

**"TOTAL QUALITY MANAGEMENT
MEASURING QUALITY FROM THE CUSTOMER'S VIEWPOINT"**

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Total quality management must start with the customer. We in the highway maintenance field have to look at our products and services through the eyes of the customer. This is a major change for most of us.

How can you explain to the customer the kind of job you are doing for them with their taxes? Is your answer one that they can understand and is it believable? Are you making their life better? Are you adding value to their lifestyle?

About three years ago the maintenance people at the Minnesota Department of Transportation (Mn/DOT) tried to answer these customer-type questions. Yes, we had the maintenance management system that seemed to measure everything that maintenance does such as tons, miles, number of signs, overtime hours, etc. Yes, we also had a cost accounting system that could generate a lot of numbers. When a customer asked us a question, we could supply them with numbers but did the numbers mean anything to the customer?

This is when we stopped and started looking at maintenance activities through the customer's viewpoint. The customers can and will tell us if we are successful in maintaining the transportation system they use. They will determine if we stay in the maintenance business or if with budget and prioritization pressures, they want to try someone else.

The following is an actual story that helps illustrate the customer's viewpoint. The state maintenance engineer received a telephone call from Ms. Public 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 did what they generally do in a quick manner of fixing the potholes.

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 her house.

Yes, the maintenance crew fixed it the normal way by leaving the material high. The crew was sent back with the message to make it smooth.

This illustrates our way of doing business of quickly over filling potholes and measuring the number of filled potholes was not what the customer wanted. The customer measured us by "smooth pavement".

Same customer type of example occurs many times during a major snowstorm. We gather and monitor information on tons of salt and sand, dollars used, overtime costs and hours, number of trucks, etc. These are not the direct concerns of our customers. When the customer calls, they want information on when can they drive the roadway at a normal speed, how long will it be before bare pavement happens, what are the roadway conditions and the weather conditions here and at their destination.

With the customer's viewpoint in mind, we decided to begin a process of business planning. We hired a consultant to help us in this process of understanding the customer and our business.

Our typical way of doing business was for the customers through the legislature and governor to supply the funding and the maintenance function to spend it on activities. More money meant more activities. At the end of each fiscal year, legally our budget must be zeroed out (Figure 1). We have to spend it. If we had a bad winter, we had to cut back on summer activities. Thus, we have focused our resource management on zeroing out our budget.

Figure #1

Funding - Expense = 0 (Budget Must Balance)
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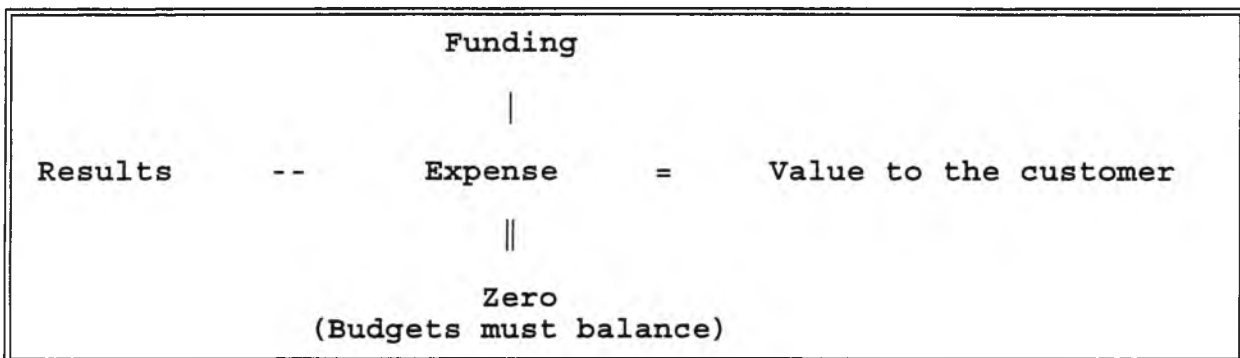
But the customer's viewpoint is that for their taxes, maintenance has to provide value in the form of products and services. They see the results by their interaction with the transportation system. (See figure #2) The expense is the same (taxes, people, material, equipment, resources). Now are they satisfied with the value provided to them?

Figure #2

Results - Expense = Value To The Customer
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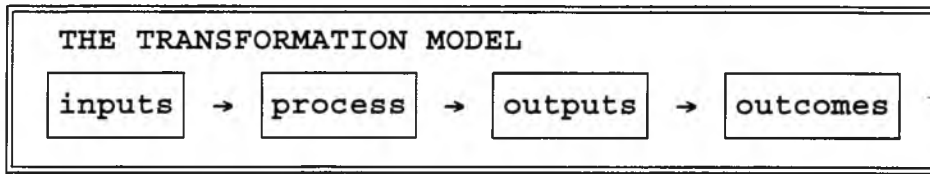
We in the highway maintenance must do both the balancing the budget process and determining the value to the customer. (See Figure #3)

Figure #3



The transformation model illustrates how our maintenance process works. The funding buys inputs such as people power, equipment, materials, and money to do the maintenance activities. Maintenance personnel determines the process to get the job done. Outputs are accomplishments measured in the number of acres mowed, miles overlaid, tons of mix used, tons of salt and sand, number of signs replaced, etc. Results or outcomes that our customers use to evaluate our performances are smoothness, ability to see, brightness, etc. (Figure #4)

Figure #4



As a beginning step in our business plan effort, we 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 followed the mission sentence that dealt with themes of keeping up with technology, serving the customer, and developing our work force. (Attachment "A")

Our maintenance activities are listed in Figure 5 and 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 have a means to measure the products and services (outcomes).

Figure #5

<u>MAINTENANCE</u>	
<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	

Measurement of the outcomes were reviewed by considering the following factors (accuracy vs. precision, relevance, timeliness permitting action, simplicity vs. complexity, and the use of statistical measurements). We wanted the measurements to be explainable to the frontline workers since they will help you succeed in obtaining the outcomes. The measurements need to help the people do their job, thus sampling must be easy and accurate. The results have to be given to the people in a quick manner.

We broke measurement of outcomes for "clear of obstruction" product/service into five key areas: prevention of snow and ice accumulation, removal of snow and ice, sweeping, removal of debris, and to respond to an emergency. The indicators for clear of obstruction would also have units of measurement (See Figure #6).

Figure #6

MEASURING OUTCOMES	
FOR "CLEAR OF OBSTRUCTION" PRODUCT/SERVICES	
	<ul style="list-style-type: none"> ● 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

Similar outcome indicator and units of measure for smooth pavement and well maintained roadsides were compiled (see Figures #7 and #8).

<u>MEASURING OUTCOMES</u>	
FOR "SMOOTH PAVEMENT" PRODUCT/SERVICES	
	<ul style="list-style-type: none"> ● 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 and Condition	Condition Rating
Shoulder Structure and Condition	Shoulder Reliability Rating

Figure #8

<u>MEASURING OUTCOMES</u>	
For "Pleasing Roadsides" Product/Service	
	<ul style="list-style-type: none"> ● Mowing Grass ● Weed & Brush Control <li style="padding-left: 40px;">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

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

In 1994 we hope to group indicator pilots in certain maintenance areas. Also we will try to pilot all the products/services in one district to see if it can be done and if it will be worthwhile. A big effort by many people is required to make the pilots work or to change the pilots to work.

Indicator development so far has been driven by our own internal understanding of customer value. Using this as a foundation, we will now have to check with the customer.

The process of checking with the customer will begin this spring as well as we are reviewing any survey or customer research dealing with maintenance activities. Ten focus groups will be held in March and April to see if the customers view the product/services as we think they do. What value do the customers see in the products and services? What satisfies them as well as what dissatisfies them?

Some of you may ask why didn't we start with the focus group first? We wanted to "know thyself". In other words, how can you communicate with the customer if you do not know what you are doing. We work with our customers nearly every day and we are our own customers, thus our understanding of value should be fairly accurate of what the customer values. Also by starting internally, we believe we can change the Mn/DOT maintenance culture to one that puts the customer first. By having many people involved in the pilots, many people have been exposed to business planning and to customer satisfaction.

This information will help us to proceed in our business plan process. The ten focus groups' survey is the first step of many in checking with the customer and monitoring the customer satisfaction. Information from the focus groups will qualify our products and services. A 500 to 1,000 telephone survey throughout Minnesota will have to be done later this year to quantify the results.

This is only the first step of many in market research to gather data to help you make a decision. For future steps, we will need to identify a problem that we need more information. At this point a person checks to see if someone has already done market research in the area or do we need to conduct a focus group, a telephone survey, or a post card survey.

We are looking to tie our business planning work with other Mn/DOT projects. This winter our department has just conducted focus groups in Intelligent Vehicle Highway System. Part of their survey dealt with issues that maintenance activities could use, such as, striping, safety, roadway information signs and roadway condition reporting. The results are being tabulated and will help the maintenance people in gathering supporting data.

As part of a commissioner sponsored strategic effort, a Mn/DOT pathbuilding project team is looking at the true cost of providing a maintenance activity. Their project will be done by July 1 so that the true cost information will help us in the maintenance business plan. We need these "true" costs of all the products/services to help us manage the precious resources.

All these activities will help us in doing the maintenance business plan and get to total quality management. We will know what the customer's viewpoint is and what we need to do to serve the customer. Our business plan process as shown in Figure #9 will have a good start.

4★ A View of the Maintenance Function

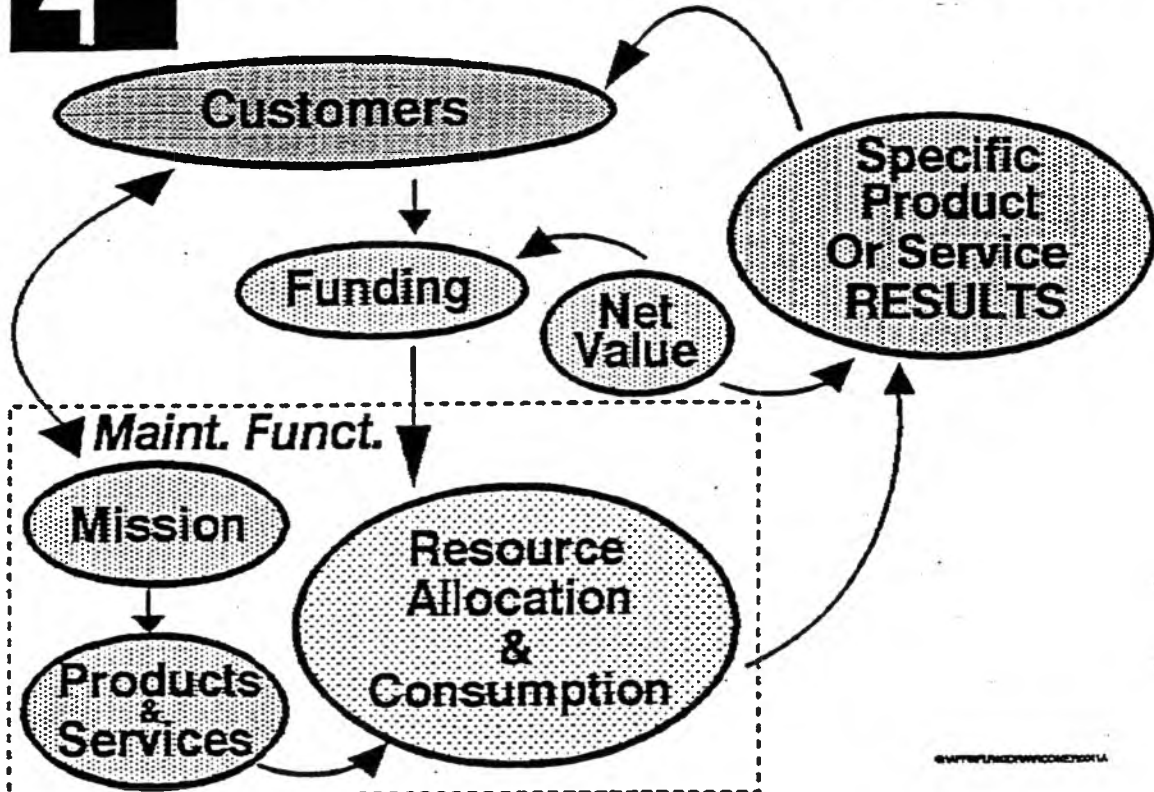


Figure #9

SUMMARY

We need to serve the customers and need to look at our activities from their viewpoint. It is an ongoing process of continuous improvement by staying close to the customer, 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 do maintenance management from the customer's viewpoint.

MN/DOT MAINTENANCE FUNCTION

MISSION STATEMENT

Maintaining the quality of your highway travel.

Our mission is to ensure that Minnesota's existing highway system is structurally sound, safe, convenient to use, and attractively maintained.

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 out 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.

May 1, 1991