budget and customer value processes.

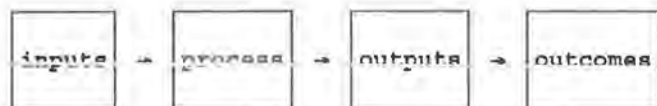


FIGURE 2 Transformation model.

We will strive to be a national leader in the quality of our highway maintenance and provide Minnesota with the best possible value from its existing highway system. We will carefully select and manage our resources to give the best possible service for the funds available to us. We will analyze the underlying causes of highway maintenance, and identify ways these causes could be eliminated or reduced. We will continually evaluate new maintenance techniques, methodologies, technology and materials, selecting those that will improve our quality and are cost effective. We will seek our partnerships with other public and private organizations that will enable us to provide more and better quality services.

We will serve our customers by working to understand and meet the needs of the individuals and businesses who use or are affected by our highway system. We will be flexible and adaptable in identifying and providing new and enhanced services to meet our customers' changing needs and expectations. We will provide information and assistance that will help them use the system easily, safely, and conveniently. We will maintain an attractive highway system to minimize its impacts on those who use or live next to it. We will keep all our highway facilities in a safe, clean, welcoming condition. We will respect the environment in which our highways are located.

We will work with the Maintenance Function employees to maintain a healthy, challenging work environment. We will maintain a cooperative, flexible work environment in which the members of our diverse work force are respected as individuals and perform well as members of the team. Our people are our most important resource. We will identify the skills the Maintenance Function will need to accomplish our mission, and provide each employee with the opportunity to grow and develop these skills to their highest level of ability.

Our maintenance activities are listed in Figure 3. Seven basic products and services were developed. Our present maintenance management helps manage our activities but does not do much for monitoring how well we are delivering our products and services. We had to develop a means to measure the products and services (outcomes).

Measurements of the outcomes were reviewed by considering the following factors: accuracy versus precision, relevance, timeliness permitting action, simplicity versus complexity, and the use of statistical measurements. We wanted the measurements to be understandable to the frontline workers since they will help obtain the outcomes. The measurements should help these people do their job, so sampling must be easy and accurate. The results have to be available to maintenance workers quickly so they can make good decisions.

For example, we decided on five key areas of measurement for the "clear of obstruction" product/service: prevention of snow and ice accumulation, removal of snow

<u>Activities</u> (Example of Processes)	<u>Products and Services</u> (Outcomes)
● Remove Snow & Ice	● Clear of Obstructions
● Fill Potholes	● Smooth Pavement
● Fix Bridges	● Structurally Safe Bridges
● Mow Grass	● Pleasing Roadsides
● Pick Litter	● Bright Signs/Stripes
● Replace Signs	● Permit Trips
● Paint Skip Stripes	● Motorist Services
● Roadway Regulations	

FIGURE 3 Maintenance products and services.

	● Prevent Snow & Ice Accumulation
	● Snow & Ice Removal
	● Sweeping
	● Removal of Road Debris
	● Emergency Response
<u>INDICATOR</u>	<u>UNIT OF MEASURE</u>
Reduction in Average Speed	Hours of Added Travel Time
Increase in Travel Distance	Miles of Detour
Bareness of Pavement	Road Surface Friction
Response Time Rate	Time From Notification to Completion
Comfort/Confidence Level of Service	Number of Predictable Events Not Prevented

FIGURE 4 Measuring outcomes for "clear of obstruction" product/services.

and ice, sweeping, removal of debris, and ability to respond to an emergency. Five indicators were used to measure whether roadways were being cleared, and these had units of measurement so results could be quantified (see Figure 4). Similar outcome indicators and units of measure were compiled for smooth pavement and well-maintained roadsides (see Figures 5 and 6).

During the summer of 1993, various indicator pilots for the product and services were conducted in all maintenance areas throughout Minnesota. We are trying to find out if the indicators and units of measurement really do meet our needs and the customers' concerns. Are we get-

ting good information? Are we measuring what we can manage? Is the indicator pilot applicable? By conducting indicator projects in all areas within the state, we are also trying to expose all maintenance workers and supervisors to this new way of viewing their work and their customers.

We will group indicator pilots in certain maintenance areas. Also, we will try to pilot all the product/services in one district to see if it can be done and is worthwhile. The effort of many people is required to make the pilots work.

The initial development of indicators was driven by MnDOT staff's internal understanding of customer value.

- Surface Repair
- Shoulder Maintenance
- Crack Sealer
- Overlays
- Pothole Repair

<u>INDICATOR</u>	<u>UNIT OF MEASURE</u>
Road Posting (Less than 10 ton)	Presence/Absence of Availability
Spring Road Restrictions	Miles/Duration of Restriction
Roadway Strength	Strength Rating
Rideability and Comfort	Ride/Comfort Rating
Pavement Structure and Condition	Condition Rating
Shoulder Structure and Condition	Shoulder Reliability Rating

FIGURE 5 Measuring outcomes for "smooth pavement" product/services.

- Mowing Grass
- Weed & Brush Control  
Tree Trimming
- Drainage Maintenance
- Wildflowers
- Fence & Noise Wall Maintenance
- Litter Control

<u>INDICATOR</u>	<u>UNIT OF MEASURE</u>
Neatness of Mowing	Quantity of Strips Not Mowed
Visible Litter	Density/Duration of Litter Present
Dead Tree/Shrubs	Quantity of Deadness Per Mile Or Acre
Noxious Weeds	Acres of Weeds/Duration
Sight Restriction	Vegetation Height at Sight Corners

FIGURE 6 Measuring outcomes for "pleasing roadsides" product/services.

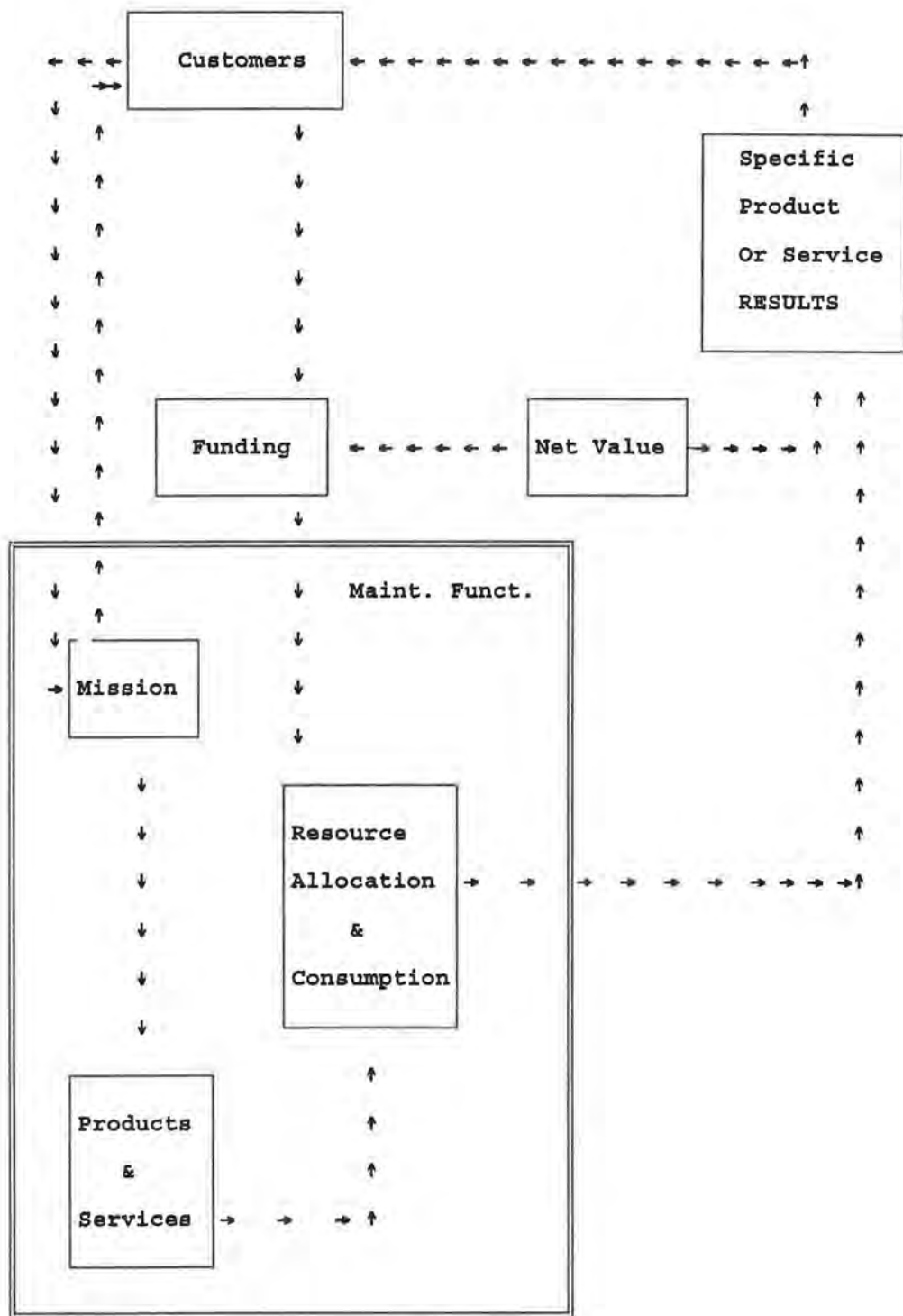


FIGURE 7 View of the maintenance function.

In spring 1994, MnDOT began checking with the customer directly. Four focus groups and other interviews in rural southwestern Minnesota were held in April to find out if customers view the maintenance products and services MnDOT delivers as MnDOT perceives they do. MnDOT asked a series of questions of participants, including what value the customers see in the products and services, and what satisfies or dissatisfies them. The market research consultant retained by MnDOT will recommend a plan for market research in the rest of the state.

Why didn't we start with the focus group first? We wanted to apply the "know thyself" principle. In other words, how could we communicate with the customer if we did not know what we were doing? We work with our customers nearly every day and we are our own customers, thus our understanding of value should be fairly similar to what the customer values. By starting internally, we also believe we can change the MnDOT maintenance culture to one that puts the customer first. By having many of our staff involved in the pilots, we have exposed many of them to business planning and to customer satisfaction.

This information will help us to proceed in our business plan process. The four focus groups and customer interview surveys are the first of many steps in checking with the customer and monitoring the customer's satisfaction. Information from the focus groups will qualify our products and services. A telephone survey throughout Minnesota will have to be done to quantify the results, which will validate the focus group's information and check for differences in the various areas of Minnesota.

We intend to tie our business planning work with other MnDOT projects. This winter our department has just conducted focus groups in Intelligent Vehicle Highway System. Part of their survey dealt with issues that overlap

with maintenance activities, such as striping, safety, roadway information signs, and roadway condition reporting.

As part of a commissioner-sponsored strategic effort, MnDOT pathbuilding project teams are looking at three issues: the true cost of providing a specified maintenance activity, preservation of the system, and market research for a highway segment during wintertime operations. Their projects will be completed by July 1, 1995. We really need these true costs of all the products and services to help us manage our limited resources.

All our business planning activities will help us to get to total quality management. We will know what the customer's viewpoint is and what we need to do to serve the customer. Because of this knowledge, our business plan process, as shown in Figure 7, will be off to a good start.

We view the business plan as a dynamic system. We have to be continuously improving to meet the customer's needs and wants. Any time one part changes, the rest of the business plan has to change.

## SUMMARY

We need to serve the customers and look at our activities from their viewpoint. It is an ongoing process of continuous improvement by staying close to the customers, understanding how well we are meeting their needs, knowing the quality of our products and services, and being sure we are efficiently delivering them through our maintenance operations.

We believe the Minnesota Department of Transportation is now starting to manage its maintenance from the customer's viewpoint.