

# Next frontiers for lean

Ewan Duncan and Ron Ritter

Lean-production techniques have been revolutionizing operations for 50 years. Advances in technology, psychology, and analytics may make the next 50 even more exciting.

**When the first issue** of *McKinsey Quarterly* rolled off the printing presses, 50 years ago, nearly everyone in senior management thought that manufacturing operations had been perfected. Henry Ford's great innovation, the moving assembly line, had been refined over the previous five decades, had served as the arsenal of democracy during World War II, and by the mid-1960s was operating efficiently, at great scale, in a wide range of industries around the world.

Quietly, though, in Nagoya, Japan, Taiichi Ohno and his engineering colleagues at Toyota were perfecting what they came to call the Toyota production system, which we now know as lean production. Initially, lean was best known in the West by its tools: for example, *kaizen* workshops, where frontline workers solve knotty problems; *kanban*, the scheduling system for just-in-time production; and the *andon* cord, which, when pulled by any worker, causes a production line to stop. In more recent years, this early (and often superficial) understanding of lean has evolved into a richer appreciation of the power of its underlying management disciplines: putting customers first by truly understanding what they need and then delivering it efficiently; enabling workers to contribute to their fullest potential; constantly searching for better ways of working; and giving meaning to work by connecting a company's strategy and goals in a clear, coherent way across the organization.

Lean is one of the biggest management ideas of the past 50 years. No less than Ford's original assembly line, it has transformed how leading companies think about operations—starting in assembly plants and other factory settings and moving more recently into services ranging from retailing and health care to financial services, IT, and even the public sector. Yet despite lean's trajectory, broad influence, and level of general familiarity among senior executives, it would be a mistake to think that it has reached its full potential.

Indeed, we believe that as senior executives gain more exposure to lean and deepen their understanding of its principles and disciplines, they will seek to drive even more value from it. The opportunities available to them are considerable. For example, powerful new data sources are becoming available, along with analytical tools that make ever more sophisticated frontline problem solving possible. Similarly, leading-edge companies are discovering that lean can supply strong insights about the next frontiers of energy efficiency. Toyota itself is pushing the boundaries of lean, rethinking the art of the possible in production-line changeovers, for example, and bringing customer input more directly into factories. And leading service-based companies such as Amazon.com are extending the value of lean further still, into areas beyond manufacturing (see “When Toyota met e-commerce: Lean at Amazon,” on [mckinsey.com](http://mckinsey.com)).

What's more, new technologies, new analytical tools, and new ways of looking at customers are making it possible, with greater precision than ever before, to learn what they truly value. The implications are profound because one of the primary constraints on the ability to design a perfect lean system in any operating environment has always been the challenge of understanding customer value, lean's ultimate “north star.” In this article, we'll highlight the advances that could make it possible to translate what customers value into additional improvements and help to bridge the age-old gaps among operations, marketing, and product development—groups that have historically occupied separate silos.

## When lean met services

The present round of improvements won't be the first time lean has catalyzed management innovation by bringing together what seemed to be strange bedfellows. The first time around, lean operating principles were applied to service industries that had not previously thought of themselves as having factory-like characteristics. Consider these examples from the *Quarterly* during lean's early forays into services:

### “ Retail banking

Since it involves a physical process not unlike an assembly line, the handling of paper checks and credit-card slips lends itself readily to lean-manufacturing techniques. And their impact can be dramatic: the faster a bank moves checks through its system, the sooner it can collect its funds and the better its returns on invested capital. ”

Devereaux A. Clifford, Anthony R. Goland, and John Hall, “First National Toyota,” *McKinsey Quarterly*, November 1998, [mckinsey.com](http://mckinsey.com).

### “ Hospitals

Obviously, a hospital isn't an automobile factory, and people—especially sick ones—are less predictable than car parts. Nevertheless, hospitals, which usually have far fewer discrete stages to worry about than do major manufacturers, can often reduce their variability a good deal. ”

Paul D. Mango and Louis A. Shapiro, “Hospitals get serious about operations,” *McKinsey Quarterly*, May 2001, [mckinsey.com](http://mckinsey.com).



## Airlines

Aircraft worth \$100 million or more routinely sit idle at gates. Turnaround times between flights typically vary by upward of 30 percent. Lean techniques cut hours to minutes with a [new] changeover system. . . . ”

Stephen J. Doig, Adam Howard, and Ronald C. Ritter, “The hidden value in airline operations,” *McKinsey Quarterly*, November 2003, mckinsey.com.

### Eliminating delays

**Minutes and seconds per step** for Airbus A320 single-aisle medium-range airliner (disguised example)

	Turnaround time between flights			Lean techniques
	Average	Best practice	Potential reduction <sup>1</sup>	
Unload passengers <sup>2</sup>	6:14	4:38	1:36	Stricter controls on carry-on bags, fewer passengers moving back in aisle to find bag
Wait for cleaning crew to board aircraft	0:24	0:18	0:06	Cleaning crew in position ahead of time
Clean airplane	11:48	9:40	2:08	Standardized work flow, timing, and methods, such as cleaning supplies in prearranged kits
Wait for transmission to gate of cabin crew's approval to board	4:11	0	4:11	Visual signal from cabin crew to agent when plane is ready to board—for example, light flashing at top of ramp
Wait for first passenger to board	4:06	0	4:06	
Load passengers	19:32	16:00	3:32	Active management of overhead storage bins by flight attendants
Wait for passenger-information list	1:58	0:13	1:45	Passenger-information list delivered by agent following last passenger to board
Close aircraft door	0:57	0:09	0:48	Agent ready at aircraft to close door
Detach boarding ramp	1:39	0:43	0:56	
<b>Total time (including initial steps<sup>2</sup>)</b>	<b>52:18</b>	<b>33:11</b>	<b>19:07</b>	

<sup>1</sup>Assumes rudimentary application of lean techniques; further reductions may be possible.

<sup>2</sup>Time for initial steps (attaching boarding ramp, opening aircraft door, and waiting for first passenger to deplane) can't be significantly reduced.

## “ Restaurants

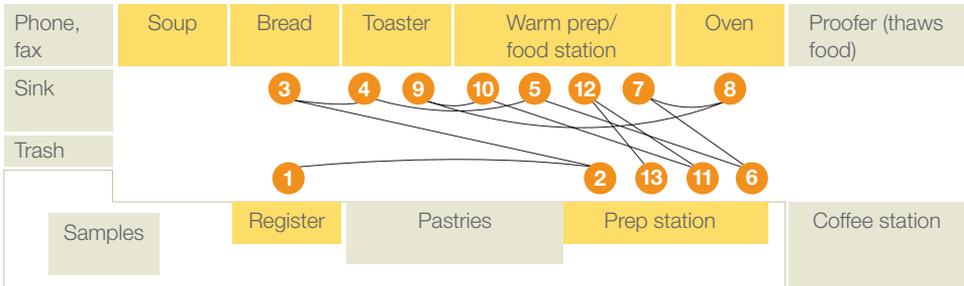
Lean techniques seek to improve product and service quality while simultaneously reducing waste and labor costs. For food-service operators, the additional trick is to link such improvements to customer loyalty. ”

John R. McPherson and Adrian V. Mitchell, “Lean cuisine,” *McKinsey Quarterly*, February 2005, mckinsey.com.

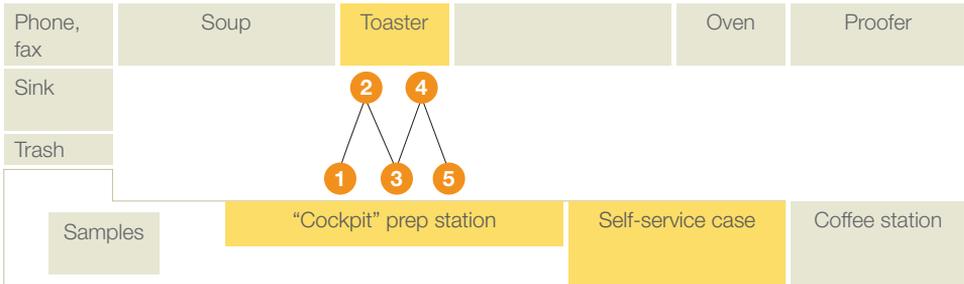
### Standardizing procedures saves time.

Service steps for fulfilling order (example: hot chicken sandwich)

#### Before improvements



#### After improvements



Reduced preparation time for ...

... a breakfast sandwich by **51 seconds**

... a lunch sandwich by **1 minute, 11 seconds**

## “ Asset management

Power companies use ‘peaker’ plants to manage spikes in electricity demand flexibly and cost-effectively. Likewise, managers in many back-office processing environments can make them more flexible and remove waste to boot by organizing transactions or activities according to their variability and then assigning different ones to baseload or swing teams. ”

Dan Devroye and Andy Eichfeld, “Taming demand variability in back-office services,” *McKinsey Quarterly*, September 2009, mckinsey.com.

## New horizons

As these examples suggest, lean is hardly stationary. Indeed, as senior managers' understanding of lean continues to develop, we expect it to further permeate service environments around the world. In the past few years alone, we've observed lean's successful application to mortgage processing in India, customer-experience improvements in a Colombian pension fund, better and faster processing of political-asylum requests in Sweden, and the streamlining of business services in the United Arab Emirates.<sup>1</sup>

In the years ahead, service and product companies alike will increasingly be able to reach their long-term goal of eliminating waste as defined directly by customers across their entire life cycle—or journey—with a company.<sup>2</sup> For example, an unprecedented amount of product-performance data is now available through machine telematics. These small data sensors monitor installed equipment in the field and give companies insights into how and where products are used, how they perform, the conditions they experience, and how and why they break down. A number of aerospace and industrial-equipment companies are starting to tap into this information. They are learning—directly from customer experience with their products—about issues such as the reliability of giant marine engines and mining equipment or the fuel efficiency of highway trucks in different types of weather.

The next step is to link this information back to product design and marketing—for example, by tailoring variations in products to the precise environmental conditions in which customers use them. Savvy companies will use the data to show customers evidence of unmet needs they may not even be aware of and to eliminate product or service capabilities that aren't useful to them.<sup>3</sup> Applying lean techniques to all these new insights arising at the interface of marketing, product development, and operations should enable

<sup>1</sup> To learn more about these and other examples, see *The Lean Management Enterprise: A system for daily progress, meaningful purpose, and lasting value* (January 2014), a collection of articles available at [mckinsey.com/leanmanagement](http://mckinsey.com/leanmanagement).

<sup>2</sup> For more about customer journeys, see Ewan Duncan, Conor Jones, and Alex Rawson, "The truth about customer experience," *Harvard Business Review*, 2013, Volume 91, Issue 9, pp. 90–98.

<sup>3</sup> See Ananth Narayanan, Asutosh Padhi, and Jim Williams, "Designing products for value," *McKinsey Quarterly*, October 2012, [mckinsey.com](http://mckinsey.com).

companies to make new strides in delighting their customers and boosting productivity.

Information about customers won't be coming only from sensors and databases. The understanding of what makes people tick has been improving dramatically, and companies are starting, more and more, to apply psychology to their operations.<sup>4</sup> Disney, for example, recognized that visitors in its theme parks respond to different emotional cues at different times of the day and embedded this realization into its operations in precise ways. In the morning, for example, Disney employees are encouraged to communicate in a more inspirational style, which resonates with eager families just starting out their day at the park. In the late afternoon (when children are tired and nerves become frayed), employees aim for a more calming and supportive style of communication. The integration of these psychological insights with Disney's operating philosophy allows the company to eliminate waste of a different sort: employee behavior that would not be desired by customers and might inadvertently alienate them at certain times of the day.

Finally, market- and consumer-insight tools (for instance, statistically based regression analysis, as well as advanced pricing- and financial-modeling tools) are creating a far more sophisticated (and much closer to real-time) view of what customers value. The changes may just be getting started. Better-integrated datasets across channels and touch points are rapidly enabling companies to get much more complete views of all interactions with customers during the journeys they take as they evaluate, buy, consume, and seek support for products and services. Usage patterns of mobile devices and services are painting a richer picture than companies previously enjoyed.

The end result should be more scientific insight into how product and service attributes contribute to customer value; new ways to look at what matters most for classic lean variables, such as lead time, cost, quality, responsiveness, flexibility, and reliability; and

<sup>4</sup> See John DeVine and Keith Gilson, "Using behavioral science to improve the customer experience," *McKinsey Quarterly*, February 2010, [mckinsey.com](http://mckinsey.com).

new opportunities for cross-functional problem solving to eliminate anything that strays from customer-defined value.



The future of lean is exciting. Its tools for eliminating waste and for increasing value as customers define it are being enhanced by huge gains in the volume and quality of the information companies can gather about customer behavior, the value of the marketing insights that can be integrated with operations, and the sophistication of the psychological insights brought to bear on the customer's needs and desires. These advances bring new meaning to the classic lean maxim "learning to see." The contrast between where companies are now and where they'll be 20 years on will seem as stark as the difference between a static color photograph and a high-definition, three-dimensional video. ○

*The authors wish to thank Jeff James, vice president of the Disney Institute, for his contribution to this article.*

**Ewan Duncan** is a principal in McKinsey's Seattle office, and **Ron Ritter** is a principal in the Miami office.