TOKYO—Born in the factories of Toyota Motor Corp. and adopted by nearly all manufacturers around the world, "lean manufacturing" eliminates waste, creates efficiencies and helps companies continuously shave production costs.

But Toyota's recent problems highlight how certain elements of this approach—eliminating overlap by using common parts and designs across multiple product lines, and reducing the number of suppliers to procure parts in greater scale—can backfire when quality-control issues arise.

Those risks are magnified as companies expand globally and offer their products in greater volume. What's more, the growing technological complexity of everything from cars to electronics makes it harder for manufacturers to diagnose problems in the early stages before the issue becomes more widespread.

David Meier, co-author of "The Toyota Way Fieldbook" and founder of a consulting company on lean manufacturing, said there is a "trade-off" with standardizing parts across the company.

"The cost may be decreased in the short term, but the risk is increased," Mr. Meier, a former group leader at Toyota's factory in Kentucky, wrote in an email.

In the Toyota situation, a defect causing its gas pedals to stick has forced the company to halt sales of more than half of its U.S. models. The Japanese auto maker has also recalled an unspecified number of cars in Europe. Chinese regulators have also ordered the recall of about 75,000 RAV-4 sports-utility vehicles.

Standardizing parts across different models is a common practice in the automobile and electronics industries. It's one aspect of lean manufacturing that allows companies to simplify production methods and create economies of scale to cut procurement costs.

Toyota's competitors have experienced the pitfalls of such efficient manufacturing practices as well. In October, Ford announced a recall of 4.5 million cars to address a fire hazard involving a faulty cruise-control deactivation switch used across different models. That brought the total number of Ford cars and trucks recalled due to the switch to 16 million vehicles since 1999. At the time, a Ford spokesman acknowledged that the switch had led to vehicle fires although there have been no serious injuries or fatalities.

While manufacturers are aware of the potential risks, the existing business model of the car industry makes sharing parts across different models necessary, said Yoshinori Iizuka, a University of Tokyo engineering professor.

"It takes a huge amount of cost to develop one car."
Unless companies share parts among models they cannot win,” said Mr. Iizuka, a former head of the Japanese Society for Quality Control, a research group studying quality-management technology.

He said the key to preventing quality-control problems from widely used parts is a combination of good design and adequate testing. Should a problem arise, companies need to act immediately with a manufacturing management system to pinpoint and identify the issue.

Constant declines in the prices of electronic gadgets have also increased the competitive pressure for electronics manufacturers to turn to parts standardization and streamline their supplier base.

Coming off its first annual loss in 14 years, Sony Corp. created a division last year to handle procurement across the company and decided to cut its number of suppliers by more than half. In the past, procurement was handled separately by the company’s various business divisions. Sony has said these measures will result in savings of 500 billion yen.

Rival Panasonic Corp. has been standardizing parts across products for years to reduce costs. That practice was a factor behind one of the company’s biggest product recalls ever in 2007. Matsushita Electric Industrial Co., which would later become Panasonic, recalled three million microwave ovens, clothes dryers and refrigerators, which shared common electric parts that could overheat and catch fire.

“There is a lot of emphasis of cost reduction and streamlining, but something can slip by and have a big impact,” said Kailash C. Kapur, a University of Washington professor of industrial and systems engineering, who has worked with General Motors Co. and Ford Motor Co.

Gain

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