Concept of a Process: Product Quality versus Process Quality

As a teacher and consultant, the late W. Edwards Deming developed a new philosophy for management. He devoted his life to helping leaders in business, education and government service to understand and implement a process for transforming the Western style of management. The key elements of this transformation process are:

- Adopting a systems perspective;
- Applying statistical methods; and
- Providing leadership to create, provide and sustain a healthy environment for work, learning and continuous improvement.

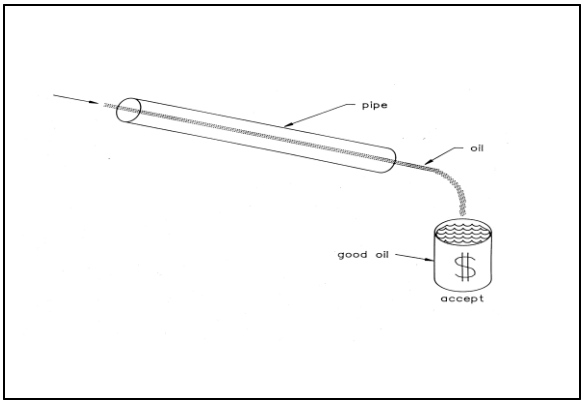
The first two elements of the transformation process interact with each other, illustrating that variation in outcomes is most often produced by processes themselves. In other words, products are already good or bad by the time one inspects them. The enemy is the variation and sources of variation in and around the design, development and production processes.

According to Wheeler, Chambers and others, reduced variation (improvement) in outcomes can only be achieved via careful study of the sources of variation in a process, followed by action to reduce or eliminate extraneous or excessive variation. In other words, if we are not happy with the outcomes (products) of a process, we must change the process. If we do not change the process that's producing an unacceptable output, it will forever produce that unacceptable output!

To illustrate this concept, let's say we operate an oil company. Our output (product) is oil and, if all goes well, we produce good oil, accept it, put it in a barrel, ship it and make money. Our process is the piping system through which the oil passes. (See Figure 1.)

Now, let's say that in our company we are most concerned about the quality of our product. We want to make sure it's good versus design specifications, customer requirements, and so on. We're focused on the quality of our *product*.

Figure 1. Piping system and its output, oil.



A few weeks later, the pipe cracks. All kinds of dust, dirt and other contaminants get into our oil. At the end of the pipe, and driven by our concern about product quality, we determine that the oil is bad. We cannot pass it on. With this product quality focus, what corrective action will we take?

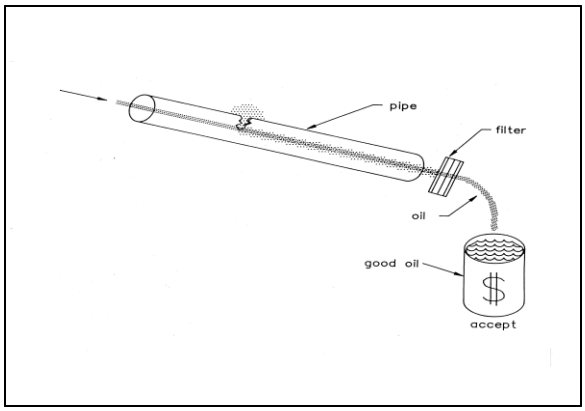
We could patch the crack, but we're not looking at the pipe. We are focused on the product, oil. From this product quality focus, we'll add a filter to the end of the pipe to correct the situation. The filter will detect and screen out the contaminants. Now the oil is good again. It's acceptable; we can put it in a barrel; we can ship it and make money. (See Figure 2.)

Please note, however, that the filter – in and of itself – does nothing about the source of the contaminants (the crack in the pipe). It detects them; it screens them out; but the filter adds no value! All it does is get the oil back to where it should have been all along when it first came out of the pipe.

How many filters have we added in American business organizations? One is product inspection. But the product is already good or bad by the time it's inspected or tested. The test adds no value!

This is not to say that we must eliminate all inspection. Without measurement and assess-

Figure 2. Piping system and its output (oil) with filter added.



ment, we won't have answers to the question, "How are we doing?" Within the context of the systems perspective, however, we must accept that inspection adds no value.

Another non-value-adding filter in manufacturing is rework. Rework adds no value. All it does is get the product back to where it should have been, all along, when it first emerged from the manufacturing process pipeline.

In manufacturing, such filtering practices are called inspection and rework. In our schools, they're called student testing and remediation. As my seven-year-old grandson Wyatt might say, "Same difference!"

For years, this focus on outcomes or product quality worked; until we eventually discovered that the filter gets dirty. Nobody seemed to know how or why. So, in Western management, we created QC people. Their job is to stand at the end of the pipe and look at the product as it comes out. If it's clean, they are to put it in the "accept" barrel and pass it on. If it's dirty, they put it in the "reject" barrel; then call Maintenance to have them change the filter.

Later, management added redundant inspection: audits. The auditor's job is to look at the oil that was deemed "clean" to determine if it is indeed clean. They also look at the oil that was deemed "dirty" to determine if it was indeed dirty. Then, they check to make sure that the filter was properly changed as scheduled.

One beauty of such redundant inspection and audit practices is that *no one's responsible!* Those managing the pipeline aren't responsible for the quality of the product; it's the job of the inspector to check it. The inspector's not responsible; it's the job of the auditor to catch it. The auditor's not responsible; it's the job of those working in the pipeline to do it right in the first place.

The result: finger-pointing, blame-placing, discontent and excuses. In our society (not work alone), it's so much easier to engage in finger-pointing, blame-placing, discontent and excuses than it is to work on process improvement.

At the risk of over-simplifying it, all Dr. Deming was getting at to his dying day in December 1993 was for leaders to ponder this oil and pipe analogy for a nanosecond. Upon doing so, they will recognize all the investment of value-adding resources that end up adding no value! Inspection adds no value; testing adds no value; rework adds no value; remediation adds no value; audits add no value.

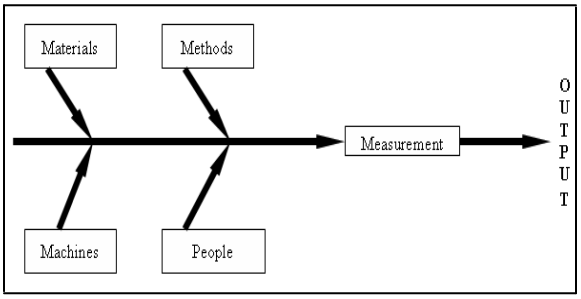
Instead, Deming urged us to shift the emphasis from product (or outcomes or output) quality to *process* quality. Leaders must provide the strategy, plan, training, tools and direction to help people shift the emphasis to the quality of the process – the quality of the pipe. As soon as they do that, they'll see the crack. As soon as they see the crack, they'll patch the crack. As soon as they patch the crack, compared to what it was, they will have improved not only the process, but all of its future outputs.

Shewhart's Concept of a Process

Walter A. Shewhart, a physicist at Bell Laboratories, provided for us a clear model of "the pipe." He developed a concept of a process that indicates that most of the problems, variation, waste, cost, loss, delays, defects and failures found at the output of a process were produced by the process itself. Deming later attributed those outcomes to *common causes* of

variation from *within* the process. Shewhart's process model is illustrated in Figure 3.

Figure 3. Shewhart's Concept of a Process



Leaders must provide a healthy work environment in which whenever we say the word *quality*, we don't want just some picture of a high-quality product, meeting all design specifications, to pop into people's minds. Nor do we want a picture of the latest monthly report of customer returns, broken down in Pareto diagram format by reasons for those returns, to pop into people's minds.

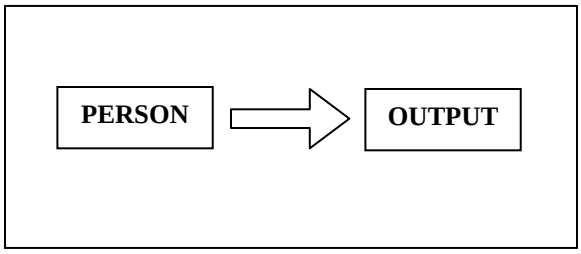
Whenever we say the word *quality*, we don't want any picture of output (or product) quality *alone* to pop into people's minds. Rather, whenever we say the word *quality*, we want Shewhart's holistic model of the *process* to pop into people's minds.

When you show Shewhart's model to manufacturing operators, however, they'll probably tell you that you're wasting their time. To most of them, the model is obvious. You can have the best-trained, hardest-working people in the world working in your plant. But if suppliers send in garbage raw materials, what's going to come out of your production pipe? *Garbage!*

Intuitively, intellectually, Shewhart's model is very clear. Despite that clarity, however, you have months of work ahead of you to help people to think this way; to get the holistic model of the process – the holistic model of the pipe – to pop into people's minds when you say the word *quality*.

That's because we have been conditioned, we have experienced, and we have come to accept a completely different model. I like to call it the process model from the age of mythology; and here it is:

Figure 4. Process Model from the Age of Mythology



Have you ever had a boss whose first question, when he or she has first encountered a problem, has been, "Who's responsible"? Welcome to the age of mythology! Have you ever worked for a company where the majority of corrective actions read, "Spoke to operator and told him to be more careful" or "Scheduled operator re-training"? Welcome to the age of mythology!

Corrective action procedures must be directed to fix the process – *not* to fix *blame*. Leaders must learn and apply Dr. Deming's "system of profound knowledge," the first component of which is appreciation for a system. The oil and pipe analogy provides a rather simplistic way to introduce people to holistic process thinking, a first step toward broad appreciation for a system.

If leaders can keep people focused and working continually to understand, maintain and improve the quality of the *process*, 100 percent of our oil can be good!
