THE LIMITS OF BIG DATA'S COMPETITIVE EDGE

Anja Lambrecht and Catherine E. Tucker

To extract more value and competitiveness from big data, businesses need to strengthen their strategy, skills, and organizational competence — not their data.

There is plenty of hype around big data and its potential, but does it offer only operational advantages or can it provide sustainable competitive business advantage? One way to answer this question in a meaningful way is to look at big data using a classic framework called the 'resource-based view of the firm.' The framework states that for big data to provide competitive edge, it has to be inimitable, rare, valuable and non-substitutable.

Perhaps surprisingly, analysis suggests that big data doesn't meet these criteria: It is not inimitable or rare; substitutes exist, and by itself, big data is unlikely to be valuable. In fact, there are many alternative sources of data available reflecting the extent to which customers leave multiple digital footprints on the Internet. The digital economy offers many examples — such as Airbnb, Uber and Tinder — where a simple insight into customer needs allowed a startup to enter into markets where incumbents already had access to big data. Many successful companies end up amassing big data, but reverse causality is not necessarily the case; big data collection will not automatically lead to success.

In order to extract more value and competitiveness from big data, businesses need to institute the right skills and business strategy. To build sustainable competitive advantage in new, data-rich environments, businesses' focus must be on developing tools and organizational competence that lets them use big data to provide consumer value in previously impossible ways.

EXPLORING BIG DATA'S STRATEGIC VS. OPERATIONAL IMPLICATIONS

When we examine big data through the lens of 'the resource-based view' of the firm, we can view its claim to provide sustainable competitive advantage more objectively. The framework is useful because it sharply distinguishes between factors that enhance an entire industry and advantages that benefit a single firm. For there to be a sustainable competitive advantage, rivals must be unable to duplicate the benefits of a single firm, and unable to duplicate the benefits of their strategy or input. Specifically, as the offline economy goes digital, firms are naturally collecting big data-- distinguished by its volume, variety of formats and velocity-- meaning that data is recorded in real time.
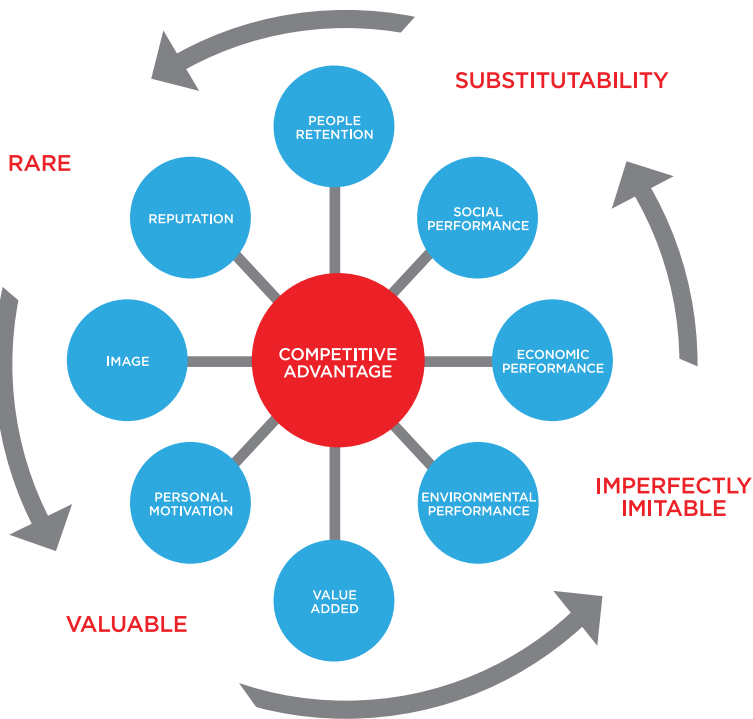
IN THIS RESEARCH BRIEF

- There is little evidence that the mere possession of big data is sufficient protection against a superior product offering.

- Only when big data is combined with managerial, engineering and analytic skill will it be valuable to business.

- Businesses need to develop tools and organizational competence that lets them use big data to provide consumer value in previously impossible ways.

- Successful companies have developed the ability to design, implement, evaluate and then act upon meaningful field experiments. It is this 'test-and-learn' environment coupled with the skill to take action on the insights that can make big data valuable.

MIT INITIATIVE ON THE DIGITAL ECONOMY

Businesses today are constantly exhorted to set strategies to collect and analyze big data and they are warned about the potential negative consequences of not doing so. However, the long-term strategic implications of big data, rather than its operational value, are unclear. Academic opinion differs on whether huge data availability will lead to a new type of competitive advantage or not. The question of whether big data can indeed confer sustainable competitive advantage is directly relevant to innovators and marketers in a wide variety of global industries -- from professional services to retail, health care to manufacturing, as well as governments and those involved with the Internet of Things. Nevertheless, the subject has received surprisingly little systematic attention.

The framework above offers perspective and suggests that for a resource to be a source of competitive advantage, it has to be inimitable, rare, valuable and non-substitutable. Each point is discussed as follows.

IS BIG DATA INIMITABLE?

For big data to be inimitable, no other firm should easily replicate the advantage. There are two underlying economic reasons why big data is unlikely to be inimitable. First, the data is non-rivalrous; meaning consumption of the good does not decrease its availability to others. Second, big data has a near-zero marginal cost of production and distribution, even over long distances. These two basic characteristics, combined with the fact that customers constantly leave footprints on the Internet, have led to a thriving industry where consumer-collected big data is resold and therefore, replicated.

Recent research in computer science has emphasized that by combining a myriad of external online profiles, third-party firms can gain huge insights into any one customer. In short, where a market for data exists, it is unlikely that big data is inimitable.

IS BIG DATA RARE?

For big data to be a rare resource, few other firms can possess it. Two key reasons prohibit this from holding true, however. First, large shifts in supply infrastructure and cloud-based storage have rendered the tools for gathering big data commonplace and inexpensive. This allows ever- smaller firms to access powerful computing resources. Additionally, free, open-source technologies such as Hadoop, let users analyze large datasets that are widely available and accessible to all.

BIG DATA ISN'T INIMITABLE OR RARE. SUBSTITUTES DO EXIST. AND BY ITSELF, BIG DATA IS UNLIKELY TO BE VALUABLE.

Second, as consumers' lives increasingly shift to the web, traces of their needs and preferences are everywhere. Firms that embrace these low-cost digital technologies have many opportunities to gather customer data. Indeed, such multi-homing -- the use of multiple digital services by consumers-- means that similar pieces of information are often available to many companies.

IS BIG DATA VALUABLE?

Much of the current managerial literature about big data value is focused on whether or not the data enhances profitable relationships with customers. In fact, by itself, big data is not sufficient to create profit-enhancing opportunities, due to three challenges: compatibility and integration; data's unstructured nature in forms like text and video; and the difficulty of establishing causal relationships within large pools of overlapping observational data.

The third challenge is the most important factor that limits big data's business value. Very large data sets usually contain a number of very similar or virtually identical observations that can lead to spurious correlations that may mislead managers in their decision making. A Sloan Management Review blog post emphasized that while many firms have access to big data, such data is not 'objective,' since the difficulty lies in distilling true actionable insights from the data.

THE SEARCH FOR COMPETITIVE ADVANTAGE IN THE NEW DIGITAL ECONOMY SHOULD FOCUS ON ATTRACTING THE KIND OF SKILLED WORKERS WHO ARE ABLE TO TRANSFORM BIG DATA INTO VALUABLE TOOLS.

Successful companies have developed the ability to design, implement, evaluate and then act upon meaningful field experiments. It is this 'test-and-learn' environment, coupled with the skill to take action on the insights, which can make big data valuable.

Once again, however, it is not the amount of the underlying data, but the ability to identify the critical pieces of information that best predict a customer's preferences. In other words, it is only when combined with managerial, engineering and analytic skill that data proves valuable to business. This suggests that for firms, the primary challenges lie in determining a big data strategy, implementing the systems and tools to analyze the data, and adapting organizational capabilities. It seems clear that the search for competitive advantage in the new digital economy should focus on attracting the kind of skilled workers who are able to transform big data into valuable tools.

IS BIG DATA NON-SUBSTITUTABLE?

For a resource such as big data to provide a sustainable competitive advantage, there cannot be other means of achieving success in the specific industry. Yet, in the digital world there are many examples of firms without any embedded data advantage that were still able to disrupt an industry and attract more customers because of a superior value proposition. Five settings where alternative capabilities—such as an easy-to-use interface, low cost, or a great idea-- have proved to be compelling substitutes to big data, and consequently where big data has not been a sufficiently sustainable source of competitive advantage, are described in the full research report, which you can view here.

The rise of the 'sharing economy' – and the ascent of Uber and Lyft—provides further evidence that access to big data is not required to build entirely new digital industries in traditional sectors. Airbnb entered a highly competitive industry where large travel companies have access to swathes of data and regularly run experiments to interpret their data in a meaningful way to constantly improve business practices. Nevertheless,

MIT
INITIATIVE ON THE
DIGITAL ECONOMY

Airbnb quickly became a dominant player because of its superior value proposition.

Industries where data is important for delivering a personalized experience, and where a personalized system of recommendations is particularly important—like online dating--could be another natural setting where big data might have few substitutes. However, Tinder entered the online dating market in September 2012 with no access to existing data and quickly became a dominant player with 1.6 billion Tinder profiles, making more than 26 million matches per day (as of April 2015). Tinder succeeded not because of big data, but because it offers a better solution for its market. Critically, this included a simple, game-like 'swipe-right' user-interface and a 'double opt-in' for matches, where both users must agree before they can message each other.

Overall, in a similar manner to the offline world, online success is determined by a superior ability to understand and meet customer needs. Digital business shows little evidence that the mere possession of big data is sufficient protection for an incumbent against a superior product offering.

IMPLICATIONS

In a wide range of examples, having access to big data does not meet the criteria required for a resource to constitute a sustainable competitive advantage. That doesn't mean that firms cannot derive benefits from owning and evaluating big data. Instead, the simple act of amassing big data does not confer a long-term competitive advantage. To build competitive advantage, firms need to develop two new competencies:

- First, they need to develop complementary organizational skills and attract employees who have the ability to develop algorithms or to design and/or to set up and run meaningful experiments.

- Second, they need to use big data to look forward and understand evolving customer needs, rather than using historic data to make incremental improvements to their current product offering or service.

The focus of a digital strategy should be to use digital technologies and big data to create customer value in ways that were previously impossible.

MIT INITIATIVE ON THE DIGITAL ECONOMY

The MIT Initiative on the Digital Economy brings together internationally recognized researchers seeking solutions to how people can – and will – thrive in a digital world. Drawing on MIT's strengths in technology and innovation, IDE explores the profound impact of a rapidly advancing digital economy, and how it's changing the ways we live and work.

SUPPORT THE MIT IDE

Foundations, private donors and corporate members are critical to the success of the IDE. Their support fuels cutting-edge research by MIT faculty and graduate students, and enables new faculty hiring, curriculum development, events, and fellowships. Contact Christie Ko (cko@mit.edu) to learn how you or your organization can support the IDE.

TO LEARN MORE ABOUT THE IDE, INCLUDING UPCOMING EVENTS, VISIT MITSLOAN.MIT.EDU/IDE