



Economics of quality: A strategy for growth

Identifying the right tools, indicators are keys to high returns

By Kaiwen Cheng

NNo business can survive long term without quality.

Most business leaders are aware of this fact, but some still view quality only as a necessary evil. Some may view quality as nothing but paperwork. We want to move away from this negative approach to quality and instead fit quality into the economic model of the business.

Quality of products and services is a fundamental requirement to sustain a business. But just blindly using all known quality tools won't guarantee a successful outcome. A smart deployment of quality tools brings amazing benefits to a business. The recommended approach starts with defining the strategic position by choosing the level of quality that drives the proper set of tools. Then follow up with the positive key performance indicators (KPIs) to build the cadence of improvement.

Four levels of quality

The behavior of a business can be categorized into one of four quality levels, as seen in Figure 1. This should

be done with a self-reflection exercise to determine the appropriate level that represents one's own brand and value. The result from this self-reflection would be the key strategic component to drive the business's quality approach.

There is no right or wrong level. A business may also move between levels based on circumstances, and different parts of a business may operate at different levels. For example, when try-

ing to move from level 1 to level 2, a solid inspection plan is more appropriate than conducting design of experiments. Typically, a higher quality level would require using more proactive and predictive quality tools. It would also increase the focus on customer services and require different sets of creative talents.

As an example, it is clear Walmart is at level 3. It is a huge, successful enterprise and clearly demonstrates that

FIGURE 1

Levels of quality

How the quest for quality affects a business' behavior.

Level 1 - Survival
• Quality to meet customers' expectations so they don't drop you
Level 2 - Sustain
• Sustain product & process performance to avoid extraordinary cost
Level 3 - Growth
• Quality in process to cut waste to increase profitability of business
Level 4 - Premium
• Excellent quality & service to get customer loyalty

a higher quality level is not necessary. Reviewing the company's three-year strategic plan in 2018 (see image to the right), it is clear becoming a premium brand is not its target. Instead, there is an obvious focus on processes to deliver value and a seamless experience with customers.

It is also well-known that Walmart uses a low-margin strategy to drive up volume. That is the core approach started by founder Sam Walton from the beginning. A low margin model is not an issue if you can drive efficiency, as Walmart emphasizes in its strategy.

Porsche is another good example at a premium quality level. Porsche is driving to target 15 percent as its threshold on margin while other automakers are working hard for sub 10 percent; this is included in Porsche's "Strategy 2025." The company is designed for "inspiring customers with a unique product and brand experience" as stated on its website. The low-volume production – Porsche's 55,000 vs General Motors' 10 million car sales per year – would require a different set of quality plans where more specific testing becomes feasible.

Other premium brands in each sector are typically at the highest quality level. For example, Tiffany, Nike and Lexus are companies where having prestige pricing drives higher margins. The premium-brand paradigm is one example of how quality level is a critical factor of the economic model for your business and will continue to be relevant in the following discussion.

Positive key performance indicators

Key performance indicators need to be selected once the strategic direction is set. It is used to describe whether the areas or processes are moving at a rate that meets the need. There are cases where multiple KPIs can be selected to measure the same thing, and it is critical to select KPIs that encourage positive thinking. A positive metric will

drive positive behavior.

For example, businesses want to keep inventory lower to avoid tying up working capital. However, operations can also lose flexibility with restricted inventory. Instead of measuring inventory level directly, it can be measured with inventory turns to be more positive. In this case, the size of inventory doesn't matter. Such a metric would drive more attention toward managing high value or critical items to flow faster and drive up inventory turn. Such a positive metric would prioritize resource management naturally.

We suggest businesses start with return on asset (ROA) as the foundation for the positive KPI approach. Instead of seeing ROA as a simple "return/asset," we turn it into a positive metric by driving up the margin and/or driving up turns to improve ROA, as seen in Figure 2.

Margin and asset turns are strongly correlated with quality level and operational efficiency, respectively. Businesses can drive up margin by driving up the quality level. Such a focus translates into an overall positive attitude for the workforce versus mere cost reduction. However, margin is also strongly controlled by the market and often limited within the industry.

An efficient operation always has a good asset turn. It is as powerful, and often easier, to drive up ROA than margin. To achieve a higher asset turn, a business needs to become more predictable, which means less downtime, scrap and other wastes. That also means a high-quality process is also a predictable process.

Figures 3 and 4 demonstrate the combined effect on margin and turn. The curve in Figure 3 indicates the high rate of asset turn decreasing for a constant 12 percent return. As we discussed earlier, the external factor from the market, driven by customers, has a strong control on margin. But even if the margin is as low as 6 percent, as in

FIGURE 2

An equation of quality

Businesses should start with return on asset as the foundation for the positive KPI approach.

$$\begin{aligned} \text{RoA} &= \frac{\text{Return}}{\text{Asset}} \\ &= \frac{\text{Return}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Asset}} \\ &= \text{Margin} \times \text{Asset turns} \end{aligned}$$



Figure 4, the compounding 10 percent improvement on asset has a significant improvement on return.

ROA is an outcome (lagging) metric and it is a powerful indicator by itself. An even more efficient approach is to combine it with input (leading)

Communication among soft skills every engineer needs

In the communications age, the soft skills needed to be part of a team and convey and share ideas is more important than ever to engineers. A 2017 article in *Forbes* offered these six communication tips from engineering consultant Ash Norton:

- **Interpersonal skills.** Learning to be a team player rather than a lone wolf will better connect with colleagues.
- **Creativity.** The ability to come up with fresh solutions is an asset to any team.
- **Communication.** Having great ideas is the first step but being able to convey ideas and plans effectively to team members is the most important bridge to cross.
- **Empathy for customers.** Being able to walk in the customers' shoes and know how a project affects their businesses is a key to understanding.
- **Adaptability.** Be willing to try different ideas when your first suggestions don't fly.
- **Interest in learning.** The desire to keep developing and improving will serve well in any endeavor.



Author Kaiwen Cheng will offer his tips on communication as presenter for a pre-conference workshop Saturday, May 18, at the IISE Annual Conference & Expo at the Rosen Shingle Creek Hotel in Orlando, Florida. The workshop, "Communication Essentials for Engineers," (<https://link.iise.org/AnnualWorkshops>) aims to demonstrate essential elements of more effective communication and includes hands-on practices designed to help participants become effective communicators.

metrics. In short, one highly recommended measure is the overall equipment effectiveness (OEE) metric with its submetrics: availability, productivity and yield. This is also a common metric used in lean manufacturing. Businesses can utilize these measurements to properly prioritize and achieve the maximum potential of its workforce.

Reaping the benefits of increased quality

The concepts of four levels of quality and positive KPI are the foundation of the economics of quality. By applying a plan-do-check-act cycle approach,

the quality level is developed during "plan" phase. The KPI would be a perfect device integrated into the do-check-act phase to monitor the progress of improvement.

Even without full deployment of the margin/turn process, the concept can easily turn the conversations into a positive direction. To harvest even more benefits from this concept, businesses need to drill further down with the OEE dashboard or other quantifiable measurements to drive project selections and implementations. This drilldown would involve more complex conversations.

In a nutshell, quality shall generate

tangible business benefits beyond just "it is the right thing to do." We realize the journey can be challenging and confusing. This two-phase approach can turn the challenging journey into an enjoyable one. ❖

Kaiwen Cheng is the owner of KC Business Consulting in the Charlotte, North Carolina, area. His experience ranges from manufacturing to supply management with a strong concentration in quality. He has a master's degree in industrial engineering from the University of Missouri at Columbia. He also has an MBA, a bachelor's degree in physics, and is a certified Six Sigma black belt. He is an IISE member.

FIGURE 3

Maintaining ROA

The curve indicates the high rate of asset turn decreasing for a constant 12 percent return.

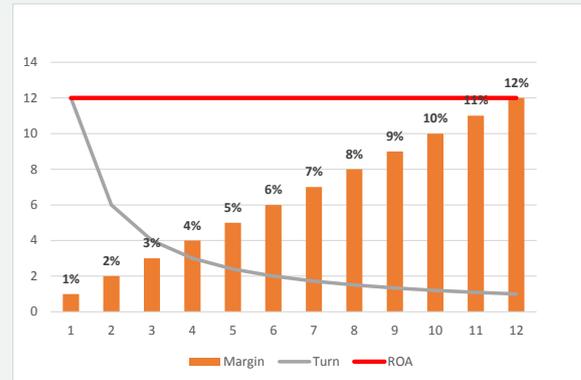


FIGURE 4

Impact of asset turn

Even with a low margin, a higher improvement on asset can have a significant improvement on ROA.

