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Wood-based Entrepreneurs Toolkit: Quality Management

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This is a publication of the Oregon Wood Innovation Center (OWIC), Department of Wood Science and Engineering, College of Forestry, Oregon State University.
Abstract


“Quality is Job 1”—this slogan is familiar to many people because it was used by Ford Motor Company for nearly 20 years. All businesses know the importance of quality—with respect to quality of products and quality of service. However, knowing specifically how to manage for quality is another matter. Here we present some practical suggestions for what entrepreneurs can do with regards to quality management. These suggestions are presented as a series of questions regarding your approach to three primary areas: (1) customer focus; (2) process focus/continuous improvement; and (3) participation and teamwork.

**Keywords:** quality, quality management, TQM, continuous improvement
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Every business knows the importance of focusing on quality. However, to know how to manage for quality, we first need to define the term. This is easier said than done, since “quality” can be defined from numerous perspectives and in both objective and subjective terms. One quality expert proposed five approaches to defining quality (Garvin 1984):

1. **Transcendent**—synonymous with “innate excellence.” Quality cannot be defined precisely, but “you just know it when you see it.” The primary challenge with this definition is that it does not provide a means to measure quality and hence a way for managers to make decisions.

2. **Product-based**—views quality of a product as represented by some measurable attribute. For example, the quality of a car could be reflected by its horsepower rating and/or mileage. Although this approach is quantitative, it suffers from the fact that the value of the specific attributes to individual customers will be highly variable.

3. **User-based**—in essence, the “customer is always right” view of quality. This is a highly subjective view, given that each customer determines how quality is defined.

4. **Manufacturing-based**—the analytical, and most objective view of quality, in that it can be summarized as “conformance to specifications.”

5. **Value-based**—relates usefulness or satisfaction to price. This view of quality recognizes the need for balance—excellence at a fair price and conformance to specifications at a reasonable cost.

We believe the last definition, “value-based,” is the best and most useful. It recognizes the shift in focus that has occurred over the years in quality management—from an internal focus on conformance to specifications to the recognition of the need for an external focus as well, i.e., the needs and experiences of the customer. The value-based definition also recognizes the need for balance—while “perfect quality” may be the customers’ goal, producing perfect products often results in a cost higher than most customers are willing to pay. So companies must determine how to achieve the right quality while still making a profit.
In the early years of formal quality management programs, quality was primarily equated with “conformance to specifications.” As a result, approaches to quality management primarily concentrated on the use of analytical and statistical methods to measure, monitor, and control specific process variables. Tools like statistical process control (SPC) were the cornerstone of such approaches to quality.

After WWII, quality gurus like W. Edwards Deming and Joseph M. Juran rose to prominence in Japan, as their quality tools and management philosophies guided efforts to rebuild Japan’s post-war economy. During this time, recognition of the need for a holistic, systems view of quality began to grow. In the 1950s, Armand Feigenbaum coined the term “Total Quality Control”; the Japanese adopted this view and termed it “companywide quality control.” By the 1980s, U.S. industry, automakers and electronics firms in particular, were feeling significant pressure to improve quality, in large part due to the higher quality of Japanese products. As a management philosophy, Total Quality Management (TQM), as Total Quality Control eventually grew to be known, spread rapidly around the globe in the 1980s. As difficult as it is to define quality, it is equally, if not more difficult, to define TQM. And some readers may even be wondering why discuss TQM at all? Didn’t TQM die out years ago? Although it is true that, even among quality professionals, the focus shifted several years ago to topics like Lean Manufacturing, Six Sigma, and Innovation Management, this shift in focus isn’t an indication that “TQM is dead.” The fact is that TQM principles and practices have become so entrenched in business that few organizations use the label. In short, the tools and techniques of TQM are largely now standard practice in industry. For our purposes here of discussing how to manage for quality, we must define these standard practices.

Many authors have attempted to provide a simple definition of TQM. In their book, *The Management and Control of Quality*, Evans and Lindsay (2002) state that Total Quality is based on the three fundamental principles shown in Figure 1—customer focus, process focus/continuous improvement, and participation and teamwork.

While these three principles serve as a means to define the fundamental principles of TQM, we still need some details to decide specifically what to do in each area and how to integrate those efforts. The U.S. Malcolm Baldrige National Quality Award (MBNQA) is often used as the framework for quality management principles and practices in high-performing companies. Rather than a set of step-by-step instructions for managing for quality, the MBNQA guidelines are structured as a series of questions for companies to consider—although “best practices” are clearly implied by the questions. For example, one of the questions regarding customer focus asks, “How do you listen to customers to obtain actionable information and to obtain feedback on your products and your customer support?”

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1 The Malcolm Baldrige National Quality Improvement Act was signed into law in 1987. The program focuses on stimulating quality and productivity in American companies; recognizing achievements of exemplary companies; establishing guidelines for firms to evaluate their quality improvement efforts; and providing guidance to other companies via publishing information on the practices of award-winning firms.
Again, it’s implied that you should develop an approach such that you are able to effectively answer this question. Therefore, we will follow a similar approach here with regard to the three principles shown in Figure 1. Rather than prescribe how to manage for quality, we pose a series of objectives and leave it to you as managers to decide how best to meet these objectives, given the context of your company (e.g., number of employees, products produced). At the same time, we fill in the blanks here and there with recommendations based on our experiences working with small- to mid-sized wood products firms. Finally, in each of the following sections, follow the gold sidebars for a brief look at how our fictitious company, ABC Hardwoods, makes use of these principles.

Example—Launching a Quality Management Program at ABC Hardwoods

ABC Hardwoods is a small company that specializes in custom-made hardwood lumber and moulded products. The owner, Julie Gardner, has successfully expanded the customer base from wholesalers and walk-in traffic to include specialty manufacturers and architects throughout the Pacific Northwest. How can this small company implement the quality management practices we describe in this publication? Follow Julie and her team as they begin their efforts to develop a structured approach to quality management at ABC Hardwoods.
3 Customer Focus

It’s no accident that we begin with the customer—because, without customers, there is no business. And the “customer is always right” is a saying that’s been around now for more than a century. However, all too often we’ve found that managers believe that ensuring customer complaints are adequately addressed is synonymous with “customer focus.” However, this is a reactive vs. proactive focus on the customer—customer interaction depends largely on the customer making a complaint. But not all customers take the time to complain when they’re dissatisfied, especially if they don’t have an easy way to do so or don’t believe their supplier really cares. Many unhappy customers simply switch to a different supplier.

Figure 2 is a simple flow diagram we often use as a model to describe quality management. As you see, it all starts with customer expectations, also referred to as “the voice of the customer.” The gold sidebars illustrate how our fictitious company, ABC Hardwoods, follows the model in order to learn more about customer needs and then translate those into process specifications that improve quality control.

3.1 Engagement and Feedback

To manage for quality we must have close relationships and constant dialogue with customers, such that we know in detail what they need—ideally before they know they need it! So the primary goal here is to develop a system for proactively engaging with both existing as well as new customers and to ensure that everyone in the company regularly receives actionable feedback from customers. Here are some key questions to ask related to customer focus:

Existing Customers

1. Who are your current customers? How do you define customer segments—contractors, furniture makers, cabinetmakers, homeowners, etc.?
2. How do you know their needs? How does your approach to identifying needs vary by segment?
3. How do you measure customer satisfaction/dissatisfaction?
4. How do you obtain feedback and suggestions from customers?
5. How do you obtain new product/service ideas from customers?
6. Who in your company interacts with customers? Is the interaction limited to people responsible for sales?
7. How do you ensure that everyone in the company is aware of the customer feedback?
8. Do the people who make the product know who the customers are and why they buy your products?
9. Who is responsible for acting on the information you obtain from customers?
10. What systems have you developed to make it easy for customers to interact with you?
11. Describe your system for addressing customer complaints.
New Customers
1. What is your target segment for new customers and why?
2. How do you determine the needs of new customers?

Former Customers and Competitors
1. How do you determine why customers stop buying from you?
2. Why do people buy from your competitors?
3. For customers who buy from you as well as from competitors, what is your relative position to the competitors and why?

While all of the questions above are relevant, they may be summarized in two fundamental questions centered on customer focus that every business needs to be able to answer: (1) who are your customers? And (2) what are their needs (and how do you know)?

Customer Focus
Following the model presented in Figure 2, the team at ABC Hardwoods begins by contacting a few key customers to ask for feedback and suggestions related to quality. They schedule visits with two of their biggest customers: Wood-n-Kitchen Accessories, manufacturer of custom kitchen items, and Bill-D Mod Homes, a manufacture of deluxe prefabricated modular homes, to learn more about these businesses first hand. They also invite all of their customers, including these two companies, to visit ABC Hardwoods for their annual BBQ.

After the visits and the BBQ, the ABC Hardwoods team members then discuss and summarize what they’ve learned. The top two items they learn from nearly every customer are (A) the need to improve the consistency of their lumber dimensions and (B) the need to improve the accuracy (e.g., species, size, quantity, and grade) and timeliness of deliveries. Note that these lessons learned may not necessarily come from direct complaints by customers.

For example, in watching production during the visit to Wood-N-Kitchen Accessories, members of the ABC production team notice that the planer operator has to keep making adjustments to ensure the lumber surfaces cleanly—this is a clear indication of inconsistent product dimensions.

And while chatting with Bill D’Holmes, owner of Bill-D Mod Homes, during the ABC BBQ, Julie learns that his company conducted some unscheduled maintenance during the week before because they didn’t have the lumber they needed to continue with production.
3.2 Focus in Practice

Here are some great customer focus practices we’ve seen used by wood products firms (of all sizes):

1. Visit your customers’ facilities and wherever your products are used, and be sure to bring not only salespeople, but both management and production workers. For example, if you sell to a retail customer, visit that facility (perhaps even incognito) to see how your products are displayed. One good example we heard about was related to packaging. The company intended their T&G paneling products to be displayed in a rack oriented vertically; all the labeling on the product was designed around that intent. However, their product was stacked horizontally, such that it was nearly impossible for the final consumer to see what the product was! Naturally, sales at this particular customer’s facility were mediocre at best.

2. Invite your customers to visit your facility. Sponsor an annual BBQ for customers or some similar “customer appreciation” event. A furniture maker we visited went to great lengths to ensure that their mill was set up for tours—they had numbered signs hung from the ceiling that showed the primary flow of materials and equipment names, e.g., 1 Edger; 2 Chop saw; 3 Edge-gluing, etc.

3. Attend trade shows. This is a great way to see how your competitors are marketing their products and talk to a lot of existing and potential customers in a single location.

4. Directly involve customers in your product design processes. This could be done in conjunction with the annual BBQ (e.g., in an afternoon meeting before the BBQ).

5. Develop a company website and/or social media page that make it easy for customers to find product specifications, order products, ask questions, provide feedback, contact key employees, etc. We’ve seen on-line “virtual tours” of facilities for those customers too far away to come visit the manufacturing facility. Benchmark some of your competitors’ websites.

2 Spend a little time exploring other companies’ websites to see how easy or difficult it is to find contact information. We’ve been amazed at times how some firms either have no apparent link to company contact information or provide only a generic form for “contact us.”
Our primary goal in the area of process focus/continuous improvement is to understand our processes (manufacturing and service) so well that we are able to design and operate them in a way that is both efficient (“doing things right”) and effective (“doing the right things”)—while we strive to meet customer needs. Although this area may sound like the domain of large corporations, it is equally if not more important for small firms. Regardless of size, all firms need to identify which features are critical to their customers, determine specifically how their processes influence those features, and ensure that their processes are designed and operated in such a way that they produce products and services that meet and exceed customer expectations. And they must do all this at a cost at which the company can still make a profit, as in keeping with the value-based definition of quality discussed earlier.

Here are some key questions regarding process focus and continuous improvement:

1. How do you incorporate input from customers and suppliers into your process improvement efforts?
2. Is the concept of the “internal customer” (i.e., the “next process down the line”) well understood in your company?
3. What are your organization’s critical processes (sometimes referred to as CTQ—critical to quality)? How do you know?
4. How do you decide what work to perform in-house and what to outsource?
5. Describe how you conduct continuous process improvement. How do you strive to reduce variability in your processes?
6. How do you develop, use, and update standard operating procedures (SOPs)?
7. What does poor quality (e.g., scrap, rework, downgrades, and customer claims) cost your company?
8. Describe your approaches to mistake-proofing processes.
9. How do you work with suppliers to improve their processes and their quality?
10. What are the vital few quality issues you need to address?
11. How do you ensure that key processes are stable and repeatable with respect to quality parameters?
12. Are your processes capable of meeting customer specifications?
13. How do the variables (e.g., feed speed, species, moisture content, etc.) in your process impact quality?

We realize that addressing each of these questions could require a stand-alone publication or even an entire textbook. And again for small companies, many of these questions may seem like overkill—question 6, for example, on standard operating procedures (SOPs); however, a key concept in quality management is to continuously strive to control and reduce variability. If everyone has a different way of doing things and there’s no agreed upon set of best practices from which to train new employees, you are guaranteed to have a high degree of variability in your products—and your customers are bound to become aware of that fact (if they aren’t already)!

Several of these questions can be addressed through the use of familiar quality tools such as brainstorming, design of experiments, statistical process control (SPC), Pareto charts, histograms, etc. However, the tools themselves have little power in the absence of a structured approach for when and where to use them. Imagine training a carpenter how to read a tape measure and how to use a circular saw and hammer—but not describing precisely when,
Process Focus and Continuous Improvement

Continuing to follow the model (Figure 2), Julie and her team at ABC Hardwoods work to address item (A): concerns about consistency of product dimensions. They “translate” this concern into operating procedures and specifications they can use to operate their mill. For example, what is the current between- and within-board sawing variation and what should be the target? They read publications on lumber size control, attend a sawmill quality control (QC) training course, and purchase digital calipers so that they are able to assess the current state of their process. They then develop a plan for ongoing monitoring and reduction of sawing variability—the QC phase of the model in Figure 2. As improvements are made, they seek feedback from Wood-N-Kitchen Accessories and other customers to ensure the changes are having the desired effect on improving customer satisfaction.

The ABC Hardwoods team also works to address item (B): concerns about accuracy of orders and timeliness of deliveries. Julie and her team develop a flowchart for the company’s current process, from order-taking through shipping, and then brainstorm changes they can make to improve the accuracy of orders and reduce delays. They then implement some changes and monitor the results for customers such as Bill-D Mod Homes.

As Julie and her team notice improvements in both areas (A) and (B), they document the new operating procedures to be sure that they don’t inadvertently slide back into the old way of doing things.

where, and in what sequence he or she should use these tools. In that regard, we recommend that you have a look at our series, Performance Excellence in the Wood Products Industry: Statistical Process Control,3 which walks through a case example of a small wood products firm that is dealing with customer complaints about quality. The series discusses how, when, where, and in what sequence to use some of these quality tools—particularly with respect to answering questions 10-13 above. There are other helpful resources listed at the end of this publication in the “For More Information” section as well.

Some process focus/continuous improvement practices we’ve seen used by wood products firms (of all sizes) include the following:

- Partnering with community colleges and universities on student projects—many schools teach courses in industrial engineering topics like process simulation, process optimization, quality control, design of experiments, etc. Working with students on team projects certainly isn’t a “freebie”—time and effort are required of your company, of course. However, these projects often give you good insights into your processes and leave you with valuable tools (e.g., customized Excel spreadsheets and forms) you can use.

- Taking advantage of the resources of professional societies such as the American Society for Quality (ASQ); groups like ASQ often have local chapters composed of local quality professionals and provide networking and professional development opportunities.

3 The series is available online here: owic.oregonstate.edu/performance-excellence-wood-products-industry
Participation and Teamwork

Last, but not least, none of these tools or techniques will make any difference if we don’t have people who can put them into practice. There was a saying some years ago that referred to the authoritative, top-down approach to management that went as follows: “teamwork means everybody doing what I say.” Well, unfortunately, that way of thinking is still alive and well in some companies. However, the people who know your manufacturing and service processes best are those who work on them for many hours each and every day. They see many opportunities to improve efficiency and quality and they therefore have the potential to be great assets for quality improvement. But they must be provided with information on what is important to the customer and they must be empowered to ask questions and to make changes to the processes.

The questions here presume you have two or more employees (counting yourself). If you’re a sole proprietor, then you might skim this section for future reference when you begin hiring additional staff, or perhaps consider the information in light of how you foster teamwork within your supply chain.
This area of quality management is really all about developing the right company culture. The questions here will help guide you in your efforts to establish a culture that will foster the practices related to customer focus and process improvement discussed above. For example, it will be a waste of time for you to send employees to statistical process-control training programs if they are not given the opportunity and authority to actually use what they’ve learned. Here are some key questions to address with regards to participation and teamwork:

1. How do your employees interact with customers?
2. How do you assess employee satisfaction?
3. How are you shaping the culture of your company such that communication is open both top-down and bottom-up?
4. How are you ensuring employees give attention to detail and are actively engaged and involved in the mission of the company?
5. How do you obtain process improvement ideas from employees? How do you act upon these ideas?
6. How are employees involved in the implementation of changes?
7. How does your performance appraisal system support the goals of an empowered workforce and a focus on quality (e.g., are employees rewarded strictly for the quantity they produce or for quality goals as well)?
8. How do you train employees to work effectively as a team?

As noted above, Julie has taken her employees on visits to a few key customers, such as Wood N Kitchen Accessories and Bill-D Mod Homes. This is a direct way to ensure that ABC employees know that their participation in quality improvement is both desired and valued. In response to customer feedback, however, Julie also invests in training employees in how to use quality tools. Further, her efforts ensure that everyone is involved in the continuous improvement process and that each employee has an opportunity to provide suggestions related to process improvement. In addition, these efforts also ensure that employees are actually able to use the new skills they have learned in the courses they have attended and materials they have read.
9. What is your system for employee development/training? How do you identify training needs?

10. What is your approach to cross-training?

11. How do you capture and document the knowledge of employees? (e.g., if a key person were to resign or retire, is their knowledge documented somewhere?)

12. How do you ensure a safe and healthy workplace?

13. How are you working to limit barriers between departments?

Some great participation and teamwork practices we’ve seen used by wood products firms (of all sizes) include employee suggestion systems and customer visits. Employee suggestion systems are hardly a new or novel idea. However, the missing link is usually implementation and/or feedback. One company we’ve worked with instituted a policy that if management didn’t give feedback within 30 days, employees were free to make the suggested changes.

As suggested above in the Customer Focus section, take a wide variety of employees along on visits to customers. This can be costly, of course, but the payoff can be big on multiple levels. One company we worked with sent five people (the company president, production manager, sales person, quality manager, and an equipment operator) to visit a customer’s facility. The first payoff was that the customer felt valued and knew that concerns and suggestions were being heard. And each visitor saw something a bit different, based on his or her area of responsibility. The biggest lessons learned for the QC manager were that (1) their competitors had far more floor space in the customer’s warehouse and (2) the appearance (cleanliness, accuracy, and placement of labels, absence of forklift damage) of the competitors’ product was far superior to that of their own. The QC manager better understood the importance of his role, felt empowered and informed about needed changes, and instituted numerous process improvements in his firm, based on this one visit to a customer.

6 Summary

We’ve presented a lot of information here, beginning with how to define quality, and then listing the key areas of quality management: customer focus, process focus/continuous improvement, and participation and teamwork. So where do you begin and how do you tie it all together? Well, of course, the customer is always a good place to start. As shown in Figure 2 above, it all begins with customer expectations, or the “voice of the customer.” As we have discussed, it is important to make an effort to get to know your key customers and their needs—pay them a visit! They will be flattered and eager to tell you what they need.

Then comes the work of “translation.” Customers rarely express their needs in terms that are directly applicable to your products and processes. You have to translate these needs into process specifications. For example, a customer might say “we need products for which the thickness is consistent and stable so they don’t jam our automated assembly equipment.” You might then conduct an experiment to develop specifications related to thickness (target ± tolerance, e.g., 3 ± 0.1 inches) and a moisture content (e.g., 6% to 8%).

The next step is then what we traditionally think of as quality control—we need to obtain the “voice of the process.” What are the tolerances of your process as it is currently operating? Is it stable at these levels? Most of the time, continuous process improvement is needed to “dial in” the process so that it can consistently meet customer expectations. And then the role of quality management must be to ensure that key processes remain stable and capable over time. Further, efforts must be made to continuously reduce variability and improve efficiency in order to reduce costs—again, the value-based definition of quality—excellence at a fair price and conformance to specifications at a reasonable cost.
The upper and lower loops on the diagram are included in recognition of the fact that things are rarely if ever linear. For example, the voice of the customer and voice of the process may be so far out of synch at first that some negotiation is needed (the upper loop). As an extreme example, customers may say they need a “perfectly stable” product—on-target, with zero variability. Given that this is impossible with wood due to the way wood shrinks and swells with changes in relative humidity, the company can negotiate—and can do so with data, i.e., based on knowledge of what their process is currently able to produce. As the process is improved and monitored through time, specifications must be revised as well (the lower loop).

Last but not least, while participation and teamwork may not be explicitly shown in the figure, we repeat what we said above—none of the activities mentioned here related to customer and process focus/improvement are possible without an informed, capable (trained) and empowered workforce.

For More Information


