Geared toward Innovation

In 50 Words Or Less

- Innovation occurs when a company commits resources to move an invention through R&D to market introduction.
- Quality management provides the tools and methods needed for process, product and service innovation.
- The challenge comes from convincing top management that innovation and quality are connected.

by Søren Bisgaard

Quality has a **crucial part** to play but often **falls through the cracks**

WITH THE FORCES of globalization creating rapid changes in the U.S. economy, the role of innovation is being vigorously debated among quality professionals and in society at large. It is therefore appropriate that innovation has been elevated to one of the most important strategic issues for the quality profession.[1]

To make this discussion productive and avoid confusion, however, it is important to distinguish between invention, innovation, ingenuity and creativity. These terms are not synonyms, but rather refer to very different concepts and activities (see Table 1, p. 22). It can be argued, though, that from an economic perspective, innovation can be considered an umbrella concept that includes quality improvement and Six Sigma as subsidiary functions.

Defining characteristics

In economic terms, innovation is defined as the process of moving an initial invention through research and development to the eventual market introduction. Via this process, the invention becomes a new product or service, a new method of production or provision, a new method of transportation or service delivery, a new business model, a new market or a new way of organizing something.

We can therefore see how innovation and invention are not the same. Innovation involves invention and creativity as subsidiary concepts. This broad economic definition of innovation applies not just to hardware, but also to services, organizational advances, business models, and the development of new markets and supplies of materials and labor.

The economic definition implies that innovation is a process—a concept very familiar to the quality profession. The metric of success of an invention is typically the number of scientific papers or patents related to the invention. For an innovation, however, success in the economic sense means commercial return on the investment measured in dollars. For example, there isn't a Nobel Prize waiting for the inventor who first attached wheels to suitcases. But this elementary innovation has greatly reduced the inconvenience of travel and has been a resounding commercial success.

Innovations can be of many types. They can be breakthrough or incremental and related to the design or delivery of a product or service. They can provide new features or result in the manufacture of the same product or the delivery of the same service at a lower cost. They can be related to new technologies, sources of supply or markets. Sometimes, they are classified as sustaining and disruptive innovations.[2]

Innovations can also be related to new ways to organize things. For example, the modern supermarket was a breakthrough innovation in organization that rendered the traditional grocery store concept extinct, or at least substantially modified it.

When it comes to breakthrough and incremental innovations, the latter can be viewed in a negative light as being of minor importance. It is argued that only breakthrough innovations are important. Such a view is misguided and counterproductive. While it is true that many incremental innovations throughout history have been of marginal scientific or technological im-

Dictionary definitions / TABLE 1

Definitions adapted from Webster's New World Dictionary and Thesaurus, 1998

invention, *n.*
Middle English *inuencioun* < OFr *invencion* < L *invention*
1. the act of being invented
2. the power of inventing; ingenuity or creativity
3. something invented; specif., a) something thought up or mentally fabricated; b) something originated by experiment, etc.; new device or contrivance

innovation, *n.*
Late Latin *innovation*
1. the act or process of innovating
2. something newly introduced; new method, custom, device, etc.

ingenuity, *n.*
Latin *ingenuitas* < *ingenuus:* sense 1 infl. by assoc. with INGENIOUS
1. [Obsolete] the quality of being ingenuous
2. the quality of being ingenious; cleverness, originality, skill, etc.
3. *pl.* **-ties** an ingenious device

creativity, *n.*
creative ability; artistic or intellectual inventiveness

commercialize *vt.*
1. to run as a business; apply commercial methods to
2. to engage in or make use of mainly for profit, esp. at a sacrifice of other values

portance, they have been significant from a commercial point of view.

The cumulative sum of many incremental innovations has had major economic impact. In many cases, the real commercial success has come as the result of an initial breakthrough, followed by a sequence of incremental innovations.

For example, RCA invented the videocassette recorder, a breakthrough innovation. But it was Japanese and Korean manufacturers that improved the quality of the product and the process through many incremental innovations, some of which could be called kaizen innovations, and eventually reaped the financial benefits. Focusing solely on breakthrough innovation is a recipe for financial disaster. We need both.

The path of innovation

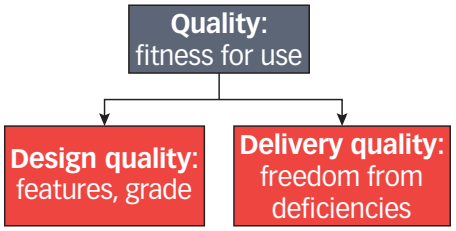
Innovations often follow a general pattern: A breakthrough invention leads to a breakthrough innovation. But the initial market introduction is often crude. Think, for example, of the first PCs, which were more of a novelty than a practical and useful product.

Like the first PCs, the initial innovation might be interesting to a few early adopters, but not to a larger consumer audience. If the firm has enough staying power and there are enough early adopters, what typically follows is a stream of incremental innovations that improves the quality of the innovation and makes the product, process or service more appealing and more useful to a larger customer base.

If the innovation is commercially successful, it attracts attention from other competitors because it will sell at a premium price and earn the innovator high profit. As competitors begin to market their imitations or improved versions of the product, the market volume starts to increase. The law of supply and demand kicks in, prices gradually fall, and the competition gets tougher.

As price pressures begin to set in, a series of incremental innovations aimed at efficiency and cost cutting follows to offset the competitive pressures. Typically, these innovations are geared toward the delivery process, which allows for better production economy. Firms also might focus on providing new and better features to differentiate the product. This is where quality enters the stage in a major way. Those incremental innovations, whether achieved through the application of *kaizen*, lean or Six Sigma, are typically considered quality improvements and are often the subject of Six Sigma projects.

Quality defined as fitness for use / FIGURE 1



As time marches on, the price of a product, if not subject to further innovations, often coverges at a level at which there is hardly any profit left. Again, think of the PC. Eventually, the weaker competitors and those that do not innovate—from a quality perspective or otherwise—are acquired, merged or go out of business.

At some point during this life cycle, a new breakthrough innovation enters the stage, and a new cycle is initiated. Such an innovation might be the successful outcome of a planned effort, such as a design for Six Sigma (DFSS) project, or it might be more happenstance. Eventually, the new innovation renders the older one obsolete. The economist Joseph Schumpeter called this "the perennial gale of creative destruction."[3]

For example, the typewriter was rendered obsolete by the PC, and lately the computer industry has been under pressure, resulting in major consolidations, mergers and acquisitions within the industry. As Schumpeter pointed out, the most powerful innovations command a decisive cost or quality advantage. Innovation-based competition, he claimed, strikes not at the margins of existing firms, but threatens their very survival.[4] This is what makes innovation-based competition extremely effective.

Related concepts

Joseph M. Juran's definition of quality as a fitness for use is helpful in this context because it focuses on the customers and their circumstances. The customers and the market define what constitutes value to them in a particular set of circumstances. But fitness for use is not sufficient. Recognizing this, Juran provided two

Summary of the main economic relations of quality / FIGURE 2

subsidiary definitions in terms of features and freedom from deficiencies.[5] We sometimes refer to these terms as design quality and delivery quality, respectively (see Figure 1, p. 23).

Design quality relates to features and grade of the product, process or service, and expresses intentions, or what we aspire to do. Delivery quality is about how well the intentions are actually executed. How many deficiencies were there in the entire process of delivering the product or service?

The drive for innovation comes from the desire to provide a product or service that is fit for use and, as a result, attractive to the customers. The firm hopes its market offering is better fit for use so customers prefer its offering and not the competitor's. To do so, the firm must design a product or service with features that are attractive and deliver it with few, if any, deficiencies and delivery problems.

Thus, we see how quality and innovation are related. When we labor to improve quality, in terms of design or delivery, we are engaged in innovation to maintain or gain market share. It might be an incremental improvement to the product or the process, or it might be a breakthrough change, but it is nevertheless an innovation.

Quality's economic effects

The economic relations relative to design and delivery quality are summarized in Figure 2 and were also covered in an earlier and much simpler model by Juran and Frank Gryna.[6] Improving design quality—adding more or new features—typically increases the cost of producing a product. Better design quality, however, also might allow the firm to charge a premium price and help increase sales volume. Thus, added or improved features or grades usually have a beneficial, top-line effect.

Also shown in Figure 2, delivery quality is related to the reduction of deficiencies, defects, delays, snags, rework, waste, field failures, after-sales service and antagonistic customer relations—any problem in the entire value creation chain. Thus, reducing delivery quality problems usually reduces the variable costs for labor, materials and energy.

But it is not just the variable costs that are affected. Dealing with deficiencies puts more demand on management and drives up overhead costs. Primarily, improving delivery quality has a middle-line, cost-saving impact (most often on the variable costs) that immediately trickles down to the bottom line as increased profit. But there are additional benefits. In the long run, reducing deficiencies and improving delivery quality will improve a company's market reputation and, ultimately, its brand. Therefore, improving the delivery quality also might allow for charging a premium price, increasing the market share or both.

Given the economic relations found in Figure 2, it can be seen that the common, but naïve, perception that high quality costs more is not necessarily true. If we are talking about delivery quality, high quality costs less

Quality as innovation

Improvements aimed at eliminating chronic sources of deficiencies from processes will reduce cost and improve an organization's competitive position.[7]

When a firm has developed a reputation for defect-free delivery of high-quality products through its innovations related to the delivery process, it has achieved a competitive edge that is hard to match and difficult for competitors to copy. Firms that have differentiated their market offerings by focusing on a quality improvement strategy will therefore achieve a market position that allows for a higher profit. This kind of competition is typically more effective than price competition; entering into price wars invariably ends up being a race to the bottom.

But we cannot rely only on reducing deficiencies. Such a strategy is dangerous and will expose the firm to risks from competitors that might develop innovations that involve new features, entirely new products, or services that provide better value to the customers. We also need to engage in product innovation, an activity called quality planning by Juran[8] and DFSS in Six Sigma terminology.[9]

We have now come to the main point: Quality management, from a broader perspective, constitutes a systematic approach and a set of tools and methods for process, product and service innovation—large and small, incremental or breakthrough. Of course, innovation entails more than quality. But quality improvement is clearly a major part of innovation.

Quality professionals have worked for years on problems that are not necessarily related directly to defects and deficiencies. In other words, quality is no longer just about defects. From a more global perspective, it is about value to the customers (whether internal or external) and fitness for use. Today, quality professionals engage in any project aimed at providing a market offering that provides better value to the customers and economic benefits to the firm.

Quality management provides important tools, methods and organizational structure for key aspects of innovation. Quality management also provides a well-developed system for managing quality-related innovations.

This is an area in which the general innovation literature has much less to say. In general, innovators can learn from the quality management literature when it comes to many of the operational aspects of the process of innovation, such as how to organize teams and manage projects.

Make the connection

The uninitiated might get the impression that quality management is only about the reduction of defects—often referred to as quality control. This is the perspective upper management has of quality management programs. Quality management often has a negative connotation. Defects are a nuisance and are best not talked about. Executives often embrace quality programs reluctantly. They often fail to comprehend the strategic and economic importance of quality.

To change this unfortunate situation, it would be wise if we referred to quality as a subject located squarely under the general umbrella of innovation. Quality is not separate from innovation. It is an important part of innovation, which is recognized by executives as a core strategic issue.

Innovation with a subsidiary notion of quality improvement would be easier to anchor in business school curricula. That might help secure a long-term role for quality in business education and, we can only hope, in general business practice. QP

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