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The CFO Imperative:
Next-Gen Technology Drives Cost Optimization

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A perennial challenge for CFOs is finding the right balance between spending and investing without hampering productivity and competitiveness. In the mobile age, this balancing act is more important than ever if companies want to stay one step ahead of disruptors. "In the age of digital business, cost optimization takes on new dimensions. The pressure to remain competitive and invest in digital initiatives is increasing across industries," according to a February 2016 Gartner report[1].

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Cost-optimization strategies must include IT and business initiatives to make sure investments are maximized for long-term growth and profits. In this effort, next-generation technology such as machine learning becomes a critical partner. "There's an old saying, 'don't be penny wise and pound foolish'," says Steven Kimbrough, Wharton professor of operations, information and decisions. Instead of focusing on cost minimization, "what you're doing with cost optimization is looking at the bigger picture. You're taking a wider, broader look." Such a viewpoint is critical if a company wishes to keep growing, because myopic actions like sweeping cuts can hurt the firm's future if it means losing experienced workers and gutting operational units.

In cost optimization, "the role of technology is clear," Kimbrough adds. It provides management with more data and analysis so the executive can make the best decisions possible for sustainable growth. The broader and longer viewpoint also encourages experimentation because it gives the company more time, wherewithal and organizational room to try new things since not all initiatives succeed. "What you want to do is set up the right portfolio, some of which can yield something new."

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—Suprio Sengupta, NTT DATA Services

Suprio Sengupta, senior vice president and global delivery head, infrastructure and cloud computing at NTT DATA Services, says that cost optimization is also about understanding how you could do more with what you already have. As the company maximizes the use of its assets, it gains efficiency and productivity. "An obvious outcome from cost optimization is that you become more competitive."

Ways to optimize with technology include automating processes, such as using robotics in manufacturing. Process improvements also could include adoption of cloud platforms where businesses benefit from efficiency and scalability. For example, an engineer managing 200 servers could expand his purview to 20,000 servers with software tools available in the cloud.

"In such a software-defined environment, you don't manage each of the elements individually, but manage all of those by a software-defined tool," Sengupta says. He recommends that it is critical to create more of "a conscious culture" in a firm that looks at and refreshes processes regularly with an eye for optimization.

Data analytics is another tool that aids cost optimization. For example, it can help companies determine where to cut costs and personnel as well as identify areas ripe for investment. Machine-learning, as a facet of artificial intelligence, also boosts optimization by being able to automatically detect and bring software fixes to points of inefficiency in operations, reducing human error and the need for human intervention.

While earlier generations of these solutions, such as auto-healing or self-healing technologies, also triggered automatic fixes to problems without requiring human intervention, they operated in an environment where "the business logic is static," says Sengupta. For

example, they can detect and repair a browser malfunction on a computer so the user does not have to contact the company's call center. But that's where it usually ends.

In contrast, machine-learning solutions continuously evolve. They begin with a default set of business rules but track changes in the operating environment to provide up-to-date solutions. Such software tools use data analytics to identify inefficiencies in operations, and fix recurring patterns of malfunctions or weak links with continually refreshed learning from operational data.

"People are trying to figure out relationships between different factors that contribute to costs and performance, and how they could maintain the same performance while reducing costs."
—Rahul Mangharam, University of Pennsylavnia

Machine-learning and Energy Savings

Machine-learning uses data to make "predictions and inferences on aspects that contribute to outcomes," says Rahul Mangharam, a professor at the University of Pennsylvania's department of electrical and systems engineering. "People are trying to figure out relationships between different factors that contribute to costs and
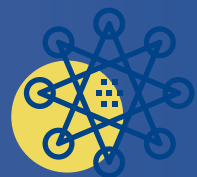
WAYS TO OPTIMIZE

PROCESS AUTOMATION

CLOUD PLATFORMS

DATA ANALYTICS

MACHINE-LEARNING

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Mangharam uses machine-learning to help achieve energy savings across 185 university buildings. Those edifices pay electric bills of $28 million annually for using an average of 70 megawatts a day – enough to power about a thousand homes. His tool is DR-Advisor, a data-driven demand response recommendation system that he and others created at the university.

DR-Advisor analyzes energy usage data from each building, overlaying that with other data, such as weather patterns or activities conducted within those buildings. It tracks more than 220,000 "knobs," or control points that measure indicators such as temperatures and pressure in campus buildings.

That exercise allows DR-Advisor to predict energy usage by the hour in each building, and advise facilities managers about which knobs to tweak to increase efficiency. In pilot trials at one university building this past summer, DR-Advisor's tools helped cut the usual four-month energy bill of $125,000 by more than a third, or $45,000. Plans are to extend those trials to more university buildings in the near future, says Mangharam.

DR-Advisor is also looking at using its technology in industrial settings such as refineries and boiler plants. For example, it could help a power company understand the extent to which it could use lower-grade fuel, which spews more carbon dioxide, before it begins to attract penalties from regulators and books higher costs, says Mangharam. Consumer and industrial products conglomerate Honeywell is in talks with DR-Advisor to use its machine-learning tools in industrial buildings.

As an evolving technology, machine-learning has its share of limitations. Current research is focused on the big challenges of "interpretability" and "provenance," says Mangharam. Interpretability is understanding why machine-learning tools made certain choices, looking backwards from the results they generated. Provenance is the historical record of the data and its origins. That's because machine-learning in some ways is like a "black box," where it is unclear why it makes these choices in cost optimization, such as in the University of Pennsylvania experiment, Mangharam says.

Global Crisis Management

Today's CFOs are embracing cost optimization as a formal objective that is continuously pursued. For example, instead of "mindless cost cutting" by reducing headcount, a technology services provider could use "nonlinear" ways to improve productivity, Sengupta says. These would include automation of certain processes and re-evaluating the existing mix of typically costlier onshore engineers and less expensive offshore employees for maximum cost efficiency. "Often we find costlier people doing relatively simple work," says Sengupta.

But as companies use technology to control costs, they should not allow that to weaken their competitiveness. For example, heavy layoffs may leave an organization understaffed in crisis situations. Here, centrally-managed global crisis management teams could help them stay prepared, advises Sengupta.

Elsewhere, technology interventions can lead to unintended consequences. Data analytics, for example, certainly enables firms to achieve process-related improvements but not

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necessarily with brand new innovation. That was the key finding of a recent research paper by Lynn Wu and Lorin Hitt, both professors in Wharton's department of operations, information and decisions.

> *"If data on existing processes is analyzed efficiently, it can help improve firms' productivity."*
>
> **—Lynn Wu, Wharton**

Their research tracked how data analysis and IT skills influenced innovation and process-oriented practices among 330 large firms between 1987 and 2007. "If data on existing processes is analyzed efficiently, it can help improve firms' productivity," says Wu. However, the research did not find a similar, positive effect of data analytics on innovation.

Further, the Wharton experts tracked patent filings by the firms they studied and found that data analytics could have a "negative effect" on pursuing riskier paths of innovation. "If a firm finds that data-related innovation is cheaper

to generate, it might focus on that and not pursue truly novel innovation or risky innovation because that is harder and the returns are uncertain," says Wu.

In the end, technology brings substantial cost-optimization benefits, but it is not a substitute for human judgment -- at least for now. "Truly creative things happen through unique judgments," Wu says. "You need to have leaps in imagination." She points to the Wright Brothers' invention of the airplane after watching birds fly. "Maybe one day, machines and artificial intelligence could do that."

Summary:

Technology plays an important part as organizations try to manage costs while improving competitiveness. Emerging technologies such as machine-learning promise agility, scalability and opportunities to prune costs, but adoption is still in the early stages. To gain full benefits from cost optimization, companies must also institute the right culture and process disciplines.

1. Gartner, Cost Optimization in the Age of Digital Business, 29 February 2016.

KEY TAKEAWAYS

CREATE THE RIGHT STRUCTURE: A corporate structure that enables constant monitoring of costs to be optimized can more ably divert capital to meet new business needs without sacrificing longer-term strategic objectives.

REFRESH PROCESSES: Incorporate processes around business continuity. It is critical to create more of "a conscious culture" in a firm that looks at and refreshes processes regularly with an eye for optimization.

RETAIN YOUR EDGE: As companies cut costs, they should not let it hamper their competitiveness. For example, deep headcount cuts could leave an organization understaffed in crisis situations. Taking a broader, longer-term view would lead to strategic reductions without hurting competitiveness.

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