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Sustaining an Analytics Advantage

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[ANALYTICS]

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BY PETER C. BELL

Sustaining a competitive advantage through analytics is a top challenge for today's leaders. After all, so much of contemporary analytics amounts to what you could call "table stakes." In other words, a rudimentary level of analytics is now essential for business survival, since most companies are using analytics. One significant corollary of this — the increasingly commonplace use of analytics — is that analytics use is no longer an automatic source of competitive advantage.

As an example, consider pricing in the airline industry. There is strong evidence that American Airlines maintained a revenue advantage through its pricing analytics from 1985 to about 1995. Today, however, the analytics of airline pricing has evolved. There are many specialist providers of airline pricing solutions. And almost every airline employs the same basic methodology to maximize revenue per seat mile flown. Though the airlines still spend large sums on pricing analytics, the cost is just the price of survival. There is little evidence that today's analytics have given one airline or another a revenue advantage.

Does this mean that all early adopters of analytics are bound to lose their initial competitive advantage, once their analytics foresight becomes an industry standard? Not at all. In fact, there are several examples of companies that have maintained a competitive advantage through analytics for many years — even decades.

How have they done this? And what are the lessons for today's corporate leaders? Research over a 30-year period suggests that there have been five basic ways in which companies have sustained an advantage generated through analytics:

1 **Keep your analytics secret.** In the 1990s, Wal-Mart Stores Inc. was collecting excellent data and developing advanced, sophisticated algorithms for its supply-chain management (including inventory sizing, order fulfillment, warehouse management and shipping). However, through the years, Wal-Mart has been canny about revealing the details of its supply-chain analytics. As a result, there is very little written on the analytics driving the company's supply chain. Competitors cannot buy off-the-shelf Wal-Mart supply-chain analytics.

This may be the result of a conscious effort by Wal-Mart, since the company is more

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COURTESY OF WAL-MART

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open about its other analytics. For example, Wal-Mart uses offshore analytics business process outsourcing in India for some of its reporting analytics. That would not normally be a good strategy if maintaining confidentiality was essential. Wal-Mart also hosts conferences where the company shares and encourages discussion of consumer choice and human resources analytics. Nonetheless, it is very difficult to obtain real insight into the logic behind Wal-Mart's supply-chain algorithms.

Keeping analytics secret typically requires maintaining an in-house analytics team that stays together — and focused on internal solutions — for several years. That is not always easy, given the potential such groups have to generate revenue. In fact, there have been a number of examples of in-house groups spinning out to form stand-alone entities supplying solutions for the entire industry. For example, Sabre Corp., based in Southlake, Texas, was originally spun out from AMR Corp., which at the time was the parent company of American Airlines. The founders of Houston-based Gurobi Optimization Inc. previously worked on developing what is now IBM ILOG CPLEX optimization software.

In general, retaining analytics talent is not easy. Individuals and teams usually have ample opportunities to jump ship for fertile ground elsewhere. Therefore, managing a sustained advantage from analytics requires recognition and nurturing of key employees. In addition, management must decide which analytics strategies should be restricted, and which ones should be deliberately sold or publicized in an effort to generate revenues or court external solutions.

2 Implement the analytics fast and defeat your competitors before they can react. Not long after ABB Electric entered the industrial transformer market in the 1970s, the market suffered a dramatic downturn. The crisis compelled ABB to develop sophisticated customer-choice analytics in the 1970s and 1980s so they could better understand their customers' needs and identify "switchable" customers (both current customers who might leave and others they might attract).

The results were so successful that in the years following implementation, six transformer companies exited the category. In addition, competitors such as Westinghouse and GE closed major manufacturing plants. ABB Electric's then-CEO attributed the business's success and survival to its analytics. (The industrial transformer division of ABB Electric was eventually sold due to antitrust concerns.)

The management lesson here is that analytics can be effective in a time of intense competition, when the analytics first-mover advantage becomes magnified. In other words, when the competition is really tough, it may be easier for the competitor to concede defeat than to plan a catch-up investment.

3 Apply your analytics to the right problems. There's an active debate on how companies should start using analytics. The most popular recommendation is to start with proverbial "low-hanging fruit" — easy problems whose solutions would produce quick savings or gains. The downside of this "low-hanging fruit" strategy is that the analytics for these small problems are easily replicated. Consequently, if competitors notice any impact, your advantage will erode once they replicate your methods. Companies that have sustained an advantage from analytics have often taken a different approach, focusing on a large, critical problem rather than a low-hanging one.

For example, Procter & Gamble (P&G) uses advanced analytics to reengineer its global supply chains. By collecting massive amounts of data and using this data to measure and optimize supply chains, P&G's analytics employees are arguably as important to its overall success as the company's storied brand managers. As a result of the analytics group's findings, manufacturing plants, production facilities and warehouses have closed or been relocated; shipping patterns have been reworked. At one point, the analytics group's recommendations for the North American supply chain generated more than $1 billion in savings.

Another company that has sustained an advantage by focusing on a large, critical problem is Industrial and Commercial Bank of China Ltd. (ICBC), based in Beijing. With thousands of branches throughout China, ICBC is the world's largest bank. Recognizing that the branch network is a key strategic asset of the bank, ICBC set out to design and maintain the best possible branch network.

In 2006, ICBC partnered with IBM and began development of ICBC's branch network optimization system. This system was driven by a market potential model where each city was divided into tens of thousands of 100-meter square cells. The business activity and demographic data for each cell was identified from GIS databases. This data was refined using human opinion and advanced analytics. Coupled with expert judgment, ICBC used the data to learn which cells offered the best locations for new branches, taking into account market potential, competitors' locations and existing branches.

ICBC has now implemented this process in more than 40 major cities in China. Despite some superb results, ICBC still finds itself facing an ever-shifting problem. As China's economy expands and modernizes, the centers of business and customer activity move around, with new urban districts and satellite cities emerging — and personal wealth increasing. These fast-changing conditions and the competitiveness of the Chinese banking market have made it essential for ICBC to continuously identify new high-potential locations in which to open branches or move and reconfigure existing branches. To address the ongoing nature of

the challenge, ICBC has trained more than 500 employees to use the branch location analytics system.

Given the technology and employee headcount required to continually address its bank branch location challenges, ICBC has indeed created for itself a sustainable competitive advantage over other banks. After all, the branches evolve and develop in response to hundreds of feedback loops over time from the analytics. These changes add to the time it takes for new entrants to catch up and take away the advantage.

4 Recognize that sometimes control of the data is more important than control of the analytics. "Analytics" can be thought of as data and the algorithms that extract useful information from that data. Some companies that have sustained an advantage from their analytics have done so by keeping tight control of their data while allowing access to their algorithms, in some cases selling their algorithms. The following example illustrates how and why this can make timely replication of the company's analytic success almost impossible.

American Airlines (AA) was the master of air crew scheduling in the 1990s, when it was widely recognized that AA had lower crew costs than its competitors. During this same period, AA marketed its crew-scheduling software to competing airlines. How did the company maintain its advantage while selling the ostensible solution? The answer is that AA sold its algorithms — which were pretty basic — but kept a grasp on the data needed to use the algorithms most effectively.

To understand how this worked, we need a small explanatory digression. Aircrews work "tours," where a crew begins at a crew base (where they live). They then fly a series of flights around the network that may include overnight stays away from home. After the series, they end up back at their base. For a large airline (like AA), there

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are a large number of tours lasting one day (where the crew is home every night); many more tours in which the crew stays away from home overnight once; and even more tours involving multiple overnight stays. Each tour has to be devised taking into account the flight schedule, where the crews live, and the complex work rules governing working hours. Each crew tour also has a cost. The algorithm producing the crew schedules selects the set of tours covering all the required flights at minimum cost. While there is some customization that can speed up the algorithms for this particular problem, the slower, basic integer-optimization algorithm can be purchased off-the-shelf from a variety of vendors.

AA management recognized that their first-mover advantage in air crew scheduling came from their vast library of crew tours — not the selection algorithm itself. They were able to maintain this advantage by working for more than 10 years on improving and extending this library —including developing computer codes that could generate millions of new potential tours every week. In addition, they moved crew bases around to add potential new tours and extend the maximum duration of the tours. AA also reduced the costs of existing and potential tours by negotiating changes in crew work rules, after they had tried the new conditions through their system and understood the financial benefits of these changes.

While doing all this, AA generated extra revenue by selling the scheduling system to its competitors, recognizing it would take years for competitors to develop as effective a library of tours as AA's own. AA also knew that developing a library was only the first step. Competitors would also have to make changes in crew locations and master contract work rules and flight schedules, in order to build a library that would lead to competitive crew costs with AA.

The bottom line here is this: Today's pricing, supply-chain management and other advanced analytics systems are data-rich applications where the established player has a data advantage over the new entrant. The lesson for management is to own and keep tight control of the data driving the strategic analytics, even though the analytics themselves can be sold to others.

5 Become a truly data-driven corporation. While it has proven difficult to sustain a long-term advantage by applying analytics to one or two small projects, there have been cases where a company applies analytics to so many small projects that it emerges as a truly data-driven corporation, maintaining an advantage for years. FedEx and IBM are well-known examples of companies where numerous early analytics successes produced a senior management culture where analytics was regularly used to inform important decisions. However, discussions of the data-driven company today almost always gravitate towards Amazon.com Inc.

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The fact that Amazon founder and CEO Jeff Bezos was educated as an engineer may explain why Amazon today is a leading data-driven company using a factual, experimental approach to constant innovation. "We have our own internal experimentation platform called 'Weblab,' that we use to evaluate improvements to our websites and products," noted Bezos in an April 2014 letter to Amazon shareholders. "In 2013, we ran 1,976 Weblabs worldwide, up from 1,092 in 2012, and 546 in 2011."

Amazon is one of only a very few companies whose annual report regularly includes a host of terms from analytics. "We use high-performance transactions systems, complex rendering and object caching, workflow and queuing systems, business intelligence and data analytics, machine learning and pattern recognition, neural networks and probabilistic decision making, and a wide variety of other techniques," noted Bezos in a 2010 letter to shareholders.

Moreover, Bezos invented the Amazon business model from scratch. His strategy was one of constant innovation supported through experimentation, data collection and analytics. While Amazon's storied warehouses and supplier list garner many headlines, Amazon's analytics algorithms and capabilities are arguably its most important strategic asset.

Analytics at Amazon has clearly enjoyed exceptional CEO support. However, there is strong evidence that, in general, for an analytics group to emerge as a strategic asset of a corporation, senior management backing is essential. That said, the benefit of strong CEO support also has risks: One prizewinning analytics group in a major international corporation was relegated to working on minor projects following a change in CEO. The new CEO was a more intuitive decision maker and was less open to recommendations based on analytics. The upshot is that for an analytics group to maintain a position of great prominence in a company, it will need to display some political acumen during periods of transition in upper management in order to generate and maintain crucial leadership support.

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