February 2016

McKinsey Quarterly

BIG DATA: GETTING A BETTER READ ON PERFORMANCE

The benefits match those of earlier technology cycles, but companies must scale up their data-analytics skills to reap the gains.

by Jacques Bughin

Over the past several years, many companies have avidly pursued the promised benefits of big data and advanced analytics. In a recent McKinsey survey of executives in this field, nearly all of them said that their organizations had made significant investments, from data warehouses to analytics programs.[1] But practitioners have raised questions about the magnitude and timing of the returns on such investments. In 2014, for example, we conducted a poll of senior executives and found that they had seen only modest revenue and cost improvements from them in the previous year.[2]

Our latest research investigated the returns on big data investments for a random sample of 714 companies around the world, encompassing a mix of industries and company sizes typical of most advanced economies.[3] Our findings paint a more nuanced picture of data analytics. When we evaluated its profitability and value-added productivity benefits, we found that they appear to be substantial—similar, in fact, to those experienced during earlier periods of intense IT investment. Our results indicated that to produce these significant returns, companies need to invest substantially in data-analytics talent and in big data IT capabilities.[4]

Yet we also found that while data-analytics investments significantly increased value-added or operating profits, the simple revenue impact for consumer companies was considerably lower. This finding, mirrored among B2B companies on the cost side, appears to confirm the intuition of executives struggling to uncover simple performance correlations. The time frame of the analysis also seems to be important, since broader performance improvements from

large-scale investments in data-analytics talent often don't appear right away.

Analyzing data analytics

The research avoided overweighting technology companies, since many denizens of the C-suite say that "we know that digital natives capture big returns, but does their experience apply to those of us who live in a hard-wired universe of factories and distribution channels?" Operating profit was used to measure returns, since it captures the impact of big data both through value-added productivity and pricing power (often resulting from better customer targeting). The data also allowed us to understand other aspects of the returns on these investments—for example, the advantages of being the first data-analytics mover in a given market.[5]

We took care to measure the returns from technologies specifically linked to big data and therefore considered only analytics investments tied to data architecture (such as servers and data-management tools) that can handle really *big* data. Looking beyond capital spending, we assessed complementary investments in big data talent across eight key roles, such as data scientists, analysts, and architects. Finally, we examined whether improvements were radiating throughout organizations or captured only in narrower functions or individual businesses.

Gauging performance

Our research looked at the results of big data spending across three major business domains—operations, customer-facing functions, and strategic and business intelligence. These were our key findings:

Big data's returns resemble those of earlier IT-investment cycles.

History tells us that it takes time for new technologies to gather force and diffuse throughout an economy, ultimately producing tangible benefits for companies.[6] Big data analytics—the most recent major technology wave—appears to be following that pattern. The average initial increase in profits from big data investments was 6 percent for the companies we studied. That increased to 9 percent for investments spanning five years, since the companies that made them presumably benefited from the greater diffusion of data analytics over that period.[7] Looked at from another vantage point, big data investments amounted to 0.6 percent of corporate revenues and returned a multiple of 1.4 times that level of investment, increasing to 2.0 times over five years. That's not only in the range of the 1.1 to 1.9 multiples observed in the computer-investment cycle of the '80s but also exceeds the multiples others have identified for R&D and marketing expenditures.[8]

Investments are profitable across key business domains.

Companies, we found, benefit broadly from big data investments. With minor variations, spending on analytics to gain competitive intelligence on future market conditions, to target customers more successfully, and to optimize

operations and supply chains generated operating-profit increases in the 6 percent range. Although companies struggle to roll out big data initiatives across the whole organization, these results suggest that efforts to democratize usage—getting analytics tools in the hands of as many different kinds of frontline employees as possible—will yield broad performance improvements.

Understanding investment patterns

Three aspects of big data investments determine the magnitude of these performance improvements:

Investing early augments the benefits.

Our research helped us identify how significantly early investments in big data analytics can raise the pace at which operating profits improve: first movers accounted for about 25 percent of the increase in our sample. One possible explanation is that early adoption allows companies to learn by trial and error how best to design data-analytics technology and integrate it into their workflows. This, in turn, could create valuable capabilities that help companies differentiate themselves from competitors. If the cycle continues as increasingly powerful data-analytics applications come on stream, the importance of rapid experimentation and learning—and of leaders who feel comfortable with this approach—could rise.

Combining investments in IT and skills is decisive.

Many companies still compartmentalize their data-analytics initiatives—for example, by making IT-architecture investments in isolation. That's a mistake: about 40 percent of the profit improvements we measured resulted from complementary and coordinated investments both in IT and in big data talent. Organizational constraints can make such gains difficult to achieve, of course, since companies often silo their investments. For instance, the IT or technology department is commonly tasked with determining the level of big data investments needed, while business units and HR departments draft their own spending plans for employee resources.

We find that when companies fully coordinate their investments in IT capital with those in skilled roles, performance improves substantially. Here's an example of what happens when they don't coordinate them: one company's large investment in database-management software foundered when HR neglected to hire the analysts needed to support the new data-driven business priorities. Experience also tells us that in the most capable organizations, a chief data or analytics officer often coordinates IT spending with efforts to acquire analytical talent across business units.

Investing in big data talent at scale is a must.

Skilled employees across the spectrum of data-analytics roles are in short supply, so aggressive actions to address this problem are critical. Our study found that 15 percent of operating-profit increases from big data analytics were linked to the hiring of data and analytics experts. Best-practice companies rarely cherry-

pick one or two specialist profiles to address isolated challenges. Instead, they build departments at scale from the start. With a broad range of talent, these companies can use data analytics to address the current challenges of their functional areas while developing forward-facing applications to stay ahead of competitors.

Combined, these three investment characteristics account for about 80 percent of the operating-profit increases in our study. Staying on top of new developments, carefully balancing investments in skills and technologies, and becoming a magnet for cutting-edge talent will be the paramount considerations for leaders keen to turn their modest data-analytics gains into broader and more substantial ones. Q

[1] In mid-2015, McKinsey polled 20 industry-leading analytics executives on their investments to date. The results, while not scientific, were instructive: 90 percent reported medium-to-high levels of data-analytics investment, 30 percent called their investments "very significant," and 20 percent said data analytics was the single most important way to achieve competitive advantage.

[2] See David Court, "Getting big impact from big data," *McKinsey Quarterly*, January 2015, mckinsey.com.

[3] These investments include a full range of spending on big data software, analytics, hardware, and data-analytics talent. We used company data to calculate operating profits and value added.

[4] Data were for the year 2013. For the complete set of findings and methodology, see Jacques Bughin, "Big data, big bang?," *Journal of Big Data*, January 2016, journalofbigdata.com.

[5] For additional analysis of big data returns, see Russell Walker, *From Big Data to Big Profits: Success with Data and Analytics*, New York: Oxford University Press, 2015.

[6] In 1987, Nobel Prize laureate Robert Solow, who studied productivity effects of adopting computers, famously remarked, "You can see the computer age everywhere but in the productivity statistics."

[7] In the operating-profit measure we account for the tendency of the most productive companies also to be early big data adopters.

[8] See Sunil Mithas et al., "The impact of IT investment on profits," *Sloan Management Review*, March 20, 2012, sloanreview.mit.edu; and Sunil Mithas et al., "Information technology and firm profitability: Mechanisms and empirical evidence," *MIS Quarterly*, 2012, Volume 36, Number 1, pp. 205–24, misq.org.

Jacques Bughin is a director in McKinsey's Brussels office.