True or False: Faster Innovation Is Better?

Research by Eric H. Kessler and Paul E. Bierly, III

For a hot topic, innovation speed has been the focus of surprisingly few scientific studies. What research there is on the subject tends to be about the process—How do you go faster? In contrast, Eric H. Kessler of the Lubin School of Business, and Paul E. Bierly, III, of James Madison University, examined the strategic implications of innovation speed—What happens when you go fast?

Kessler and Bierly felt this was a key question as there is insufficient, often conflicting evidence about how dimensions of innovation strategy (cost, quality, and speed) relate to one another and how they ultimately affect project success. The results of their study were published in IEEE Transactions on Engineering Management, vol. 49, no. 1, February 2002.

Innovation speed represents a firm's ability to move quickly from ideas to actual products and is defined in terms of the time between (a) initial development efforts, including the conception and definition of an innovation, and (b) introduction of the new product into the marketplace. Today, the pressure for speed in new-product development is intense, as products' life cycles grow shorter. New products are critical to success because they can be used to leapfrog competition, create entry barriers, establish a leadership position, open up new distribution channels, and garner new, loyal customers. For follower firms, innovation speed is central to their quest to limit the advantages of the leader.

Looking for Answers

In the current climate of urgency about new-product development, Kessler and Bierly pose three timely questions:

1. How does innovation speed relate to the two traditional dimensions of innovation strategy—product quality and efficiency?
2. How does innovation speed influence R&D (Research and Development) project success?
3. Is the relationship between innovation speed and project success altered by project and market uncertainty?

Taking a closer look at a complex challenge, the researchers studied 75 new-development projects in ten large, U.S.-based companies operating in a variety of industries, averaging approximately 90,000 employees and $16 billion in sales. They concluded that the recent buzz about the value of speed in new-product development is justified. Speed enhances quality and has the greatest influence on the success of a new product of any factor involved.

But there's a catch: The relationship between innovation speed and project success varies with the level and source of uncertainty. In other words, implementing a fast-paced innovation strategy is a good idea, but best applied only when you know where you are going.

In general, speed has a positive impact on project success for several reasons. Faster development increases the potential to realize first-mover advantages, extend profit windows, and increase market share. However, if uncertainty is high, speed advantages are reduced and could even be negative if you hasten in the wrong direction. Thus, managers should pursue speed most vigorously when they have a "clear target"—that is, when the technology is known and markets can be forecast.

It is also interesting to note that there does not seem to be a trade-off between speed and quality. During faster development, employees learn necessary skills more quickly. Speed also improves the accuracy of forecasting, because the sooner a product will appear in the market, the greater the likelihood of accurate predictions of customer requirements. And reduced time-to-market allows product designers to incorporate more advanced components that are likely to make the product cutting-edge.

In contrast, firms that skimp on costs that reduce speed or quality are also less likely to be rewarded with success. Investing in speed pays off: The researchers defined development cost as a project's total financial requirements and human resources expenditures. Contrary to their expectations, the researchers found that speed can increase the chance of success without raising costs. In other words, done correctly, a faster project is not necessarily a more expensive one.

The researchers do caution, however, against viewing the relationship between innovation speed and project success in a vacuum. Interactions between the market and the company environment shape both strategy and performance. Regardless of innovation speed, uncertainty influences the positioning and posturing of firms and lowers the chances of success. Uncertainty may center on such external factors as technology, demographics, and the environment, or such internal factors as technology sourcing and product radicalness.

Product radicalness is the degree of attempted departure from existing practices. The more radical the innovation, the more risky a speed-based strategy is. Source is an additional consideration. With internal sourcing (like corporate research and development), success is unpredictable. External sourcing (through, for example, alliances or licensing) is safer because the technology has usually been developed and tested. But since competitors may also have access to the same external sources of technology, speed is even more critical for external than for internal sourcing; the firm that gets to market first will have the upper hand. Speed is less important to internal sourcing, but internal sourcing may involve recreating processes that an outside firm has already mastered, which may be inefficient. The safest approach is probably a balance between external and internal sourcing.

The study's most important finding is that the recent emphasis on speed—is at least in the United States—largely justified. Furthermore, fast-paced innovation is best in more predictable contexts. Forcing rapid development under high uncertainty may lead to failure. Paradoxically, where relative certainty does prevail, emphasis on innovation speed is likely to result in higher-quality products and project success than is the traditional emphasis (especially in down economies) on low cost, per se. In other words, the dedication to quality should be augmented by speed to attain both high quality and success. The researchers do not recommend straining on low cost as an end unto itself. Speed is a means to improve performance in terms of both cost and quality. Consequently, firms should pursue focused improvements in speed, as opposed to skipping steps and blind haste.

Hawley Roddick
How to Outperform Competitors with SCQM

Research by Chu-Hua Kuei and Christian N. Madu

An organization’s quality is measured by its overall performance, which includes environmental safety, integrity, social responsibility—and products. A critical success factor for products is through supply chain quality management (SCQM). Yet the shift from focusing solely on product quality management to focusing on SCQM has not been accompanied by adequate attempts to establish objective guidelines.

In addressing this problem, Professors Chu-Hua Kuei and Christian N. Madu, Management and Management Science, use three equations to define SCQM:

SC – maintaining an effective production and distribution network
Q – meeting market demands correctly and achieving customer satisfaction rapidly and profitably
M – establishing conditions, such as an atmosphere of trust, that promote supply chain quality

Their research was published in Asia Pacific Review, vol. 6, no. 4, 2001.

A sketch of the distinguishing characteristics of SCQM reveals the impact of its management thinking:

**Top management** ensures conditions that encourage total quality. Engineers and designers cooperate in the product development cycle with an emphasis on quality. Workers use stable, effective techniques and processes. Suppliers, although fewer than in other supply chains, communicate capably; are reliable, and strive to improve efficiency and effectiveness while focusing more on quality than price. Benchmarking improves learning and performance throughout the chain. Information technology (IT) supports not only coordination and performance, but also decision-making and real-time responses to customers; data about the cost of quality, and other indicators, are readily available and are analyzed. All members of the supply chain take responsibility for ensuring quality. Customers are listened to, responded to, and satisfied.

**Teamwork** between supplier and customer is essential in establishing, managing, and maintaining SCQM work.

**Inefficiency** to manage effectively

**Information technology** improves learning and performance throughout the chain. Companies that promote supply chain quality management all depend on supplier participation—when supply chain members cooperated, technology and quality standards were transferred throughout the chain. Kuei and Madu believe the most compelling practical implication of their study is that supplier participation is the key to making SCQM work.

Second, in the high-performance groups, IT was integr-ated; it produced sound data and enhanced collaboration among supply chain members. Employees and managers were willing to use the information system. Quality data and control charts were displayed at employee workstations, and employees participated in job-related training. The lesson here is that because of the influence of IT on every aspect of a supply chain, members all along the chain should align themselves with the digital format. They should transform themselves into IT-based SCQM enterprises that are dependable, consistent, and accurate.

### Comparison of Management Styles: SCQM, TQM, and TQA

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<td>Organization Culture</td>
<td>Setting numerical targets and blaming individual employees for their mistakes</td>
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<td>Every member of supply chain, but dominant partner must ensure that quality-driven change is effectively implemented</td>
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<td>Horizontal/vertical/diagonal, integrated</td>
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Of central importance to SCQM is the IT system. By now, the building blocks of IT—software, hardware, telecommunication networks—are established and are no longer a challenge. The million-dollar question today is how can IT provide reliable, accurate information on production, distribution, and market demands, and support the management practices that optimize a supply chain network?

Kuei and Madu collected data from Taiwan’s computer and electronics industries and identified three performance groups. Those with the best SCQM emphasized three dynamics that can be shaped to competitive advantage by other firms as well: (1) supplier relationships, (2) IT-driven change, and (3) interactions with customers.

First, managers in the high-performance groups perceived suppliers as integral to achieving better overall performance in such areas as customer satisfaction, productivity, and revenue. Chief suppliers participated in product design and in professional improvement programs. Because supply chain design, materials, training, supervision, coordination, network optimization, and management all depend on supplier participation—when supply chain members cooperated, technology and quality standards were transferred throughout the chain. Kuei and Madu believe the most compelling practical implication of their study is that supplier participation is the key to making SCQM work.

Second, in the high-performance groups, IT was integrated; it produced sound data and enhanced collaboration among supply chain members. Employees and managers were willing to use the information system. Quality data and control charts were displayed at employee workstations, and employees participated in job-related training. The lesson here is that because of the influence of IT on every aspect of a supply chain, members all along the chain should align themselves with the digital format. They should transform themselves into IT-based SCQM enterprises that are dependable, consistent, and accurate.

In other words, a comprehensive approach to the skillful use of information technology that produces timely, relevant data improves a supply chain’s overall performance.
Data Quality Is Easy to Control but Decision Makers Are Not

Research by Kaustav Sen

Information is critical to doing business in the digital age, and total quality management (TQM) is a familiar goal. Unfortunately, while the quality of the information is taken seriously, the quality of the process producing that information has been neglected.

In examining the application of TQM to the measurement of information systems, Kaustav Sen of Lubin’s Department of Accounting found that because end users who make decisions often transform data produced by a system, data of acceptable quality could lead to information distortion. His research was published in the International Journal of Quality & Reliability Management, vol. 18, no. 9, 2001.

Sen found that, generally, quality is defined in terms of the primary data recorded and stored in the system. But when end users transform the data to suit their own needs for decision-making, they compromise the outcome. As a result, defining and measuring the quality of information systems in their entirety—from the quality of the data to the quality of the use of the data—is more important than is generally recognized.

One reason for the oversight is that the distinction between data and information does not receive adequate consideration in TQM approaches to information systems management:

• Data are the output of the system; they measure the facts about events, agents, and transactions involved in the operation of a business.
• Information is data (or data transformed by users) as applied by decision makers.

Because ensuring the quality of the data does not necessarily ensure the quality of the information, producers of information should assess carefully all possible data applications.

It is worth noting that quality management of an information system is quite different from that of a manufacturing system, because the uses of the end product are undefined in the former but are clearly defined in the latter. Moreover, it is impossible to create a comprehensive measure for accurate assessment of the quality of an information system’s output—because the data transformations and uses cannot be predicted accurately.

In trying to evaluate the quality of an information system, TQM’s zero defects goal is relevant, but the complexity of the enterprise and the cost of improving quality must be factored in. The trade-off between better quality and increased cost has always been important in striving for zero defects, but subscribers to TQM are unable to account for cost where the criteria for quality cannot be clearly defined and measured.

The fact remains that gauging information quality is crucial for a valid appraisal. Using a financial-reports database, Sen demonstrated that the choice of measures for information quality can bias the survival time of firms in his sample. When immaterial data errors (variances from the accounting benchmark for accuracy) were present after firms incurred a loss, the firm’s survival chances were sometimes increased. How can this happen? If account balances contain immaterial errors, financial ratios are affected (earnings per share, for instance) and, inevitably, so are decisions based on the information.

Hawley Roddick

Survival Biases in a Financial Reports Database

Three pairs of major accounts that are most likely to contain errors were seeded with errors:

**Balance Sheet**

1. Accounts Receivable
2. Inventory
3. Accounts payable

**Related Income Statement Account**

Sales
Cost of goods sold
Selling, advertising, general, and administrative

The nature of double-entry accounting does not allow just one account to be seeded with an error, so accounts were selected in pairs, and errors were seeded so the magnitude of the error was the same for both accounts in a pair.

The errors were distributed so that:

• Accounts receivable and sales were restricted to overstatement;
• Accounts payable and selling expenses were restricted to understatement;
• Inventory and cost of goods sold were either overstated or understated.

Of the 830 firms in the sample, 107 firms filed for bankruptcy or liquidation. The remaining 723 firms either still existed at the end of the sample’s time period or they left the sample for other reasons.

Producers of information in the study are the individual companies and their auditors. Users of the information are investors and other outsiders.

Serving such diverse interests can be complicated. The challenge is especially pertinent in connection with the variety of users of e-commerce.

While Sen’s research focuses on a financial-reports database, the issue is valid in any setting where new records are added and old records are deleted from a system. Examples include (a) a customer database where old customers lapse and new ones are added and (b) a purchasing setting where suppliers are retained or dropped, based on their product, pricing, and service. If control over the quality of explanatory variables (which predict lapse) is inadequate, the information system, as a whole, is biased toward either keeping unwanted data or removing valid data.

Although developing a comprehensive strategy for ensuring data and information quality is tricky, the effort can pay off. To apply TQM requires identification not only of the major users of the system but also of less-frequent users whose decision-making errors are costly. Experts can control the quality of data for a defined set of users. They can also create data warehouses and apply data-mining techniques to evaluate the quality of the outputs. But it is the costs of quality in an information system that should determine how—and how diligently—quality is pursued. And those are difficult to calculate.

The key is assembling as accurate a portrait as possible of how the data will be used, and by whom.
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Third, the top groups in the study took care of customer complaints, deftly, and followed up by evaluating customer satisfaction. Moreover, customer relations extended to the IT system, where requests were handled courteously and quickly, satisfying customers by meeting their requirements.

The researchers concluded that successful SCQM firms recognize that the ultimate goal is customer satisfaction. Their supply chain members pay attention to relationships with customers and are conscious of how their customers perceive them. Managers investigate internal, external, and interface customers’ spoken and unspoken needs. A point is made to view process changes along the supply chain from the customers’ perspective. At the same time, successful SCQM organizations nurture a culture of innovation in order to prompt, creative problem solving. Supply chains exist to meet customer—i.e., market—demands correctly, rapidly, and profitably. To this end, organizations should maintain a customer-centered culture and excellent IT-based capabilities that supply customers with quality products in the right place, at the right time. Above all, management should cultivate the strong relationships with suppliers that provide the setting for IT-driven change and for winning and holding customers.

Hawley Roddick

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