Decision Science Asset Diversification versus Concentration in an Evolving Pharmaceutical Market

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Introduction

The pharmaceutical industry continues to undergo tremendous changes, as told through numerous white papers in this series of published articles (http://axtria.com/axtria-research-hub-pharmaceutical-industry/). The questions facing executives are how do these changes affect the direction of investments in new decision science technologies and what should be focus on certain areas of analytics expertise that is felt to offer a competitive advantage for the company? These choices in the direction of investments are embodied in the title of this commentary white paper, the difference between diversification versus concentration of decision science assets. It is also important to note as inferred in the title that decision science expertise is a strategic asset to help achieve a company competitive advantage.[1] There is recognition for example that the application of big data analytics (BDA) can provide firm competitive advantage, both from a theoretical perspective and based on empirical data using survey analysis of respondents.[2-5] We also know from the literature that BDA technology applications can affect business practices and methods that in turn generate a competitive advantage.[1,6] Firms that insert BDA into their business practices do better than their competitive peers by 5% in productivity and 6% in profitability according to one study.[7] Survey studies show the business value of BDA activities. For example, a survey of IT and business executives at 500 European firms found BDA provides business value at different points along the value chain.[8] Another survey study on 297 Chinese IT managers and business analysts employed a big data analytics capability (BDAC) model to analyze this question found similar direct and indirect effects of deploying BDA.[9] Lastly, an interesting theoretical mathematical modeling paper showed that variations in the resource allocation of internal commercial operations (CO) functions can be just as important in affecting sales-response

> " Diversification may preserve wealth, but concentration builds wealth.
>
> &
>
> Diversification is a protection against ignorance. It makes very little sense for those who know what they're doing.
>
> **Warren Buffet**
> *American business magnate, investor, philanthropist and the CEO, President, and Chairman of Berkshire Hathaway*

effectiveness as outcomes from a typical marketing-mix exercise looking across channels for a given brand.[10] This is an underappreciated but valuable idea. For example, within typical biopharmaceutical companies, investment allocation decisions in subunits within a CO division can be critical to achieve business performance. Moreover, companies with a different portfolio of drugs may find that emphasis in certain data management, sales and marketing operations, decision science, etc. functions are more critical to success. For example, a company that focuses on immuno-oncology may require expertise in certain decision science areas that are different from companies with a portfolio of primary care-driven drugs.

The preceding comments reveal a few insights relevant to this white paper topic. First, developing an expertise and enterprise-wide application of analytics can bring about improvements in firm performance and competitive

advantage. Second, changes in resource allocations in commercial operations capabilities, including those pertaining to analytics, can bring about different effects on brand and company performance. Third, little guidance however is given to executives on what investments in analytical capabilities should be made to bring out a competitive advantage. Fourth, what analytical capabilities should be developed and kept in-house, while others be out-sourced? Finally, what then do these insights mean to the executive when making choices in developing new analytical capabilities?

Pharma Decision Science Asset Diversification versus Concentration

Pharma decision science asset diversification

The shift to specialty medicines by biopharmaceutical companies has meant a rethinking of the analytics needed to support these drugs for success in the marketplace with a wide range varying healthcare stakeholders (e.g., payers, patients, physicians, provider systems). This view is supported by independently-produced studies, though connected by these important points:

1. Results from survey data of pharmaceutical company representative viewpoints for what is needed to address emerging commercial issues.[11-12]

2. Data gathered on changes in medicine use in the US and predictions for the near future.[13]

3. Challenges brought about by higher R&D costs and risks to produce specialty medicines and their effect on drug pricing.[14-15]

4. Change in viewing the intent of sales and marketing practices toward one of being informative, disseminating messages with scientific/clinical/medical content, and demonstrating drug value, given the shift to specialty medicines.[16-18]

5. Need to look beyond traditional commercial measures of success toward one that is focused on outcomes and value, concomitant to what is derived from HEOR (health economic and outcomes research) and RWE (real-world evidence) modeling.[19]

These preceding pharma market changes necessitate company executives to expand their analytical capabilities, where the focus of commercial activities must be to demonstrate value (as measured by health and economic outcomes), given the higher cost of specialty medicines to payers and patients. **Table 1** provides a viewpoint on pharma decision science asset diversification and concentration, broken down into three broad analytical categories, with newer analytical capabilities bolded:

• Advanced Analytics

• Basic Insight Generation and Reporting

• Cloud and Data Information Management

The reasons for key changes in each analytical category are as follows:

• **Advanced Analytics** – The most significant changes here are modeling capabilities associated with the trend toward merging health and economic outcomes research into traditional commercial analytics. This means introducing biostatistics, econometric models of qualitative choice

(e.g., logistic, multi-nominal logistic, tobit, ordered-logistic models) and panel data analysis (pooling of time-series and cross-sectional data models), and statistical analyses to account for the richness of data that can be modeled to explain how changes in drug utilization are associated with variations in patient outcomes. In addition, given the shift to specialty medicines that are often classified as orphan drugs, using models associated with low counts and/or rare choices are needed. This means traditional parametric assumptions of the underlying statistical distribution of the data must give way to non-parametric tests of statistical inference. Availability of large data sets have increased the applications of data mining, machine learning & artificial intelligence, and causal structures for predictive modeling. Lastly, simulation and game theory models will be needed to understand the reaction to and effects from competitive threats, such as the pricing and market share penetration impacts from biosimilar entry on a reference biologic**.**

• **Basic Insight Generation and Reporting** – While there has not been a fundamental change in the need for basic insight generation and reporting, one significant change has been the development of tools that allow for dynamic reporting and visualization of the data to those making critical decisions to determine what has happened and eventually what actions are needed which will trigger the application of more advanced analytics.

Table 1 – Pharma Decision Science Asset Diversification[1]

Type of Analytics	Description of Specific Analytical Capability	Degree of Competitive Advantage	More Likely to Outsource
Advanced Analytics	(a) Optimization: **Health and economic outcome research analyses (HEOR models), real-world evidence modeling (RWE), HEOR/RWE integration with traditional commercial analytics**	High	Low
	(b) Predictive modeling: **Data mining, machine learning (artificial intelligence), Monte Carlo simulation, game theory, causal predictive structures**		
	(c) Forecasting/extrapolation: Naive and ARIMA (autoregressive integrated moving average) models		
	(d) Statistical analyses: **Biostatistics, econometrics (especially qualitative choice and panel data models)**, regression and structural modeling, statistical inference, **parametric and non-parametric analyses**		
Basic Insight Generation and Reporting	(a) Alerts (through dynamic tools)	Moderate	Moderate
	(b) Query/drill downs		
	(c) Ad hoc reports		
	(d) Standard reports		
Cloud and Data Information Management	(a) **Cloud data management**	Low	High
	(b) **Cloud business insight, data mining**		
	(c) **Cloud master data management**		
	(d) **Big data management**		
	(e) Data warehouse & management, **data merging** and access		

Source: Adapted from Davenport and Harris (2007), p. 8.[1] Notes: The decision of an individual company to realize a competitive advantage from and whether to outsource or not analytical capabilities involve considering other factors. Newer analytical capabilities are in bolded print. The depictions above are for the average company.

• **Cloud and Data Information Management** – The movement toward greater focus on health and economic outcomes has meant leveraging access and utilization of patient-level claims data and electronic medical records. This explosion of data has ramifications for big data management, cloud information management, application of data mining, and the need to merge different databases that have not normally been accomplished to achieve insights into measures of drug value. Also, affecting this category are the explosion of different channels to disseminate drug information value, e.g., digital channels, social media, and metrics generated through search,

and the expansion of different means by which key stakeholders access and generate data, e.g., through an array of mobile devices on top of traditional means of access. Failure to create an efficient and robust cloud and data information management foundation significantly and adversely affects the ability to generate downstream analytical capabilities.

Pharma decision science asset concentration
Also, noted in **Table 1** are analytical capabilities that are more likely to generate a competitive advantage, and thus developed and kept in-house, versus those to be outsourced. Given scarce resources, a company needs to have a strategic

plan on its decisions to determine which capabilities will be internally developed and applied versus those that are to be outsourced. A company cannot excel in every analytical capability, but rather make prudent choices for further development. A company needs to look at its current and future portfolio and decide what analytics are needed to generate success with those brands. Maintaining cloud and data information management capabilities are foundational elements needed to generate downstream advantages through the creation of reliable insight from the application of advanced analytics. While a company competitive advantage is more likely generated by further internal development of the latter than the former, outsourcing with an expert external partner that understands effective cloud and data information management will make generating downstream advantages easier. Challenges with outsourcing involving novel ideas and practices a company produces are the potential loss of proprietary protection, with ideas being shared to other companies, and the difficulty of retaining knowledge development over time. So, it's up to executives to decide what specific analytical capabilities need to be protected and nourished from within. Further, while not noted as a distinct analytical capability, companies need to install a center of excellence for commercial decision science and innovation to keep on the cutting edge of ideas and methods to be applied and to retain knowledge development. Lastly, and again not noted here, is a concomitant change in a company's culture and organization design that must entail cross-organizational collaboration, cooperation, and communication to generate and implement new analytical capabilities. Pharma companies are inherently highly structured, specialized, and siloed organizations, where cross-organizational alignment is very difficult. This means as pharma problems become increasing complex requiring interdisciplinary solutions, the traditional culture and structure of companies will be ill-equipped to generate needed new ideas and execute solutions that require a high degree of organizational alignment and collaboration.

Conclusions

The changing pharmaceutical market is requiring executives to rethink their strategies on what decision science capabilities are needed for sustained success, as well determining which ones to pursue using an outsourcing versus developing in-house approaches. One thing is becoming very clear, the traditional set of decision science capabilities is no longer sufficient to sustain brand success. The pharma environment is increasingly shifting its emphasis to developing and launching costly specialty medicines where demonstrating drug value through health and economic outcomes to key healthcare system stakeholders will be paramount. There is an urgency that new thinking is required. Pharmaceutical market and governmental policy forces are requiring that companies adapt to a new reality. As **Table 1** notes, the application of advanced analytics is most likely to generate the highest degree of competitive advantage.

However, one challenge in generating this advantage is the reality that most senior pharma executives are not very well tuned with analytics. During exercises that companies run to determine what to keep in-house versus to outsource, the answer is always to outsource operational activities and keep strategic thinking in-house. However, in practice, many pharma leaders outsource strategy work while in-sourcing various operational functions. The reality is that a large majority of pharma employees are likely focused on simple operational activities, such as sample, fleet, and convention operations versus focusing on strategy work. Many brand managers are focused on logistical matters related to the effective execution of their campaigns versus trying to get the most bang for the resource investment from their campaigns (as evidenced by the lack of conducting ROI analyses post-campaign). All this must change in the current and future pharma environments.

As the opening quotes suggest, diversification reduces risk and preserves wealth, whereas concentration (or put another way, specialization) is needed to build wealth. The latter approach requires making choices and having a strategic orientation toward what sustains brand and company success. Brand success is derived through the successful execution to achieve company objectives whereas the determination of company objectives is based more on external factors. The choice of decisions science asset concentration is dependent on the company strategic objectives, which manifests itself in the portfolio of products the company has invested in for long-term success. The needs of the brands will dictate which analytical capabilities are needed, while competitive market dynamics will suggest which ones need to be cultivated and applied from within versus those that are outsourced. As inferred in the title of this white paper, developing decision science capabilities is an important strategic "asset" critical for brand and thus company success. Davenport and Harris in their work identify four attributes exhibited by analytical competitors to cultivate and sustain this strategic asset:[1]

1. **Support of a Strategic, Distinctive Capability** – This distinctive capability is what the organization views as necessary to achieve a competitive advantage in the marketplace.

2. **An Enterprise-Level Approach to and Management of Analytics** – Analytical activities are seen as critical to success across the entire the company and not just applied in isolated parts of the organization. Furthermore, data and analyses are accessible across the entire organization. The efficient and effective management of data and analyses across the entire company are essential to be an analytical competitor.

3. **Senior Management Commitment** – Any change in the culture of a company, such as becoming an analytical competitor and engagement in evidence-based decision-making, must come with the support and commitment from senior leadership.

4. **Large-Scale Ambition** – The movement behind becoming an analytical competitor must be large enough to impact company results. As noted by the authors, incremental use of analytics will yield only marginal or incremental results.

This paper ends with the following quote suggesting knowledge of the drugs that a company has, and why those drugs are in the portfolio, will dictate which decision science capabilities to cultivate and in what manner.

> " Know what you own, and know why you own it. "
>
> *Peter Lynch*
> *An American investor,*
> *mutual fund manager, and philanthropist*

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