Do Pharma Mergers and Acquisitions Improve R&D Productivity and Increase Shareholder Value?

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> The historical evidence shows that shareholders usually greatly benefit from mergers.
>
> ***Stephen Moore***
> *American writer and television commentator on economic issues, and former member of The Wall Street Journal editorial board*

> Mergers generate substantial synergies.
>
> ***Roger Altman***
> *American banker and served at the US Treasury during the Carter and Clinton presidential administrations*

1. The Importance of Pharma Merger & Acquisition Activity

1.1 Introduction

Mergers & acquisitions (M&As) have long been used as a critical strategic instrument by pharmaceutical company executives to spur R&D innovation, sustain financial growth, and generate cost efficiencies.[1] Huge mergers far pre-date recent deal-making and dramatically altered the landscape of the pharma industry to this very day, such as (newly-formed companies in parentheses) those between Ciba-Geigy and Sandoz (Novartis) in 1996, Astra AB and Zeneca (AstraZeneca) in 1998, and Glaxo Wellcome and SmithKline Beecham (GlaxoSmithKline (GSK)) in 2000.[2] Likewise, large acquisitions by pharma companies of other organizations also pre-date today's recent activity, again changing the face of the industry such as (targets in parentheses) those by Pfizer (Warner-Lambert, 1999; Pharmacia, 2002; Wyeth, 2009), Sanofi (Aventis, 2004), Merck (Schering-Plough, 2009), Roche (Genentech, 2009), and more currently Actavis (Allergan, 2015).[2]

Are M&As successful in achieving their strategic objectives? The practitioner business literature gives mixed signals on this question looking at M&As across industries. Numerous studies cite a commonly held belief of a 70%-90% failure rate of M&As, for example as noted in 2011 and 2016 *Harvard Business Review* (*HBR*) articles.[3-4] An earlier published article in *HBR* noted a series of errors and challenges companies make and face when trying to estimate accurately the value of mergers.[5] However, a more recent 2018 *HBR* article noted and explained why the 75% failure rate for mergers is a myth, where companies that gain experience in doing M&As over time (noted as *programmatic M&A*) are more likely to achieve "*real wins*."[6] This study also noted that smaller M&A deals work out better,[6] which would be intuitively consistent with greater errors and challenges in estimating the value of larger M&A deals as expressed in the previous cited reference.[5]

Why do companies engage in M&As? A recent McKinsey study concluded that there are three fundamental motivations that perennially drive M&As: (1) *as a source of innovation,* (2) *to unlock synergies, and* (3) *to realign portfolios.*[1] Specific events such as recent changes in corporate tax law, i.e., the 2017 Tax Cuts and Jobs Act, was predicted to have a stimulative effect on the number and type of M&As in the pharma sector.[7] A Boston Consulting Group study noted the main provisions of this tax law include the following that would affect corporate strategy and M&A activity:[7]

a. A reduction in the corporate tax rate from 35% to 21%.
b. Mandatory repatriation of offshore cash, with a one-time tax of 15.5%.
c. Immediate expensing of investment in tangible business property.
d. New limits on interest deductibility.

Corporate tax law changes mean that M&As are more attractive to sellers and provide greater incentives for companies to take their liquidity and invest in deals that would allow them to achieve strategic objectives.[7] The new tax law does encourage the repatriation of offshore cash held by pharma companies, among the largest held overseas by any industry, by reducing the tax charge on that money, thus allowing the net balance to be used for productive investments like M&As. We see this effect happening in some large recent deals, though as noted later, other pharma trends and market forces are at play in fueling M&As. In addition, certain types of deals, such as those like Pfizer's 2014 attempt to acquire AstraZeneca to lower significantly taxes through an "inversion" strategy by shifting company location from a high-tax country (like the US) to a low-tax country (like the UK) will eventually disappear.[7] The substantial lowering of the US corporate income tax rate places it in sync with other developed countries where pharma companies are headquartered.[7] Further restrictions placed by the US Treasury rules on implementing an "inversion" approach now make such deals far less profitable and attractive.[7] See a prior December 2016 Axtria Research Hub white paper on the econometric analysis of biopharmaceutical transfer pricing for further details.[8]

Thus, while tax law changes have certainly had some effect on the number of recent M&As, and the type of deals (less M&As for tax inversion reasons), what are the underlying long-term factors that affect current and future M&A deals? M&As represent complex deals for a pharma company to achieve strategic objectives. Maintaining a robust and productive R&D pipeline is the lifeblood for a pharma company needed for sustained success. M&As may also be used to address a relative short-term issue such as a "patent-cliff problem", which is not about buying R&D productivity, but rather purchasing an immediate acquisition of top line growth to stabilize a worsening profit and loss statement. The acquisition of companies that have promising late-stage clinical trial prospects to fill in the gap caused by a patent-cliff problem would be an example of this strategy. Yet, despite such an important topic for pharma companies, there is a void in the practitioner business literature that looks at this and related questions pertaining to the effects of pharma M&As on improving R&D productivity and increasing shareholder value. It is this void in the practitioner business literature that this white paper attempts to fill. This white paper can be of use for senior executives who must decide critical questions necessary for the long-term health of their company while also serving the needs of patients.

1.2 White Paper Objectives

The objectives of this white paper are noted below and will help pharma executives in making critical M&A decisions. This assistance is vital, not only given the previous background and context, but also on the continued importance that pharma M&A activity will play in the future performance of individual drug companies. Below are 5 questions addressed in this white paper:

1. What is (will be) driving current and future M&A deals?
2. Do M&As improve R&D productivity? If so, how? If not, why not?
3. Do M&As increase shareholder value? If so, how? If not, why not?
4. Are there any therapy classes that are more likely targets for increased M&A activity?
5. What kinds of analyses should companies conduct when considering M&As in order to increase the probability of such deals improving R&D productivity and increasing shareholder value?

The preceding questions will be addressed by going through the following steps:

a. Provide an overview of recent pharma M&A activity.

b. Review the objective and peer-refereed academic literature to see what previous empirical analysis says about the success of pharma M&A activity on R&D productivity and shareholder value.

c. Hear the perspectives from an experienced pharma industry principal and project leader at Axtria on insights into these issues and how Axtria can help.

The white paper will conclude with some final thoughts, avenues for future discussion, and potential research projects that can help executives considering M&As to ensure such deals achieve strategic objectives.

2. Pharma Industry Sees Heightened M&A Activity

2.1 Recent Pharma Deals

The pharma industry has seen a flurry of significant M&As and alliances announced since the end of 2018 as predicted with changes in corporate tax law. The following non-exhaustive list is an indication of recent significant deal-making activity seen in the pharma industry:

1. Amgen agrees to buy Otezla® from Celgene in a $13.4 billion deal (August 2019).[9]
2. Gilead Sciences signs 10-year $5.1 billion partnership with Galapagos NV (July 2019).[10]
3. AbbVie Inc. agrees to buy Allergan plc for about $63.0 billion (June 2019).[11]
4. Pfizer spends $11.4 billion to acquire Array Biopharma (June 2019).[12]
5. Novartis spends about $1.6 billion for a group of drugs by acquiring a subsidiary of Boston-based IFM Therapeutics (April 2019).[13]
6. Merck partners with Eisai Co. Ltd. to develop and market the cancer drug Lenvima® in a deal potentially worth up to $5.76 billion (March 2019).[14]
7. Bristol-Myers Squibb agrees to buy Celgene for $74.0 billion (January 2019).[15]
8. Takeda completes $62.0 billion acquisition of Shire (January 2019).[16]
9. GSK enters an agreement with Boston-based TESARO, Inc. to bolster its oncology pipeline for an acquisition cost of $5.1 billion (December 2018).[17]

However, while corporate tax law changes, as noted and predicted earlier, may certainly be at play here behind the scenes with some of these deals, what longer-term trends and issues are more importantly driving recent (and future) M&A activity?

2.2 What is Driving Recent Pharma M&A Activity?

There are a range of factors and continuing pharma industry environmental trends that are the main driving forces behind recent M&A activity, segmented into key reasons, though many are interrelated to each other:

Drive Productivity and Synergies

a. Push to increase R&D pipeline productivity and opportunities to expand existing drug indications, especially in the oncology therapy area. The oncology therapy area has seen the greatest focus by pharma companies on new drug launches given both the challenges and opportunities these medicines represent for development.[18] See below for specific comments on oncology R&D development.

b. Need to find cost efficiencies through synergies derived from M&As and quickly expand and/or develop a company's market presence (either within a therapy class or by geography).

Fund Portfolio Shifts

c. Shift to specialty medicines, especially in the areas of large molecule, biologic/biosimilar, genomic-based therapies that are often targeted personalized medicines and/or orphan drugs treating rare disease populations as traditional small molecule target opportunities become heavily genericized and lack economic viability for continued development.[18]

d. Need for continued innovation with the above shift to specialty medicines coupled with advances in medical technology that is fueling the launch of new active substances to address continuing significant unmet medical needs. Finding new orphan drugs for rare diseases in particular is one such area of significant unmet medical need.[19-20]

e. Drive to find more value-based drugs (improvements in health and economic outcomes) as payers, providers, employers, and patients express greater concerns over affordability and access of new medicines.[18]

Build Capabilities

f. Pressure to counter the trend of increasing cost and risk of pharma R&D,[21] as clinical and economic endpoints needed for commercial success become

more challenging to attain.[22-23] This requires the building of internal capabilities through M&A activity to affect economies of scale (size) and scope (diversity of a firm's development efforts) that can improve R&D productivity.[24] Recent analysis of clinical development success rates for investigational drugs clearly show significant increases in inherent challenges in bringing new drugs across all therapy classes, and especially in oncology.[23]

2.3 Emphasis on Oncology as a Driving Force for M&A Activity

Special attention is deserving in the oncology therapy area for the following reasons:

a. Opportunity to address significant unmet medical needs.

b. Leverage scientific innovation.

c. Provide for economically viable targets for growth.

d. Relative insulation from pricing pressures.

e. Seen as a significant driver of the aforementioned M&As.

A few points illustrate the significance of the oncology therapy in driving current and future M&A activity:

1. Numerous companies recognize the oncology therapy area as a critical source of future growth and are expanding their market presence.[25] Companies like Pfizer that were heavily involved in chronic disease areas like cardiovascular disease (CVD), or GSK that previously dissolved their oncology presence, are now shifting a significant portion of their portfolios to oncology as a major driver of business growth.[25]

2. The market opportunity is huge for the oncology therapy class based on US non-discounted spending. US spending on oncologics comprised $58.4 billion (12.1%) in 2018 on a base of total non-discounted spending of $482.0 billion.[18] Only the antidiabetics therapy class was greater in non-discounted spending for 2018 at $60.6 billion (12.6%).[18]

3. There is still a substantial unmet medical need in the oncology area as seen in **Table 1** (Leading Sites of New Cancer Cases, 2019 Estimates by Gender) and **Table 2** (Leading Sites of New Cancer Deaths, 2019 Estimates by Gender) from the American Cancer Society.[26]

Table 1. Leading Sites of New Cancer Cases, 2019 Estimates by Gender

Male New Cases			Female New Cases		
Prostate	174,650	20%	Breast	268,600	30%
Lung & bronchus	116,440	13%	Lung & bronchus	111,710	13%
Colon & rectum	78,500	9%	Colon & rectum	67,100	7%
Urinary bladder	61,700	7%	Uterine corpus	61,880	7%
Melanoma of the skin	57,220	7%	Melanoma of the skin	39,260	5%
Kidney & renal pelvis	44,120	5%	Thyroid	37,810	4%
Non-Hodgkin lymphoma	41,090	5%	Non-Hodgkin lymphoma	33,110	4%
Oral cavity & pharynx	38,140	4%	Kidney & renal pelvis	29,700	3%
Leukemia	35,920	4%	Pancreas	26,830	3%
Pancreas	29,940	3%	Leukemia	25,860	3%
All sites	**870,970**		**All sites**	**891,480**	

Source: American Cancer Society, Inc., 2019. Surveillance Research, available at https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2019/leading-sites-of-new-cancer-cases-and-deaths-2019-estimates.pdf.[26] Percentages represent a fraction of all new cancer cases.

Table 2. Leading Sites of New Cancer Deaths, 2019 Estimates by Gender

Male			Female		
Lung & bronchus	76,550	24%	Lung & bronchus	66,020	23%
Prostate	31,620	10%	Breast	41,760	15%
Colon & rectum	27,640	9%	Colon & rectum	23,380	8%
Pancreas	23,800	7%	Pancreas	21,950	8%
Liver & intrahepatic bile duct	21,600	7%	Ovary	13,980	5%
Leukemia	13,150	4%	Uterine corpus	12,160	4%
Esophagus	13,020	4%	Liver & intrahepatic bile duct	10,180	4%
Urinary bladder	12,870	4%	Leukemia	9,690	3%
Non-Hodgkin lymphoma	11,510	4%	Non-Hodgkin lymphoma	8,460	3%
Brain & other nervous system	9,910	3%	Brain & other nervous system	7,850	3%
All sites	**321,670**		**All sites**	**285,210**	

Source: American Cancer Society, Inc., 2019. Surveillance Research, available at https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/annual-cancer-facts-and-figures/2019/leading-sites-of-new-cancer-cases-and-deaths-2019-estimates.pdf.[26] Percentages represent a fraction of all new cancer deaths.

4. The oncology area also has its challenges, such as, high inherent clinical trial failure rates (see **Table 3**) expressed here as Phase Likelihood of Approval (LOA) according to the referenced research article.[23] LOA denotes the probability of reaching FDA approval from the current phase, and is also expressed as a percentage.[23] LOA is calculated as the product of each Phase Success probability leading to FDA approval.[23] The n value associated with LOA is the sum of the n values for each Phase Success included in the LOA calculation.[23] Their research work also calculated success rates from phase to phase. An overall key finding of their research is that clinical development success rates are lower than previously thought.[23] This would provide a strong reason for M&A activity in oncology to bolster clinical success rates to try and overcome greater inherent risks of clinical trial failure.

Table 3. Selected Clinical Development Phase LOA for Oncology Investigational Drugs

	Phase 1 LOA	Phase 2 LOA	Phase 3 LOA
Oncology – All indications	6.7%	10.5%	37.0%
Oncology – Lead indications	13.2%	19.1%	45.3%
Oncology – All indications by FDA classification	10.4%	16.2%	50.0%
Breast cancer	5.7%	8.4%	39.2%
Non-small cell lung cancer (NSCLC)	5.7%	6.5%	21.7%
Prostate cancer	5.6%	7.8%	37.5%
Colorectal cancer (CRC)	5.1%	8.2%	38.5%
SPA or orphan drug oncology	23.0%	27.1%	44.4%

Notes: See the source article for the methodology to derive each of the selected clinical development Phase LOA. LOA means "Likelihood of Approval" and SPA means "Special Protocol Assessment."[23]
Source: Hay M, Thomas D, Craighead J, et al. Clinical development success rates for investigational drugs. *Nature Biotechnology* 2014; 32: 40-51.

5. Aside from high inherent clinical trial failure rates, oncology clinical trials are of long duration, need to find biomarkers that segment patients that will likely respond to therapy (though the percentage of such biomarkers in clinical trials is up 56% since 2010), and have numerous challenges in bringing scientific advances to cancer patients (e.g., areas of registration, diagnostics, infrastructure and reimbursement) that affect the delivery and benefits derived from new cancer medicines.[27]

3. Outcomes from Previous Research on M&As Affecting Pharma R&D Productivity and Shareholder Value

3.1 Review of the M&A Research Literature

There has been a good deal of empirical research in the academic business, economics, and scientific literature on the effects of M&A activity on pharma R&D productivity and shareholder value. The goal in this section is to provide an indication of general conclusions from a sample of prior research rather than go through an exhaustive list of articles to establish a baseline of effects before seeking perspectives of a knowledgeable pharma industry principal and project leader on these relationships as noted in the next section. The purpose for reviewing academic studies (or seriously-researched working papers) is due to their relative objectivity in the analysis and peer-evaluation for methodological soundness. The sample of papers reviewed here will be done in chronological order from oldest to the most current which may also provide some additional insights. Italicized remarks represent quoted findings.

a. (2001 study)[24] There is no relationship between economics of scale (size) and increasing the success probability of individual R&D projects among a sample of large pharmaceutical firms. However, there is a strong positive effect caused by economies of scope (diversity of a firm's development efforts). As noted by the authors, *scope is confounded with firm fixed effects, however, suggesting an important role for inter-firm differences in the organization and management of the development function.* Economies of scope is likely to play a greater role in the success of M&As driven to improve oncology R&D productivity given the nature of cancer research and cross-fertilization of ideas across sites.

b. (2005 study)[28] There is a strong positive effect of a firm's overall experience for larger and more complex late-stage trials. Products developed through an alliance have a higher probability of success for complex phase 2 and 3 trials and if the licensee is a large firm.

c. (2007 study)[29] Acquisitions create shareholder value but not mergers (though mergers do not diminish value). The effect of acquisitions varies depending on the target being foreign-based versus US-based.

d. (2007 study)[30] In general, no value creation (using 3 performance measures – research productivity, return on investment, and profit margin) was found from M&A activity on a sample of large pharmaceutical M&As and independent non-M&A rival firms.

e. (2007 study)[31] *Controlling for merger propensity, large firms that merged experienced a similar change in enterprise value, sales, employees, and R&D, and had slower growth in operating profit, compared with similar firms that did not merge.*

f. (2010 study)[32] *Reducing late-stage (Phase II and III) attrition rates and cycle times during drug development are among the key requirement for improving R&D productivity. Essential that investments in drug discovery and early clinical development, from target selection to clinical proof-of-concept be done to increase R&D productivity. Transforming biopharmaceutical organizations into a fully integrated pharmaceutical network will allow for funding the number and quality of pipeline assets.*

g. (2016 study)[33] This academic-style and extensively-research working paper analyzing pharma mergers affecting European product markets found negative effects post-merger of patenting and R&D expenditures for the merged entity but also among non-rivals. This result is a consistent with majority of prior empirical studies they reviewed that found negative effects of mergers on innovation in the merged entity.

h. (2017 study)[34] This most recent study reviewed here noted that the prior literature on the relationship between mergers and R&D productivity is mixed. Their study of more recent large pharmaceutical mergers found a statistically significant increase from mergers on R&D productivity. *They point to two factors as critical in driving R&D productivity - depth of scientific information and objectivity of decision-making based on that information, both of which could be expected to increase because of a merger.*

3.2 Economies of Scale vs. Economies of Scope

An important distinction between economies of scale versus economies of scope is required here to understand the effects of M&As, especially since the latter concept is less commonly seen in the business literature. Economies of scale says the average total cost to produce a drug decreases as more volume is produced. Traditionally, the pharmaceutical average total cost curve (total fixed cost + total variable cost)/volume starts off high (because of high total fixed cost relative to low volume), but then quickly drops as volume increases until it flattens over a large relevant production range of output. It is possible the average total cost curve increases at very high levels of output due to diseconomies of scale (e.g., higher total average costs caused by logistical and administrative problems when running an extremely large organization, and other costs due to size). However, generally in pharmaceutical production & cost theory and practice, we do not see the effect due to diseconomies of scale. Economies of scope says that the average total cost of a drug decreases with a greater variety of drugs produced from the same inputs. This is where "diversity" of the R&D portfolio enters and becomes critical, where resources under scope can be complementary to each other that are then used to generate novel medicines. There are numerous famous drug development examples, like the discovery of Viagra® for erectile dysfunction, which was the result of a cardiovascular study for the treatment of hypertension and angina pectoris, and thus its creation was an unintended effect. This effect can be repeated many times in the history of pharma R&D discovery and success. Further, the nature of oncology development and the building of new indications is likely more consistent with scope than scale (mere size). We see this in firms trying to create highly diversified oncology portfolios to gain economies of scope not scale effects. This effect is also consistent with the fact that many drug developments are the result of serendipitous events. So, building R&D portfolios where the resources and clinical trials are more complementary to each other will more likely increase R&D productivity than just having more (size) of the same resources.

3.3 Conclusions

In conclusion, the research literature is very mixed on the effect of M&As on R&D productivity and shareholder value. However, two effects do continually stand out in the literature, that being the role of economies of scope (developing a diversity of R&D expertise) and fixed-firm effects (meaning M&A effects can be dependent on firm-specific attributes). The italicized remarks from the 2017 study reviewed echo these key findings and would explain, for example, the depth by which recent pharma mergers have taken to delve into the oncology therapy area given its complexity to build scientific expertise and to expand product franchises through additional clinical indications. This effect is also consistent with prior research that noted economies of scope as a more important driver of R&D productivity than economies of scale (size). Lastly, this study affirms the effect of firm-specific decision-making, which can be affected by an array of attributes, such as organizational network design as noted from an earlier study and the role of analytics in helping to improve objectivity in decision-making, on the relationship of mergers and R&D productivity and shareholder value.

4. Perspectives from an Experienced Pharma Industry Axtria Principal and Project Leader

This next section explores the white paper title and questions posed in section 1.2 from the perspectives of an experienced Axtria principal - Aditya Bhandari and his team member Rashi Thaper. Aditya Bhandari has many years of pharma experience working across an array of clients on different types of commercial issues. The **Appendix** has short bios of Aditya Bhandari and Rashi Thaper who contributed their thoughts on the following questions.

4.1 What is (will be) driving current and future M&A deals?

R&D is diverse and heavy on investments, with organizations looking forward to maximizing resources where mergers can prove to save both time and money leading to a better return on investments. It takes approximately $2.6 billion to develop a new drug and most of this cost is incurred due to a very high failure rate, where 90% of drug development cost is on clinical trials that do not reach the market.[21]

Most large pharma companies manage their product portfolio by organically working on a pipeline of drugs and/or engage in M&A activities. Since a significant portion of drug development is done by emerging specialty pharma and biotech companies, they are lucrative targets for large pharma companies. For example, AbbVie's acquisition of Allergan for $67 billion allowed it to bypass the risky process of R&D as it faces the loss of patent protection for Humira.[35]

Also, research-patenting adds to the crowded R&D M&A space as the research methods that are required are patent-protected by another organization or institute necessitating a M&A which ensures maximum returns churned for the acquired investments.

4.2 Do M&As improve R&D productivity? If so, how? If not, why not?

As discussed earlier in this paper, M&As allow large pharma companies to acquire small innovative specialty pharmaceutical and biotech companies to enrich/complement their product pipeline to solve the classic patent-cliff problem. M&A drivers include the constant need for innovation and enhancing the value (knowledge/technology) base of the organization to stay ahead of the competition.

On the other hand, there are theories that suggest that innovation intensity goes down after M&As due to a reduction in an entrepreneurial, innovative, and agile environment. Bain & Co. research shows that in the late 1990s, pharma companies spent an average of $1.1 billion to develop and launch a new drug.[36] A decade later, that investment doubled to $2.2 billion.[36] At the same time, R&D productivity, measured by the number of new molecular entities and biologic license applications per R&D dollar spent, declined by 21% a year.[36] Also, analysis suggests that the likelihood of R&D success when large pharma companies are involved is comparatively higher.

Thus, to say that M&A by itself ensures R&D productivity may not be entirely true. The road to a successful M&A is paved with a lot of factors which if orchestrated well shall boost R&D productivity. However, if this equation is not balanced well, may transfuse risk to the broader portfolio and prove to be detrimental.

4.3 Do M&As increase shareholder value? If so, how? If not, why not?

It usually decreases the shareholder value as it is the skepticism that takes over for the short-term usually until 2-3 years from completion of the deal. One example from 2018 is Takeda's sinking valuation after it disclosed interest in acquiring Shire, with a market cap of $40.79 billion close on March 27, 2018 just before the interest announcement,[37] to $26.33 billion close on December 28, 2018 prior to the announcement of the deal closure.[38] However, the trend prior to this announcement event was already downward, so how much the Shire interest announcement and subsequent deal negotiations contributed to further declines in Takeda's market cap over time is up for debate and empirical analysis.[39]

However, other M&A examples reflect significant growth in shareholder value, such as, Roche & Genentech, Merck & Schering Plough, and Sanofi & Aventis.[40] However, this question is hard to answer without looking at the deal value, asset portfolio, management ability to synergize different teams, optimally planning portfolio launch, loss of exclusivity, etc.[40]

4.4 Are there any therapy classes that are more likely targets for increased M&A activity?

With advances in medicine, orphan drugs and personalization of medicine, it is natural to expect that key therapy classes will see the most action in M&A activity such as oncology and rare diseases.

4.5 What kinds of analyses should companies conduct when considering M&As in order to increase the probability of such deals improving R&D productivity and increasing shareholder value?

The correct valuation of the assets being acquired and its impact on stock prices, holds a lot of importance. Large pharma companies have dedicated teams that continuously evaluate various targets and synergies between assets. Detailed analysis needs to be done on the following aspects:

1. Identification of the best deals that blends well with the current resources of the acquiring company and aligns with the strategic goals.
2. In-depth analysis of both portfolios and a compatibility check.
3. Evaluation of the value that can be unlocked from the combined resources of both companies and calculate metrics defining the rate of return of the deal.

A deep-dive into all of the above parameters will help with improving the predictive accuracy the go/no-go decision.

5. Conclusions and Future Avenues for Discussion and Research

The preceding analysis highlights the importance that M&As will have on the future performance of pharma companies. M&As will be required to achieve strategic objectives by augmenting and/or complementing existing company R&D pipelines as the risks and costs of developing new innovative medicines increase over time. The challenges for pharma companies are making the right targeting decisions for M&As and tactically ensuring such deals achieve strategic goals.

This white paper ends with a few closing remarks based on the preceding analysis for pharma executives to consider when contemplating M&As to achieve strategic goals and how to execute them effectively to deliver on desired outcomes:

a. Taking into consideration all the instrumental factors for successful M&As, well-evaluated and orchestrated M&As will be essential for pharma companies to increase R&D productivity and shareholder value over time. Having said that, a poorly planned M&A has equal probability to increase disruptions and prove counterproductive. Thus, detailed examination of the M&A elements holds maximum weight to shift the scales in the right direction.

b. Relying solely on a company's internal R&D portfolio without M&As will likely not be sufficient to achieve strategic objectives over the long run.

c. Companies must improve on their therapy class target selection as a starting point for further development, and then seek out the right company targets to satisfy R&D objectives. This means building strength and expertise in selected therapy areas, and then realigning your portfolio to the winning agents you find, which are generally found outside the company.

d. Increasing focus is being targeted by companies in oncology and rare diseases for further development for a variety of reasons (as explained in this white paper). This means companies must use M&As in order to seek out areas of competitive advantage in an increasingly crowded field.

e. Point d) means that M&As must not be seen as building 'brands' but rather 'franchises' based on increasing the indications from a single drug approved for multiple uses. This will increase the returns to R&D while allowing companies to differentiate better their franchises in the market.

f. Point d) also means that companies must decide whether to use M&As to continue with the traditional approach to R&D portfolio development, for example in oncology, by focusing on *late-stage* cancers and extending the life of patients, or instead target *early-stage* cancers in the hopes of finding a cure. AstraZeneca recently announced a change in their cancer R&D portfolio strategy to focus on *early-stage* cancers as a way to differentiate themselves from the competition.[41]

g. The execution of M&As in order to achieve strategic objectives carries with it many risks and uncertainties given the nature of limited information at the time of assessing a M&A deal. Analytics need to be employed to assess accurately future costs, revenue, and synergies expected.

h. One key conclusion from prior pharma empirical research is that *economies of scope* (advantages gained through building research diversity) are far more important on M&As increasing R&D productivity than increasing *economies of scale* (size).

i. Lastly, another key conclusion from prior pharma empirical research is the effect of firm-specific attributes in realizing gains or generating losses through M&As. As noted by one previous article, achieving success through M&As is acquired through experience gained and learned over time.[6] A useful research project would be to review all pharma M&As for the purpose of detecting whether some companies do it better than others and why.

> How do you make money? Spinoffs, split-ups, liquidations, mergers and acquisitions.
>
> ***Mario Gabelli***
> *American stock investor, investment advisor, and financial analyst*

Appendix – Bios of Contributors

Aditya Bhandari is a Principal at Axtria with over 16 years of analytics experience primarily in pharmaceutical commercial sales and marketing. Over these years, Aditya has done various types of commercial analytics to optimize sales and marketing efforts across different markets: US, Asia, Latin America, and Europe. He is currently leading the decision science practice for Axtria offshore in India. He earned a B.A. in Economics from Delhi University, M.A. in Economics from Jawaharlal Nehru University (JNU) in Delhi, and a MBA in International Business from the Indian Institute of Foreign Trade (IIFT) in Delhi. He joined Axtria in August 2011.

Rashi Thaper is a Project Leader at Axtria with over 7 years of experience in the healthcare industry working across various pharmaceutical companies. She has worked across various therapy areas and carries subject matter expertise on commercial problems affecting pharmaceutical companies. She has a focused MBA in health sciences from Symbiosis International in Pune, India. She joined Axtria in July 2019.

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