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Latest Pharma R&D Cost Estimates – Implications for the Expanded Use of Commercial Analytics

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> The **price of light** is less than the **cost of darkness**.
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> Arthur C. Nielsen
>
> *Market Researcher & Founder of ACNielsen*

1. Structure of a First-in-Class Commercial Analytics Capability

The above quote addresses the question, "Why commercial analytics?" For a rapidly evolving and increasingly more complex pharmaceutical landscape, the importance now of commercial analytics has never been greater. Rather than being seen as just a set tools to solve certain key business problems, developing a first-in-class commercial analytics capability applied across the business is to create a strategic asset that differentiates the best-in-breed companies from the majority others for a sustained long-term competitive advantage.

This white paper defines pharma commercial analytics as activities in seven buckets:

1. *Commercial Model Design* - the go-to-market approach and model design necessary to achieve all company strategic goals, but dependent on the drug technology of the project/product portfolio that can be successfully developed and tactically executed in an efficient fashion to deliver optimal results while mitigating external threats and positioning the company to take advantage of opportunities (e.g., define metrics to determine success and how company resources will be positioned/organized/coordinated to ensure achievement of stated company goals).
2. *Sales Analytics* - focused on processes and outcomes related to ensuring optimal sales force investment efficiency and result effectiveness (e.g., sales force strategy outcomes, territory alignment, call planning, objective setting, incentive compensation, sales performance metrics, sales reporting).
3. *Marketing Analytics* - focused on processes and outcomes related to ensuring optimal brand performance throughout the entire lifecycle (e.g., emerging brand status, pre-launch preparations, launch, growth, maturity, and post-patent expiration).
4. *Payer Analytics* - focused on managed markets (e.g., private third party commercial and public drug plans), analyzing effects from changes in plan design, and their relationship to sales, marketing, and patient outcomes.
5. *Patient Analytics* - focused on analyses generated from real world evidence (RWE) and patient-level data on outcomes (e.g., drug compliance and adherence, drug costs, treatment costs, health outcomes, cost-effectiveness) resulting from drug utilization.
6. *Commercial Analytics Innovation Center* - focused on basic research activities designed to generate new management/marketing science methods for solutions to address future commercial problems faced across the entire project/product lifecycle using experimentation, collaborations with academic researchers, and other activities to encourage innovation.

7. *Cloud Information Management* - focused on speed, agility, and scale in association with managing new data sources, elastic infrastructure, data quality & accuracy, and actionable insight in support of activities in all of the preceding commercial analytics buckets.

Traditionally, these commercial analytics buckets were seen and conducted as more distinct and separate activities. Today, and increasingly in the future, these commercial analytics buckets are rapidly becoming interdependent activities. Moreover, outcomes from payer and patient analytics will become the principal emphasis and drivers of all commercial decisions. The construction of the right commercial model design and the conduct of all remaining analytics in other areas will be done to support payer and patient outcomes. This means solving problems in the near future using commercial analytics will require greater alignment among these activities, an open system framework of thinking in solving commercial problems, a data environment constructed to support all of these activities, and a leadership approach and innovative analytics culture necessary to cultivate and sustain a competition advantage.

2. Latest Pharma R&D Cost and Risk Estimates

Given this background, the question this white paper explores is what are the implications for the expanded use of commercial analytics given new estimates of the total cost and risk of new drug R&D? This white paper will study this question in the following manner:

1. review the latest estimates on new drug R&D costs and risk;
2. note where has traditional pharma commercial analytics been focused and the need for change;
3. list changes in the emerging pharma environment toward specialty medicines that have implications for R&D total costs and risks;
4. review research on suggested model changes to improve R&D efficiency; and
5. relate proposed changes in the R&D model to suggestions on the expanded use of commercial analytics to address challenges in an evolving future pharma environment.

Important new estimates on pharma R&D cost estimates were published earlier this year by researchers who have consistently followed this topic over time in a number of previous studies.[1] While their cost estimates have come under criticism on various grounds from a number of sources (as reviewed in the paper), this paper will not debate the magnitude of the new cost estimate since there is no question that the costs and risks to pharma R&D are indeed increasing.[1] The actual amount, whatever it may be, is substantial, and questions do exist about the long-term economic sustainability of the industry if ways are not found to place checks on increasing R&D costs and risks. Here are key conclusions quoted from their latest R&D cost estimate study published in the *Journal of Health Economics* (2016, pp. 31-32):[1]

1. *We estimated total out-of-pocket and capitalized R&D cost per new drug to be $1,395 million and $2,558 in 2013 dollars, respectively.*
2. *To examine R&D costs over the entire product and development lifecycle, we also estimated R&D costs incurred after approval. This increased out-of-pocket cost per approved drug to $1,861 million and capitalized cost to $2,870 million.*
3. *Our pre-approval out-of-pocket cost estimate is a 166% increase in real dollars over what we found in our previous study, and our capitalized cost estimate is 145% higher.*
4. *The success rate found for this study is nearly 10 percentage points lower than for the previous study. The overall change in the risk profile for new drug development by itself still accounted directly for a 47% increase in costs.*
5. *Our analysis of cost drivers indicates that the rate of increase observed in the current study was driven mainly by increases in the real out-of-pocket costs of development for individual drugs and by much higher failure rates for drugs that are tested in human subjects, but not particularly by changes in development times or the cost-of-capital.*

3. R&D Cost Estimates and Implications for Commercial Analytics

The preceding conclusions suggest an ever-increasing trajectory in both the costs and risks associated with new drug R&D given the movement to specialty medicines[2] that have higher inherent failure rates,[3] newer mechanisms of delivery such as biologics that involve both higher risks in development and costs of production,[2] and the trend toward

personalized medicines[4] and targeted therapies (especially for anti-cancer medicines).[5] Where then can an expanded use of commercial analytics be of help here either to reduce R&D costs and risk, and/or to improve R&D ROI?

Unfortunately the current emphasis of academic biopharma commercial analytics offers no help since it is driven by a tactical non-strategic economic model framework myopically focused to maximize ROI of spending across various promotion channels for the purpose of increasing physician prescriptions.[6] A similar emphasis likely holds true when viewing results from an exploratory survey looking at current versus emerging sales force science issues deemed important by practitioners in the biopharma industry.[7] Pharma commercial analytics are currently seen mainly as a means for tactical execution to achieve short term financial goals, rather than as a strategic asset as a key source for competitive differentiation to sustain long term industry advantage.[7] Instead, biopharma companies need to pursue a strategic open systems based approach across the entire pharmaceutical value chain throughout the project/drug lifecycle.[6] This means pharma companies will be increasingly called upon to demonstrate value through significant improvements in health outcomes and reductions in treatment costs. This latter viewpoint is consistent with a common theme in the white papers & blogs written here in that research-based biopharma companies must think differently and apply tools beyond traditional boundaries while engaging in interdisciplinary-type analyses to solve increasingly more complex business problems in the future. This means companies must first rethink the current commercial model design that was appropriate for a different set of drugs based on small molecule development/launch/commercialization, and then establish sales, marketing, payer, and patient analytics to support a new design based on the next generation of specialty medicines.

There has been well-documented evidence over the last few years regarding explanations on the historical decline in pharma R&D productivity, how that trend motivated a shift in the industry toward investment focus in specialty medicines, and greater inherent risks of failure that resulted from shifts in R&D project portfolios.[3,8-9] While an increase in new drugs launched in recent years focused on specialty medicines has for now reversed that long-standing trend in declining R&D productivity, numerous industry structural and commercial challenges remain that confront biopharma companies.[2] Specialty medicines now account for a significant proportion of US total drug spending and represent the area contributing most to spending growth.[2] Also, substantial challenges exist for biopharma companies in the sustainability of raising revenue through price increases.[10-12] True, increasing total costs of new drug R&D do not directly affect pricing since R&D costs represent "sunk" costs according to health economists and thus should not affect pricing based on marginal costs. Also, pharma pricing is tempered by market power held and/or contracting efforts conducted by payers (both public and private commercial plans in the US, and single-payer governmental reimbursement systems outside the US), drug wholesalers and pharmacy chains, and limits on what employers (as payers of insurance for employees) and employees/patients are willing to pay and able to afford. Nevertheless, increasing R&D costs do put upward pressures on pharma companies to shift costs to those paying for drugs in order to reap returns on investment costs necessary to plow resources back into further R&D for future drugs. Complicating new drug R&D costs/efforts and pricing relate to the growth in personalized medicines,[4] greater focus on targeted cancer therapies[5] since oncology drugs represent a significant portion of recent new drug launches,[2] pricing for anticancer drugs,[13] and pressures to devise a framework to assess the value of cancer treatment options and especially for those that extend life expectancy measured in months instead of years.[14]

4. Recommendations on the Expanded Use of Commercial Analytics

What then should biopharma companies do to apply commercial analytics beyond current areas of utilization in an environment of increasing R&D costs & risks, and focus on targeted personalized specialty medicines? Add to this, greater focus by payers for pharma companies to enter into outcomes-based performance contracts for plan coverage and patient access, and greater pressures on commercial teams to reap a necessary financial ROI to satisfy shareholders while generating funds to return back into the R&D process for sustainable success? The evolving

environmental landscape and various pressures mean changing R&D models in research-based pharmaceutical companies.[15] A recent *Journal of Translational Medicine* (2016, abstract) article notes three concepts by the authors that pharma companies are engaging to increase their R&D efficiencies using the following activities:[15]

1. *to reduce portfolio and project risk*,
2. *to reduce R&D costs*,
3. *to increase the innovation potential*.

How does this translate into an expanding use of commercial analytics? Below is a non-exhaustive list of suggested company actions in applying commercial analytics, many beyond current traditional boundaries, in response to growing R&D cost estimates and risk:

- The overall theme is to start thinking about applying commercial analytics earlier in the project/product life-cycle and not just prior to launch through to patent expiration.
- Companies need to rethink their current commercial model design if it was constructed to support traditional small molecule-developed drugs that will be increasingly replaced by newer specialty medicines using very different and more complex drug technologies. This means the entire ecosystem of sales, marketing, payer, patient, data analytics & analytics innovation must subsequently change and adapt to support the commercialization of newer specialty medicines.
- Organizational changes are needed to facilitate greater exchange of data and insights between the scientific/clinical and commercial parts of the company. This means a different approach in leadership style to make this a reality. Projections regarding data and insights into the future commercial landscape need to inform target selection for further investigation, development, and clinical trial testing. Basic segmentation analysis of the future landscape can help inform R&D efforts. The expectation is that this will improve the likelihood of target selection success (risk reduction) and lessen resource expenditures (increase efficiencies) on projects further into the more expensive clinical trials that do not meet viability criteria taken from commercial analytics of the future market landscape. The bottom line is that commercial analytics can improve project portfolio management, reduce search costs for viable targets for further development, and reduce R&D risks.
- Given the increasing influence of payers and cost shifting of specialty medicines to patients, market access analytics

and cost considerations to patients should enter in as the critical factors in determining project target selection for further development and as candidates for clinical trials. As noted earlier, payer and patient analytics will solve problems which will drive future commercial decisions, whereas sales, marketing, and data analytics will play supporting roles to ensure optimal payer and patient outcomes.

- Clinical trials should be structured to quickly adapt demonstration of value propositions from results into commercial strategy and operations. The use of commercial analytics can serve to strengthen the linkages between scientific/clinical and commercial, while also speeding up commercialization times. Speeding up commercialization times will provide for a longer time window to amortize substantial R&D costs across a shrinking population set of patients already pressure by higher costs per treatment per patient.
- Phase 3 clinical trials of drug candidates should be measured not only against placebo but also the leading generic therapy treatment option (where appropriate) given managed care dynamics. Research-based branded drugs cannot compete against generics on the basis of cost. The only pathway for patented branded drug success over generic drugs is to demonstrate value over cost. Empirical evidence needs to be generated showing the net value increase in adopting new patented drug technology over older generic drug technology.
- Payer and patient analytics stressing market access/affordability should play a major role in determining the economic viability when deciding whether to move forward with expensive phase 3 clinical trials.
- The construction of forecast simulations based on commercial analytics should be done no later than the phase 3 decision point (and then be continually updated beyond this decision point as new information becomes available about product, market, payer, and patient attributes) and analytics on the simultaneous relationship with drug pricing. This means accounting for variations in product attributes (relative to the competition), product risk profile, regulatory decision risk, market dynamics such as order-of-entry and time delay in the marketplace, managed market formulary acceptance, and individual willingness and ability-to-pay.
- Future sales and marketing activities should be seen primarily as channels to disseminate clinical/medical information about product net value attributes to payers, physicians, and patients - not as the principal mechanisms that determine brand success.[16]
- Performance-based pricing will become the norm for future managed care contracting.[17] This means the health economics and outcomes research team will play a major role in the determination of a specialty drug price. The effectiveness of sales and marketing activities will be possible only if a price point is established that ensures optimal payer formulary acceptance, physician adoption, and patient compliance and adherence. Commercial analytics is the common medium for making these linkages a reality.
- Performance-based pricing contracts will require companies to leverage mobile technologies, where appropriate and that protect individual patient information, that allow for self-diagnosing and self-monitoring of patient behaviors to demonstrate product success. An added benefit of such technologies is to show patients the continuing progress and value of their drug therapy which should boost drug adherence, improve health outcomes, and lower cost of care.[18]
- Given the high cost of specialty medicines to patients, companies need to leverage commercial analytics to develop cost elasticity analyses on patient out-of-pocket expenses to support the optimal development of discount card and patient assistance programs, both of which have an impact on the drug net price but also mitigate concerns from policymakers about the rising cost of medicines and decreased patient access to new medicine.
- Commercial analytics are needed to determine optimal opportunities for mergers & acquisitions (M&A) to help improve R&D efficiencies.[15] Successful M&A activities can lead to a greater likelihood of success in more complex phase 2 and 3 clinical trials, especially important given the trend toward R&D on more complex specialty medicines.[19]

Also, M&A can increase economies scope which previous research has shown to be more important in increasing R&D productivity than greater economies of scale.[20]

- The benefits of expanding the use of commercial analytics goes well beyond its connection to R&D cost and risk estimates. Such areas can include, but are not limited to the following: operations and supply chain management, public policy, external corporate affairs, medical affairs, regulatory, human resources, and finance.

- Many biopharma companies have reached out to academic institutions for research collaborations to increase know-how and innovation towards improving R&D productivity.[15] A similar philosophy must occur on gaining basic research knowledge on the creation and applications of commercial analytic methods with academics at major research universities on developing new commercial models and the analytics needed to support them.

5. Conclusions

The latest pharma R&D cost estimates illustrate that greater pressures will increasingly be placed on companies to find greater cost efficiencies, reduce risks, improve pipeline productivity, and sustain a ROI on R&D spending needed for long-term drug development and commercial success. The shift to specialty medicines and especially the development of personalized medicines focused on targeted therapies increases the challenges for companies to control R&D cost and risk estimates. This means companies must look beyond current applications of commercial analytics focused mainly on tactical uses in an economic model framework designed to increase prescriptions. *Instead, successful best-in-breed companies will see the development and expansion of commercial analytics expertise as a key strategic asset to sustain a competitive advantage to be applied in an interdisciplinary open system framework across the entire project/product lifecycle for a rapidly evolving pharmaceutical landscape.*

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