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Managing Pharmaceutical Research And Development Portfolios: An Empirical Inquiry Into Managerial Decision Making In The Context Of A Merger

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Managing Pharmaceutical Research and Development Portfolios: An Empirical Inquiry into Managerial Decision Making in the Context of a Merger

By

Catrina Marie Jones

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

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ACCEPTANCE

This dissertation was prepared under the direction of the *CATRINA JONES* Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Executive Doctorate in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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Dr. Lars Mathiassen

Dr. Wesley Johnston

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To these four young men God gave knowledge and understanding of all kinds of literature and learning. And Daniel could understand visions and dreams of all kinds. Daniel 1:17

I give honor to God, who has anointed me with the gift of edification so that I may encourage others and myself to strive for excellence and success in all things. It is my prayer that through this research, more research and development funding is allocated towards Cancer, Alzheimer's, Sarcoidosis and many other diseases that have taken the life of my family members and many others.

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LIST OF ABBREVIATIONS

DCF……	Discounted Cash Flow
FDA……	Food and Drug Administration
IRR…….	Internal Rate of Return
M&A……..	Merger and Acquisition
MAU……..	Multi-Attribute Analysis
MoP……	Manager of Portfolio Practitioner
NPV……	Net Present Value
OGC……	United Kingdom's Office of Government Commerce
PfM…….	Portfolio Management
Pharma…….....	Pharmaceutical
PfMP……..	Portfolio Management Professional
PMI…….	Project Management Institute
PoC…….	Proof of Concept
R&D……	Research and Development
ROI……..	Return on Investment
TNT…….	Theory of Narrative Thought

ABSTRACT

Managing Pharmaceutical Research and Development Portfolios: An Empirical Inquiry into Managerial Decision Making in the Context of a Merger

By

Catrina Marie Jones

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Committee Chair: Danny Bellenger

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Most research and development portfolio managers face one common problem: They are expected to select projects for a portfolio that will yield high returns and a viable pipeline for future growth. The onset of a merger or acquisition adds complexity to existing portfolio management challenges. Prior research has shown that most research and development projects fail or terminate after a merger or acquisition, especially within the pharmaceutical industry. This research takes a case study approach to examine how managers make decisions during the portfolio management process. We apply a narrative-based decision theory to explain what influences their decisions. The major findings that emerged are: (1) post-merger processes and methods are applied with greater rigor and lack integration, (2) managers' perspectives on how they make decisions differ from reality, and (3) managers inject personal criterion into standardized portfolio evaluations. We contribute to the literature on portfolio management by providing insight into merger influences on managerial decision making. The implications of R&D post-merger portfolio shrinkage are discussed.

I INTRODUCTION

I.1 Problem Statement

Firms that engage in research and development (R&D) face a critical task of selecting portfolios that will contribute to both its short and long-term profitability. The process for selecting a portfolio has proven to be challenging due to manager's inability to predict portfolio outcomes. These challenges are further extended when the complexity of a merger is integrated into the portfolio management (PfM) process. Prior research reveals that mergers require the integration of key functions of a firm, especially the R&D functional area. Within the pharmaceutical (pharma) industry, the results of mergers and acquisitions (M&A) have shown significant declines in R&D, demonstrating the potential need for more effective post-merger PfM processes. One of the key components of pharma PfM is portfolio selection. Although pharma portfolio selections are often driven by financial analyses, there is also a requirement for managers to make decisions based upon the output of these financial valuations and other criteria identified by the firm. Prior research on pharma PfM processes suggests that managers' portfolio decision-making behaviors are often altered based on the strategies set forth by the executive team. For example, a study conducted by Smith and Sonnenblick (2013) revealed that because executives had difficulty terminating projects so that more viable projects could be added to the portfolio, managers followed suit and went against their recommendations year after year by allowing projects that should be terminated to remain the R&D portfolio. The motivation behind managers' decisions needs to be further explored within pharma, especially after M&A, so that firms can become aware of executive influences on managers' portfolio decisions and seek out ways to eliminate these distractions. After a pharma merger, portfolio selections become even more critical since wrong decisions can be detrimental to a firm.

According to the Wall Street Journal, there were over 112 deals announced in 2015, making it the biggest M&A Year of all time ("2015 Becomes the Biggest M&A Year Ever, 2016). More than $200 billion was at play in the last round of M&A activity within the pharma industry – a frenzy that includes 14 deals announced in 2014 ("'Trying to Recapture the Magic': The Strategy Behind the Pharma M&A Rush," 2014). PharmaZeta acquired Warner-Lambert in 2000 for $90 billion. As a result of this merger, PharmaZeta found itself saddled with some businesses it didn't want ("'Trying to Recapture the Magic': The Strategy Behind the Pharma M&A Rush," 2014). Japan's Daiichi Sankyo in 2008 bought a 64% stake in Ranbaxy for $4.2 billion, but problems followed soon thereafter, with the Food and Drug Administration (FDA) banning the U.S. distribution of drugs produced in Ranbaxy facilities in India after discovering lapses in regulatory compliance ("'Trying to Recapture the Magic': The Strategy Behind the Pharma M&A Rush," 2014). Pharma firms spend billions yearly engaging in M&A seeking to develop and grow R&D portfolios. Table 1 displays the Top 25 M&A deals in 2013. These deals included acquisitions of small to large-sized pharma firms.

Table 1 Top 25 M&A Deals in the Year 2013

Acquired Firm	Acquiring Firm	Price
Thermo Fisher Scientific	Life Technologies	$13.6 billion
Amgen	Onyx Pharmaceuticals	$10.4 billion
Valeant Pharmaceuticals International	Bausch + Lomb	$8.7 billion
Perrigo	Elan	About $8.6 billion
Actavis	Warner Chilcott	About $8.5 billion
AstraZeneca	Bristol-Myers Squibb (BMS; Diabetes development operations)	Up to $4.3 billion – including $2.7 billion upfront, up to $1.4 billion tied to regulatory and sales-based milestones, and up to $225 million to transfer of assets. AstraZeneca also agreed to pay BMS royalties on set sales through 2025
Shire	ViroPharma	About $4.2 billion
BayerHealthCare	Algeta	$2.9 billion
Patheon	NewCo	More than $2.6 billion
Salix Pharmaceuticals	Santarus	$2.6 billion
Mylan	Agila (injectables business of Strides Arcolab Ltd.)	Up to $1.75 billion
Grifols	PharmaIota (blood transfusion diagnostics unit)	$1.657 billion
Madison Dearborn Partners	Ikaria	About $1.6 billion
Endo Health Solutions	Paladin Labs	About $1.6 billion
KKR	PRA International	More than $1.3 billion
AstraZeneca	Pearl Therapeutics	$1.15 billion
GlaxoSmithKline	GlaxoSmithKline Pharmaceuticals Ltd. (India pharmaceuticals subsidiary)	$1.028 billion (Rs. 54 billion)
Jazz Pharmaceuticals	Gentium	About $1 billion
Johnson & Johnson	Aragon Pharmaceuticals	Up to $1 billion
Allergan	MAP Pharmaceuticals	$958 million
Otsuka Pharmaceutical	Astex Pharmaceuticals	$886 million
Cubist Pharmaceuticals	Trius Therapeutics	$704 million
Novo A/S	Xellia Pharmaceuticals	$700 million
Akorn Pharmaceuticals	Hi-Tech Pharmacal	$640 million
Pharmstandard	Beaver Pharmaceutical Pte Ltd.	$590 million

Data obtained from GEN Insight and Intelligence website (2015)

Table 2 shows three major mergers and its post-merger portfolio outcomes. The strategic motives of all three mergers involved R&D savings. However, the outcomes were decreased expenditures due to budget constraints and pipeline deterioration. Merged pharma firms tend to focus on short-term projects that can be developed cheaper and faster with favorable profits. As a result, pipelines of some of the largest pharma firms have shown significant declines. Merged pharma firms need to find the balance between staying risk averse and satisfying short-term sales targets without sacrificing future growth (Smith & Sonnenblick, 2013).

Although merged pharma firms have applied reputable valuation methods to aid in the selection of an optimum portfolio, R&D declines suggest that better decisions are needed, and more effective portfolio processes could be adopted. These declines could partially be attributed to the behaviors of managers responsible for making portfolio decisions. To achieve growth, firms need to understand why pharma R&D portfolios are less successful after a merger. Gaining insight into what managers are actually doing throughout the PfM process could provide possible answers for the decline of R&D success.

To appropriately manage a firm's portfolio, decisions must be made on when to fund projects so that long-term growth can be established (Kester, Griffin, Hultink, & Lauche, 2011). Making the wrong portfolio decisions can be devastating to a firm's budget, and new PfM strategies may need to be developed. Deciding on the right portfolio can mean the difference between remaining competitive and falling behind (Martinsuo, 2013). Within the automotive industry, executive leader Bill Ford acknowledged in 2006 that it was management's failure to make the right portfolio decisions that led Ford Motor into financial trouble (Kester et al., 2011). Forced to refocus their efforts in the midst of the economic recession, Ford, General

Table 2 Portfolio Outcomes of 3 Major Pharmaceutical Mergers

Merger Year	Acquired Firm	Acquiring Firm	Strategic Motive	Outcome
1995	Wellcome	Glaxo	Challenges of a changing industry environment patent expirations	*Glaxo Wellcome experienced short-term savings but no long-term growth; Firm struggled to find replacements for its blockbuster drugs whose patents expired in the US
2008	Wyeth	PharmaZeta	Streamline R&D capabilities	**PharmaZeta's R&D multi-billion dollar cost savings resulted from elimination of research sites, programs, and scientists
2014	Allergan	Actavis	Billion dollars R&D cost savings	**Actavis cut R&D expenditures

Source: *Mega Pharma Book, **Pharmaceutical-technology.com

Motors, and Chrysler (known as the Big Three) all announced a complete change in product strategy at the beginning of 2009 (Kester et al., 2011). The Big Three begin focusing on building portfolios of more fuel-efficient cars, following the lead of their top competitor, Toyota (Kester et al., 2011). Portfolios need to be continuously reviewed and adjusted based on valuation outcomes and other portfolio criteria in order to remain competitive.

To aid in R&D portfolio decision making, firms rely on ranking, economic decision theory (single and multi-stage), portfolio optimization, cognitive modeling, and ad-hoc decision methods. Although the literature focuses primarily on the use of these valuation methods, none of the methods explain the behaviors that drive the PfM decisions. Additionally, these methods are often applied to a once-a-year decision event rather than an ongoing process (Martino, 1995).

As a result, many firms face reduced success due to their inability to make effective portfolio decisions (Kester et al., 2011).

Mestre-Ferrandiz, Sussex, and Towse (as cited by Smith and Sonneblick, 2013) reported that pharma projects are extremely high risk (fewer than 10 percent make it to market), expensive (a single project can cost hundreds of millions of dollars), and have long time frames (typically 3-8 years). Given these statistics, managers may feel that always making the right portfolio decisions are nearly impossible. The unpredictability of the portfolio outcome may drive managers to make educated guesses based on past experiences with portfolio successes and failures. Managers are faced with the challenge of thinking clearly in the midst of high demands and accountability for future failed projects. The portfolio decisions of these pharma managers can ultimately lead to blockbuster drugs that generate high levels of return on investment or sunk costs that lead to severe declines in R&D productivity. Managers anticipate the regrets and consequences of bad outcomes, while attempting to make the best portfolio selections. They seek out empirical methods that have the potential to delusively promise the achievement of high revenue growth goals. Prior research has shown that adhering to PfM processes alone will not suffice for building a profitable portfolio.

Many PfM processes are rushed, especially in the climate of consolidation where pharma mergers and takeover bids are often used as cost-saving measures (Lo, 2015). These cost-saving measures include the streamlining of operations and termination of R&D activity (Lo, 2015). Managers who are responsible for PfM generally follow standardized processes. These managers make PfM decisions as a result of investor demands. These type decisions are often executed quickly, and the behaviors that drive such decisions may not be well understood.

During a merger, pharma R&D departments are the last to integrate, as a firm's pipeline and patents are its most prized assets and are not revealed to competitors in case the deal falls through ("Hold you horses: M&A is about talent, not just pipelines," 2013). It can take up nine months to merge departments, which is inevitably stressful and time-consuming for management and employees ("Hold you horses: M&A is about talent, not just pipelines," 2013). During this critical period, no new projects are undertaken, and important decisions are made about the merged firm's portfolio. One way to explain how these decisions are made is by exploring the behaviors of the managers throughout the PfM process.

I.2 Conceptual Framework

This study will focus on the area of PfM. The problem setting is the R&D departments within pharma firms. Managers' behaviors will be examined in the context of merger conditions. The conceptual framework for this research is displayed in Figure 1. A summary of the research style components is shown in Exhibit A-1 of Appendix A. Table 3 displays the definition of terms used in the study.

The next section presents the literature findings on PfM and how it's leveraged in collaboration with R&D activities within the pharma industry, the impact of M&A on PfM, and the presentation of the decision-based theory that will be applied to this research. Thereafter, the methodology is outlined.

Table 3 Definitions of Key Terms Used in This Study

Term	Definition
Portfolio	A collection of programs, projects and operations managed as a group.
Portfolio Management	A set of activities that allow a firm to select, develop, and commercialize a pipeline of new products aligned with the firm's strategy that will enable it to continue to grow profitably over the long term.
Project	A pharmaceutical drug product within any given therapeutic area.
Manager	A portfolio management decision-maker within at firm who is responsible for making decisions regarding what drugs go into a portfolio.
Merger and Acquisition	A general term used to refer to the consolidation of companies. This study involves horizontal pharmaceutical mergers.
Merger Activities	A set of activities that occur during M&A, such as pre- and post-merger portfolio selection.
Phase I/Early Phase Development	The first clinical trials in which the drug is administered to healthy human volunteers.
Phase II	Clinical trials in which the drug is administered to human patients with the disease by using the results of dosing studies from Phase I.
Phase III/Late Stage Development	This clinical trial phase includes large-scale clinical studies on humans with the disease. The FDA is involved and indicates benchmarks for giving their approval. In addition to confirming the efficacy, these studies identify drug interactions, human demographics, and so forth.
Clinical Study/Trial	A rigorously controlled test of a new drug or a new invasive medical device on human subjects. In the United States it is conducted under the direction of the FDA before being made available for general clinical use.

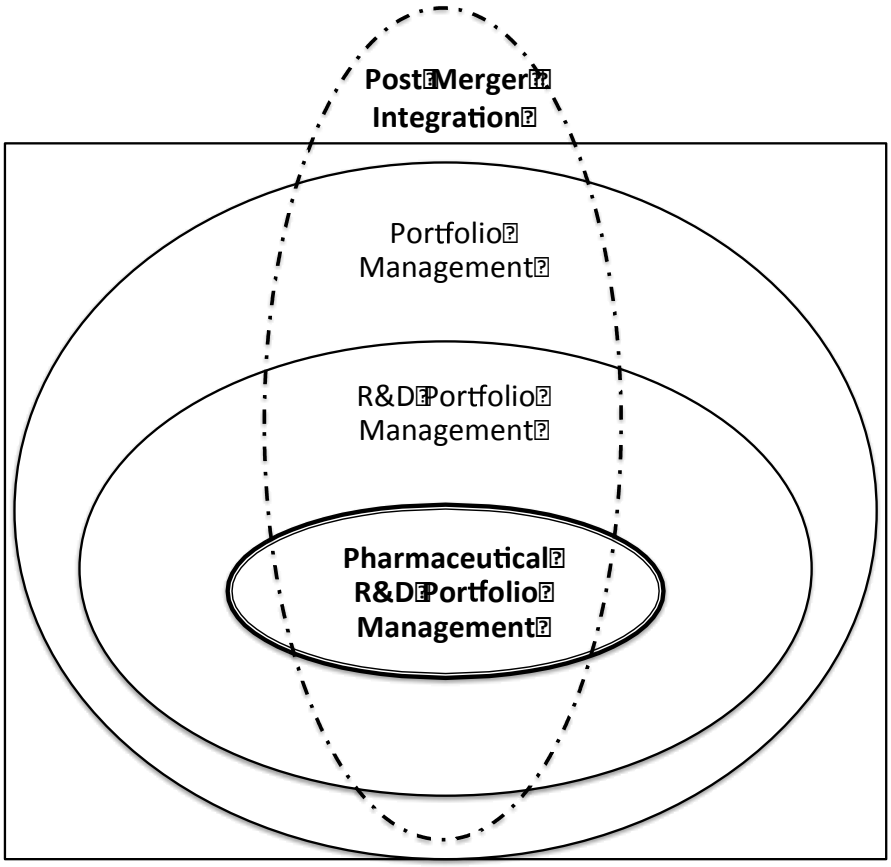

Figure 1 Conceptual Framework

II LITERATURE REVIEW

II.1 Portfolio Management

Definition. A portfolio is a collection of programs, projects and operations managed as a group ("PMI," 2015). The components of a portfolio may not necessarily be interdependent or even related—but they are managed together as a group to achieve strategic objectives ("PMI," 2015). PfM practitioners rely on two main organizations for guidance on providing frameworks for managing portfolios, Project Management Institute (PMI) and the United Kingdom's Office of Government Commerce (OGC). These organizations provide methodologies and frameworks for managing portfolios, programs, and projects. Firms have adopted various forms of these PfM frameworks, including the use of project evaluation and decision criteria control routines and other means to formalize their project PfM (Martinsuo, 2013). The common objective of these organizations is to provide tools, techniques, and processes to aid in the delivery of projects aligned with its strategic goals. Additionally, these organizations offer training and certifications for practitioners across many industries. The most common portfolio certification credentials are Portfolio Management Professional (PfMP) and Manager of Portfolio Practitioner (MoP), administered by PMI and OGC, respectively.

PMI defines PfM as the centralized management of one or more portfolios, which includes identifying, prioritizing, authorizing, managing, and controlling projects, programs, and other related work to achieve specific strategic business objectives ("PMI," 2015). United Kingdom's Office of Government Commerce's definition of PfM is a coordinated collection of strategic processes and decisions that together enable the most effective balance of organizational change and business as usual (Commerce, 2008). For this study, PfM is defined as a set of activities that allow a firm to select, develop, and commercialize a pipeline of new

products aligned with a strategy that will enable it to continue to grow profitably over the long term (Kester et al., 2011). Further, this study will focus on pharma PfM, as opposed to information technology and financial PfM.

Portfolio management spans across multiple industries and is one of the major business functions within an innovative firm. If not managed proficiently and in line with the firm's strategy, the negative impact of poor portfolio decisions can be significant (Kester et al., 2011). According to Bode-Greuel and Nickisch (2008), successful PfM must be sufficiently detailed, interdisciplinary, consistent, and embedded in a practicable corporate process. The process of developing a portfolio to deliver a firm's or department's strategy should take into account operational priorities as well as strategic priorities (Commerce, 2008).

Portfolio Management Office. The PfM office ideally reports to the head of R&D or the chief executive officer. According to Bode-Greuel and Nickisch (2008), the most effective organizational model is one in which the PfM function is closely linked to the strategy and project management entity within the firm, jointly reporting to either the chief executive office or another Board member that is not responsible for R&D. According to OGC, the portfolio office should report directly to a main board director to ensure that it has sufficient influence over investment decisions (Commerce, 2008). This reporting structure is critical because managers who are responsible for portfolios need to have buy-in and guidance from senior management and investors to provide strategies for making the PfM process effective. The PMI Pulse study has identified five key drivers of effective PfM: senior management receptivity, competent portfolio governance, standardized metrics and criteria, consistency and logic of organizational strategic objectives, and mature project management office (PMI, 2012). Effective PfM also includes metrics and criteria. Figure 2 displays metrics used across industries as reported Bode-

Greul and Nickisch (2008). Project Management Institute's Pulse of Profession In-Depth Report (PMI, 2012), stated that organizations that are effective in PfM had 62% of products meet or exceed return on investment (ROI).

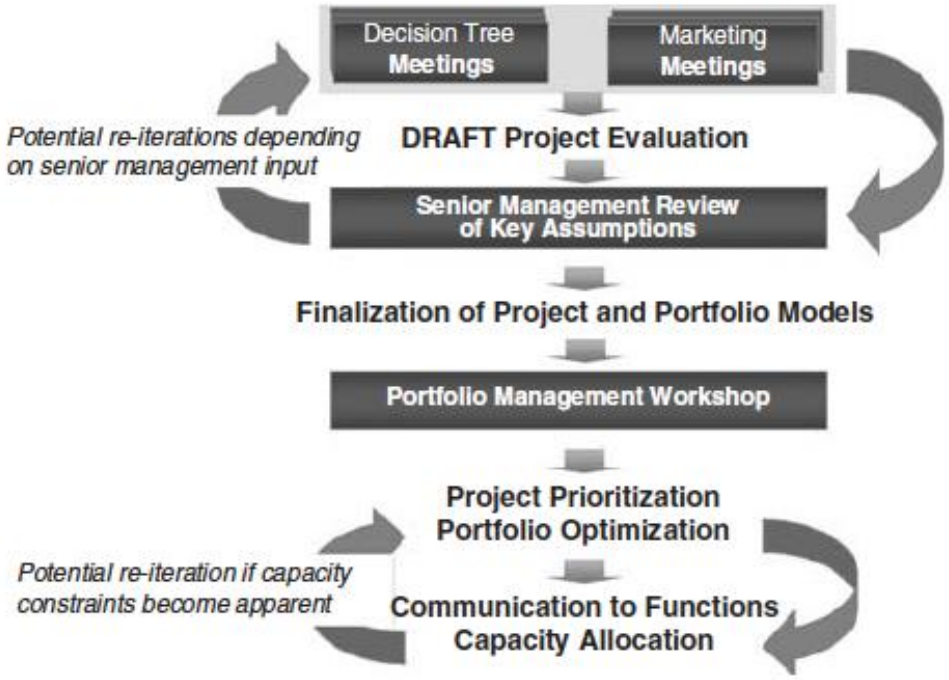

Figure 2 PfM Process in Fully Integrated Firms
(Bode-Greuel and Nickisch (2008)

Portfolio Management Process. According to Bode-Greuel and Nickisch (2008), a typical PfM process includes the evaluation of development milestones and probabilities (decision-tree meetings). The commercial analysis (marketing meetings) of individual projects is usually performed at the project team level, followed by a senior management review of the key assumptions across projects facilitates the establishment of valid and consistent assumptions (Bode-Greuel & Nickisch, 2008). Bode-Greul and Nickisch (2008) stated that project management is the predominant operative instrument for the execution of portfolio decisions. A typical PfM process is displayed in Figure 3. As capacity constraints may limit the operational

execution of portfolio decisions, effective communication, and interaction with functions facilitates the translation of project prioritization decisions into feasible actions (Bode-Greuel & Nickisch, 2008). Bode-Greul (2008) identified four common tools that are applied to align project management with portfolio decisions: target product profile (TPP), a stage-gate decision process, timeline and budget management, and sales forecast aligned with TPP and development plan. A TPP serves as a blueprint of the desired future product (Bode-Greuel & Nickisch, 2008). The stage-gate decision process is related to the major preclinical and clinical development milestones and is also a well-established principle in the pharma industry (Bode-Greuel & Nickisch, 2008). At each stage-gate, it is decided whether the achieved results support continuation of development, and the project may be reprioritized depending on other projects competing for resources (Bode-Greuel & Nickisch, 2008). Sales forecasting and financial project evaluation are undertaken to a variable extent and level of detail, depending on firms' policies at which development stage quantitative analyses should commence (Bode-Greuel & Nickisch, 2008).

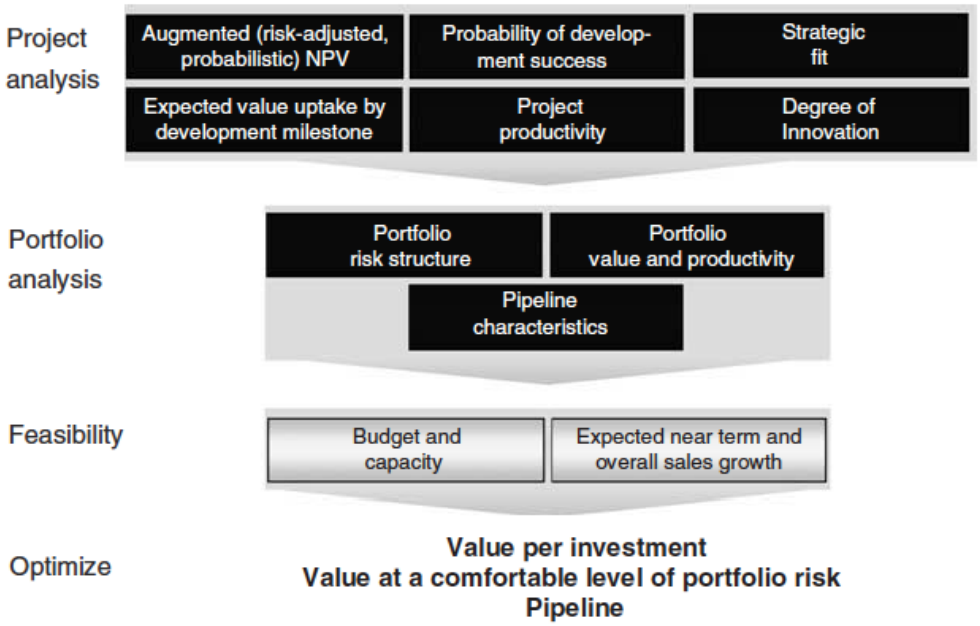

Figure 3 Commonly Applied PfM Metrics
(Bode-Greuel & Nickisch, 2008)

II.2 R&D Portfolio Management

Extending PfM to the R&D function adds complexity and the need for effective portfolio selection models. Research and development managers often view PfM in terms of strategy and valuation. Wang and Hwang (2007) presented a simple fuzzy multi-criteria R&D portfolio decision model that represented project appraisals for each criterion as a fuzzy set and developed an algorithm to find non-dominated solutions. Multifactorial analyses should be a routine part of any R&D portfolio assessment to account for all of the parameters that could impact a portfolio profile. The most effective use of the PfM activity is not the value calculation at the end, but rather how information is effectively used to help develop, define, and carry out an overall business strategy (Tiggemann, Dworaczyk, & Sabel, 1998).

Tiggemann et al. (1998) presented four points that need to be considered when managing projects within an R&D portfolio: (1) probability-weighted net present value (expected NPV),

(2) long-term versus short-term balance of risk and strategic business needs, (3) balance of territory-specific versus global strategic business needs, and (4) organizational ability, capability, expertise, and resources. These considerations should be included in pharma PfM criteria when trying to consolidate portfolios after a merger. Another consideration is to recognize and properly deal with personal biases of managers (Tiggemann et al., 1998). Biases could deter managers from effectively managing a pharma R&D portfolio.

II.3 Pharmaceutical Portfolio Management

Standard Approach to Portfolio Management. According to Kester, Griffin, Hultink and Lauche (2011), pharmaceuticals are one of the most mature industries in PfM. This maturity comes from the fact that pharma firms may have an abundance of project alternatives at every level of the drug development process, where continuous decisions must be made for a constant pipeline of products. An overview of the FDA drug development process is displayed in Table 4. Today, no major pharma firm is without some type of centralized PfM function with wide ranging responsibilities including strategy development, decision making and resource allocation (Grainger, 2014). The impact of rising and falling productivity levels has led pharma firms to pay closer attention to their portfolios and look into the various ways in which they are managed. The pharma industry uses PfM to evaluate the commercial value and the risk structure of development projects (Bode-Greuel & Nickisch, 2008). Standard approaches to PfM in the biopharma industry involve sizing R&D portfolios as a function of expected revenues, and making inclusion–exclusion decisions on a compound-by-compound basis (Evans, Hinds, & Hammock, 2009). Although most pharma firms have adopted PfM, the process for managing portfolios vary based upon firm size, culture, and corporate governance and structure. Smith and Sonnenblick (2013) found the success of the new PfM process is dependent on having a strong

portfolio group with access to the project data, the ability to manipulate the data to answer what-if questions, and access to executives who would listen to the insights gleaned from the analyses. PfM within the pharma industry involves the selection of products that are expected to deliver growth and sustain R&D operations. Historically, the pharma industry has prided itself on investing more in R&D (as a percentage of revenues) than any other industry (LaMattina, 2011). The portfolio selection methods employed by firms such as the "BIG Three" are primarily focused on quantitative modeling methods. The common denominator of these methods presents the selection decision as a rational, evidence-based rigorous comparison of numbers (Kester et al., 2011). There is a general agreement in the pharma industry that the evaluation of projects entering full development after a successful proof of concept (PoC) should include quantitative financial parameters (Bode-Greuel & Nickisch, 2008). Interestingly, firms relying solely on financial methods for project selection and decision making perform worse than other firms (Kester et al., 2011). There are various portfolio methods that are utilized within pharma R&D. Common methods include: (a) discounted cash flow (DCF), (b) decision-tree analysis, (c) real options, (d) expert opinion, (e) sensitivity analysis, (f) internal rate of return (IRR), (g) pharma reviews, (h) stage-gates, (i) and net present value (NPV).

Pharmaceutical Portfolio Valuation and Selection Models. Project selection is one of the first and most critical activities in PfM (Kaiser, El Arbi, & Ahlemann, 2015). Portfolio selection is a process characterized by uncertainty and changing information: new opportunities arise, multiple goals as well as strategic considerations are required, and interdependence among projects (either when competing for scarce resources or when synergies are achieved) exist, multiple decision-makers and locations (Kaiser et al., 2015). Gupta and Wilemon (as cited by Blau, Pekny, Varma, & Bunch, 2004) stated that a portfolio must be selected in such a way that

the competition among drug candidates for limited resources does not result in unusually long average product development times and hence late commercialization.

Deciding from a pool of available and competing projects is a complex decision (Kaiser et al., 2015). Many managers mistakenly assume that the selection of good projects yield a profitable portfolio. However, managers have to consider multiple project dimensions and intuitively decide how adding or removing a specific project would have an impact on the portfolio (Kaiser et al., 2015). Smith and Sonnenblick (2013) stated the goal of PfM is not to pick which projects are the best but to pick the best set of projects to achieve the firm's goals. The selection of a project can be determined at any interval during the drug development process as displayed in Table 4.

Table 4 Overview of the Drug Development Process
(Adapted from Dimasi, Hansen, and Grabowski (2003) as cited on www.fdareview.org)

Preclinical	**Clinical**				**Approval**	**Market**
Toxicology	Investigational New Drug Application	Phase I	Phase II	Phase III	New Drug Application	Phase IV / Post market surveillance
		Safety	Safety dosing efficacy	Safety efficacy side effects		
Expenses		$15.2 million	$23.4 million	$86.5 million		
Time		21.6 months	25.7 months	30.5 months		
1 to 6 years	6 to 11 years				0.6 to 2 years	11 to 14 years
Overall probability of success						
		30%	14%	9%	8%	
Conditional probability of success						
	40%	75%	48%	64%	90%	

Note: The line marked "Overall probability of success" is the unconditional probability of reaching a given stage. For example, 30 percent of drugs make it to phase I testing. The line marked "Conditional probability of success" shows the probability of advancing to the next stage of the process conditional on reaching a given stage. For example, the probability of advancing to Phase III testing conditional on starting Phase II testing is 48 percent.

Bole-Greul and Nickisch (2008) indicated the following common set of criteria used to evaluate pharma projects for portfolio selection: (1) scoring around market size, attractiveness, and competitiveness, (2) high, medium, or low cost, either for research cost alone, or including development cost, (3) time to entry into clinical development / PoC / launch, expected time per milestone, (4) score against therapeutic area strategy, (5) scoring against TPP and milestone criteria. Other criteria may include rankings of low, medium and high for: Innovation potential, specificity, efficacy, tolerability, appropriate early clinical PoC / availability of biomarkers, preclinical feasibility, clinical feasibility, degree of unmet medical need, competitiveness, number and categories of competitors, patent status, peak sale potential, and potential follow-on indications (Bode-Greuel & Nickisch, 2008).

Discounted Cash Flow. Chapman and Ward (as cited by Blau et al., 2004) reported that the earliest PfM techniques applied in the pharma industry were based on economic analysis. One of these methods, DCF, is defined as the present value of a company's future cash flows. Discounted cash flow is calculated by dividing projected annual earnings over an extended period by an appropriate discount rate, which is the weighted cost of raising capital by issuing debt or equity ("Discounted cash flow," 2011). According to Krishnan and Ulrich (as cited by Blau et al., 2004) the DCF method remains the most commonly used valuation method. However, Poh, Ang, and Bai (as cited by Blau et al., 2004) argued that DCF is based on expected values of uncertain parameters and is unable to generate quantitative details about the risk associated with a given drug candidate.

Decision-tree Analysis. Decision tree analysis is an effective tool used to illustrate R&D decision points, the probabilities of uncertain outcomes at each milestone, and potentially resulting decision options (Bode-Greuel & Nickisch, 2008). Sharpe and Keelin (as cited by

Blau et al., 2004) indicated that decision trees allow management to undertake complex resource allocation decisions among competing drug candidates with full consideration to the possibilities of drug failures. Decision trees serve as a communication tool for FM, project management and line functions (Bode-Greuel & Nickisch, 2008). Ding and Eliashberg (as cited by Blau et al., 2004) reported that the decision tree method also has addressed PfM issues such as how many projects to pursue and how many projects to terminate.

Real Options. The real options approach is used in capital market theory to determine valuation of risky R&D projects (Wang & Hwang, 2007). Real options are defined as the situation in which an investor can choose between two different investments, where both choices are tangible assets ("Real Options," 2011). The first reported practical use of a portfolio selection strategy is the application of the real options pricing valuation model presented above by Merck and Co. (Hartmann & Hassan, 2006). The results of a study reported by Hartmann and Hassan (2006) indicate that real options pricing, despite its valuation models, have not seen a high rate of adoption within the pharma industry. This lack of adoption may be attributed to a finding by Copeland and Antikarov (as cited by Blau et. al., 2004) that in practice, the real options method has been used effectively only to evaluate single projects. In pharma, multiple projects across various therapeutic areas are evaluated simultaneously, and final selections form a portfolio.

Expert Opinion and Sensitivity Analysis. Research shows that pharma portfolio managers rely heavily on expert opinion and in-house calculations obtained by sensitivity and scenario analysis (Hartmann & Hassan, 2006). Sensitivity and scenario analysis involve changing one or more of the values supplied for the payoffs, costs, and probabilities, then rerunning the procedure for selecting optimum portfolio (Martino, 1995). Expert opinion is

defined as a statement from a specialist on a particular subject. These opinions could be based on past and present experiences of subject matter experts.

Internal Rate of Return and Net Present Value. For any given portfolio, there is a planning horizon for the time in which the portfolio is being considered, a budget for the total amount of money available for the selected projects and minimum performance requirements such as a minimum IRR or a minimum NPV (Kaiser et al., 2015). Internal rate of return is defined as the discount rate at which the cash inflow on an investment equals its cash outflow ("NPV," 2011). Net present value is defined as the present value of the expected future cash flows minus the cost ("NPV," 2011). In most pharma portfolio processes, projects are ranked according to their NPV. This method is the most understood by investors, managers and finance teams and is commonly used a decision-making component. Projects with a positive NPV are favored over those with negative NPVs. Evans et al. (2009) identified two crucial inadequacies of the NPV approach when used a sole determination: (1) it fails to distinguish between projects offering comparable returns but different levels of risk, and (2) it fails to provide a cumulative measure of risk and returns at the whole-portfolio level. Tiggemann et al. (1998) corroborated this notion by stating that a priority ranking of R&D projects from the highest down to the lowest probability weighted NPV will fail. Therefore, managers are not holistically informed to make a critical portfolio decision using NPV alone.

Reviews and Stage-Gates. Once a portfolio has been defined, portfolio reviews are conducted once or twice a year. Portfolio reviews are defined as qualitative and quantitative evaluations consisting of parameters such as: strategic fit, degree of innovation, NPV and expected value uptake, project productivity, sales, probability of launch, time to launch, and cost (Bode-Greuel & Nickisch, 2008). Pharma R&D portfolio reviews are extensive and time-

consuming, as they require careful consideration of scientific issues such as efficacy and safety data for each product, as well as commercial issues such as potential duplication and strategic directions of the merged firm (LaMattina, 2011). These reviews are sometimes rushed as a result of approaching deadlines and environmental conditions. Portfolio reviews are helpful because they usually involve many levels of management and key decision-makers. According to Bode-Greul and Nickisch (2008), portfolio decisions are best achieved in an interactive way because individual opinions and attitudes become transparent, paving the way for consensus and compromise increasing the chance that decisions are respected and translated into action on the operational level.

A stage-gate is defined as a phased project management approach that produces fact-based funding decisions based on a set of defined evaluation criteria. According to O'Connor (1994) (as cited by Blau et al., 2004), the stage-gate process appears mainly focused on tactical decisions such as regulating the flow of work in the pipeline rather than on strategic decisions such as project selection and sequencing.

II.4 Pharmaceutical Portfolio Management and Post-Merger Integration

M&A Objectives. Richey, Kiessling, Tokman, & Dalela (2008) (as cited by Oh, Peters, & Johnston, 2014) state that M&As have been used as a market growth strategy. Still today, firms continue to pursue M&As with the expectation of significant growth. Table 5 presents 20 goals or objectives for M&As derived from Kitching 167; Howell, 1970, Steiner, 1975 (as cited by Walter and Barney, 1990). The most common goals or objectives pharma managers align with items 2, 7, 9, 10, 11 and 20 of Table 5. These objectives aim to enhance capabilities, improve efficiencies, penetrate new markets, utilize talent, and integrate technologies of the acquired firm. Portfolio management objectives are to divest poor-performing drugs. Prior

research has shown the goal to attain immediate growth is realized. However, the merged entity eventually suffers and experience lower performance.

Table 5 Managerial Goals of M&A
Walter and Barney (1990)

Item	Goal
1	Promote visibility with investors, bankers, or governments, with an eye to subtle benefits later.
2	Accelerate growth or reduce risks and costs in a particular industry in which the acquiring company has a strength such as executive wisdom.
3	Utilize interlocking and mutually stimulating(synergistic) qualities of the acquired company vis-a-vis the acquiring company.
4	Attain improved competitiveness inherent in holding a sizeable market share or important market position.
5	Utilize financial strengths of the acquired company such as foreign tax credits or borrowing capacity.
6	Gain complementary financial features such as those that balance earnings cyclicality.
7	Reduce risks and costs of diversifying products and services delivered to customers within an industry.
8	Utilize the acquiring company's expertise in marketing, production, or other areas within the acquired company.
9	Divest poor-performing elements of the otherwise undervalued acquired company, in portfolio management style.
10	Improve efficiencies and reduce risk in the supply of specific goods and/or services to the acquiring company.
11	Penetrate new markets by utilizing the acquired company's marketing capacities.
12	Improve economies of scale by utilizing the acquired company's distributional capacities to absorb expanded output.
13	Gain valuable or potentially valuable assets with the cash flow or other financial strengths of the acquiring firm.
14	Broaden the customer base for existing goods and services of the acquiring company.
15	Create economies of scale by relevant capacity expansion.
16	Reduce risks and costs of entering a new industry.
17	Expand capacity at less cost than assembling new facilities, equipment, and/or physical assets.
18	Fulfill the personal ambitions, vision, or some particular goal of the acquiring company's chief executive.
19	Pursue opportunities to sell stock at a profit by such acts as pressing management of the acquired firm for improved earnings.
20	Utilize the acquired company's personnel, skills, or technology in other operations of the acquiring company.

M&A Process and Impact on Firm. M&A activity is likely to occur when one firm is performing low and another firm is seeking market expansion (Campbell, Sirmon, & Schijven,

2016). In this scenario, the high performing firm would acquire the low performing firm. These acquiring firms can acquire same and smaller size firms. Investors perceive the acquiring firm as having sufficient capital to maximize the acquisition. According to Campbell et al. (2016), investors pursue acquisitions when the acquiring firm is strategically and organizationally fit, have strong performance, and leverage experience. They influence board members and the executive team to acquire the low-performing firms. The traditional steps of the acquisition process are shown in Figure 4.

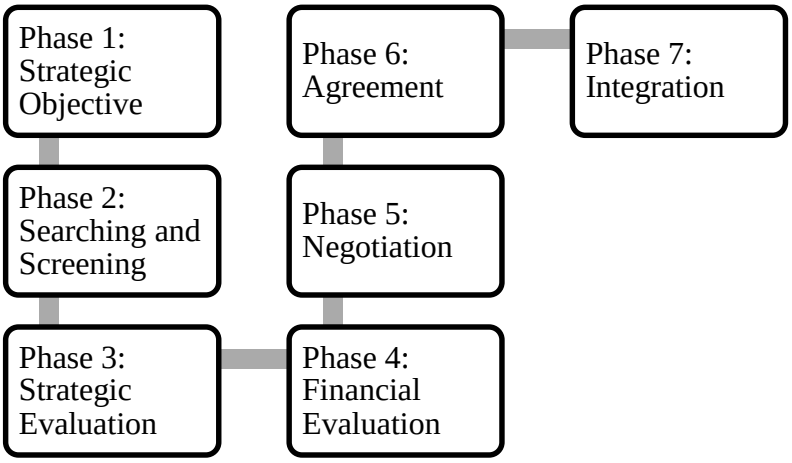

Figure 4 Traditional view of the acquisition process
Adapted from Haspeslagh & Jemison (1991) (as cited by Angwin, Paroutis, & Connell, 2015)

The low-performing firms are usually acquired by larger firms. However, larger firms can also acquire firms of equal size. Cartwright and Cooper, 1993 (as cited by Oh et al., 2014) state that smaller firms are known to adopt the changes that are introduced by the larger acquiring firm. The acquiring and acquired firms form a perception about that the culture of the merged entity, even before the merger takes place (Cartwright and Cooper, 1993 as cited by Oh et al., 2014). In a quantitative study conducted by Oh et al. (2014), it was discovered that post-merger performance deterioration due to the conflict in organizational cultures is greater in acquisitions involving larger target firms than in acquisitions of smaller target firms.

Research from the Harvard Business School found that 86% of M&A failed to achieve their goals and expectations (Bart & Schreiber, 2013). Until strategies are set forth and executed to address the challenges with culture, talent retention, strategy alignment and integration, this declining trend may continue.

Post-Merger Integration. According to Shrivastava (1986), the ability to integrate two entities into one is a major concern for most firms. Technologies, procedures, accounting systems, and physical assets are among the first and easiest to be integrated. Studies conducted by Chatterjee, Lubatkin, Schweiger, & Weber, 1992 and Kusewitt, 1985 (as cited by Campbell, 2016) reveal that the closer the firms are in size, the higher the likelihood that they will face integration difficulties. In many cases, the acquiring and the acquired firms are large, which further complicates mergers.

Culture is one of the hardest components to integrate. Oh et al., (2014) indicate that conflict in firm cultures is only temporarily influential in affecting post-merger performance, and executing the right strategy to gain merger synergies could make integration more successful.

Schweizer and Patzelt (2012) emphasize the importance of human elements in the integration process. Increased turnover among key R&D personnel and key managers following an acquisition results in the loss of valuable knowledge and expertise which limits knowledge transfer (Canella & Hambrick, 1993; Ranft & Lord, 2000 as cited by Schweizer and Patzelt, 2012). McMullen & Shepherd, 2006; Podolny (1994) drew on the behavioral decision-making perspective that employees from acquired firms leave to avoid the substantial uncertainties as a result of the integration (as cited by Schweizer and Patzelt, 2012).

Shrivastava (1986) estimated that almost half to two thirds of all mergers fail as a result of faulty integration. Decades of failed mergers have been documented in the literature. In

1981, Exxon Inc. bought Reliance Electric Firm for $1.2 billion but failed as a result of poor integration (Shrivastava, 1986).

Other factors that complicate the post-merger integration of firms are the diverse motives behind these mergers, the diverse strategies used to acquire firms, and complex technologies and production systems that need to be integrated after the merger (Shrivastava, 1986). Managerial motives for mergers vary from the creation of financial value for stockholders to the almost altruistic, friendly, saving gesture on the part of the acquiring firm (Shrivastava, 1986).

Schrivastava (1986) identified three types of post-merger integrations: (1) procedural integration, (2) physical integration, and (3) managerial and sociocultural integration. Since one of the contexts of this study is R&D, we will focus on physical integration. If the post-integration process is badly managed, an acquisition can imply a potential disruption in the established routines of the merging firm and in its newly acquired component, and thereby even reduce R&D productivity (Cassiman, Colombo, Garrone, & Veugelers, 2005). Physical integration involves the consolidation of product lines, production technologies, R&D projects, plant and equipment, and real estate assets (Shrivastava, 1986). The integration of these components is costly, labor intensive and time-consuming and must be managed properly. Product line integration involves the evaluation and assessment of existing products and its strategic alignment with that of the acquirer. A decision will be made to either terminate or divest a product line. Integration of production technologies involve screening and divesting redundant production facilities or transferring production systems across divisional and firm boundaries, as well as integrating existing plants and equipment (Shrivastava, 1986). Mergers may result in the relocation of plant and equipment in efforts to reduce production costs, inventory holding costs, and the cost of transporting goods to markets (Shrivastava, 1986). The

integration of immovable real estate assets primarily involves revaluation of properties and their allocation to appropriate functions (Shrivastava, 1986). Pre-merger analysis and valuation of real estate assets very often do not take into account the rapid escalation of property prices, especially properties located in urban areas, which could significantly negatively impact stock prices of the merged company (Shrivastava, 1986).

Increased financial leverage from M&A activities affects the financing of R&D activities by increasing the opportunity cost of funds allocated to R&D, leading to elimination of R&D projects and/or a higher risk-aversion in R&D project selection (Cassiman et al., 2005). According to Cassiman et al. (2005), M&A activity can yield favorable results when (1) firms are involved in M&As for technology sourcing purposes; (2) the M&A integration process is effectively managed; (3) firms are able to retain key people, and, (4) firms have a strong own internal know-how base, which allows to better evaluate potential targets and to realize synergies from combining know-how from the target and acquiring firm.

Big pharma firms have demonstrated that, despite the inevitable disruption caused by the mergers, they end up better off (Bershidsky, 2014). A report by the management consulting firm McKinsey & Co. found that of the 11 pharma firms that have remained in the global Top-20 since 1995, seven have made acquisitions worth more than $10 billion each (Bershidsky, 2014). Median excess returns for megamergers were positive, showing returns 5 percent above the industry index two years after a deal's announcement (Bershidsky, 2014). Despite these growths, prior research shows that R&D portfolios suffer from budget cuts and a decline in investments. Undergoing one merger will have a substantial negative impact on the momentum of research portfolios, but enduring this multiple times can be crippling (LaMattina, 2011). According to LaMattina (2011), after a major pharma merger, the rate of progress of compounds

in the development pipeline seems to decrease. For example, comparing data from PharmaZeta's pipeline updates before the Wyeth merger in February 2008 and in February 2011, 40% of the compounds (not including those from Wyeth) had been in Phase II development for more than three years, which is below the industry average (LaMattina, 2011). To our knowledge, there is no data that show the behaviors of managers responsible for selecting a portfolio that have negatively impacted R&D after a merger. The next section will discuss the theory that will be used to analyze the behaviors demonstrated by managers throughout the PfM process.

II.5 Theory of Narrative Thought

Origin and Definition. Theory of Narrative Thought (TNT) is a theory from the field of naturalistic decision making (Rutten, Dorée, & Halman, 2013). The central goal in the field of naturalistic decision-making research is to understand how people actually make decisions in real-world settings (Rutten et al., 2013). The naturalistic decision framework was initiated in 1989 in a conference in Dayton, Ohio, sponsored by the Army Research Institute (Lipshitz, Klein, Orasanu, & Salas, 2001). According to Lipshitz et al (2001), the original definition emphasized the shaping features of the contexts in which many decisions of interest were made: ill-structured problems, uncertainty, dynamic environments, shifting, ill-defined, or competing goals, multiple event-feedback loops, time constraints, high stakes, multiple players, and organizational settings, where expertise was included as a secondary factor. This approach would appear to fit the M&A context based on the shaping features of that context.

Classical approaches to decision making, such as Multi-Attribute Utility Analysis (MAUA) and Decision Analysis, prescribe analytical and systematic methods to weigh evidence and select an optimal course of action (Klein, 2008). Other decision-making theories are

economic based and lack the cognitive elements that help explain decisions made in real-world settings using memory from past and present experiences. Hence, TNT was chosen to help answer our research question and provide rich insights into the behaviors that drive portfolio decisions during post-merger PfM processes. The antecedents of TNT are described in Exhibit A-2 of Appendix A. These theories help derive the core constructs of TNT, which include: narratives, forecasts, decisions and actions. These constructs explain how the cognitive abilities: memory, perception, imagination, and decision making shape R&D portfolio management decisions in the aftermath of a pharma merger.

TNT Concepts. Theory of Narrative Thought's view of decision making is built on the notion that decision-makers' narratives play a key role in decision making (Rutten et al., 2013). Decision-makers' narratives are the stories they tell themselves (both consciously and unconsciously) about what happened in the past and what is happening in the present (perception). It is a rich mixture of memories and cognitive images that enable a person to forecast what will happen in the future (Rutten et al., 2013). When a person decides that all or part of the forecasted future is undesirable, they make further decisions about what actions to take to ensure the arrival of the actual future is desirable. A comprehensive list of constructs for TNT is displayed and defined in Table 6.

Table 6 TNT Constructs
Beach (2010)

Construct	Definition
Narratives	A rich mixture of memories, visual, auditory, and other cognitive images, all laced together by emotions to form a mixture that far surpasses mere words and visual images in their ability to capture context and meaning. Narratives are the stories that we tell ourselves and what we are told by others.
Action Forecast	An educated guess about how the future might unfold if you make an effort to intervene or change it.
Decisions	The way you shape the future to conform to your values.
Resultant Action	The outcome of an implemented plan that conforms to your values and desired future.
Imagination	The ability to use information about the past and present to forecast the future.
Memory	The ability to retain, retrieve, and use information about the past.
Narrative Thought	The proposition that narratives are the vehicle for cognitively constructing the past, present and future is the theory of narrative thought.
Rules	Explicit steps used for manipulating both cognitive and physical events so that your actions achieve their desired ends.
Values	Ethics, and your ideas of equity, justice, solidarity, stewardship, truth, beauty, and goodness, together with your moral, civic, and religious precepts and the responsibilities you assume in the course of performing your daily duties and engaging in social interactions.
Decision Making	The ability to detect that a forecasted future is undesirable, to select actions that will promote a desirable future, and to monitor the actions progress toward achieving the alternative future.
Plan	A sequence of potential actions designed to influence crucial junctures in the unfolding course of events in order to transform what you otherwise forecast to be an undesirable future into a desirable future.
Desired Future	The alternative future that your intervention is designed to achieve.

Application of TNT. The overarching concept of TNT is that human beings take charge of their situations by understanding how the future derives from the past and present, and using that knowledge to guide actions aimed at making the future more desirable than it might otherwise be (Beach, 2010). A theoretical model of TNT is displayed in Figure 5. The constructs of TNT are being used in this study to explain the behaviors that drive managers to make R&D portfolio management decisions after a pharma merger. We chose TNT because its

constructs help explain how conscious, unconscious, and intuitive decisions are formed and organized during the PfM process. The theoretical framework for this study is illustrated in Figure 6.

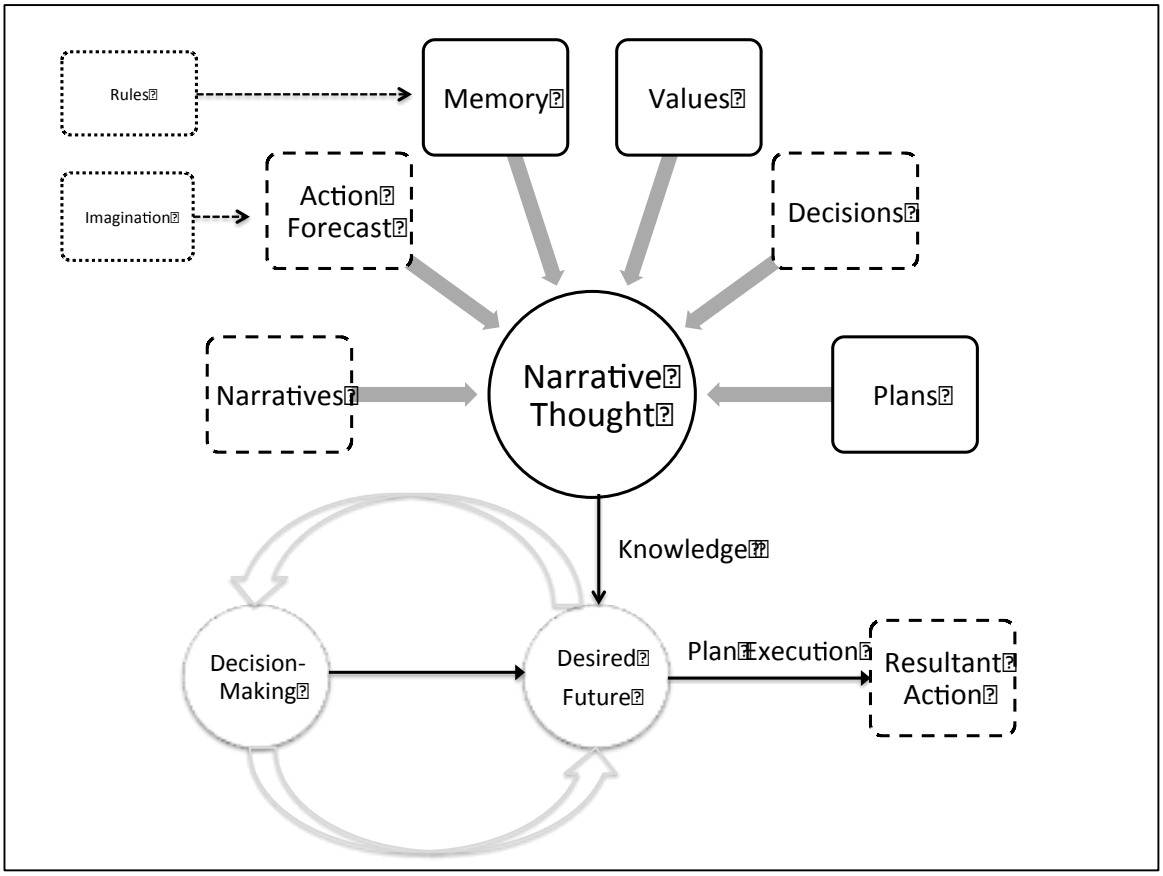

Figure 5 TNT Model
(Derived from Beach, 2010)

First, we determined if professional and personal experiences, both past and present, shape the decisions of leaders faced with the responsibility of choosing the right projects to grow and sustain the R&D pipeline while conforming to the complexities of organization disruption caused by M&A. Consistent with the logic of the theoretical model, we explored how these professional and personal experiences, or others, influenced portfolio decisions. We discovered how the portfolio is managed until an attractive and promising portfolio is attained.

Second, the naturalistic nature of TNT allowed us to assess the thought processes of

leaders in this setting. The context is the R&D departments that encompass the combined drug portfolio of at least two merged entities. The condition of the R&D department post-merger is delicate and uncertain, and leaders are faced with the responsibility of making critical decisions. The department at the merged state is complex, and is met with an abundance of drugs that may have conflicting implications, development constraints, and unexpected costs. Continuing with the logic of theoretical model, the future state of the portfolio is envisioned, and strategic plans are composed from the minds of the decision-makers. These decision-makers combined current sensory and memory information to produce an image of the merged firm's portfolio condition. If the current condition of the portfolio was not attractive, decision-makers revised the strategic plans as new knowledge is discovered and transform these plans into actions. This process repeated until the desired state of the portfolio met the standards (rules) of a revenue-generating pipeline.

Third, TNT enabled us to explore the behaviors of managers while making PfM decisions. To initiate the post-merger portfolio process, initial discussions about integrating the R&D organizations occur and the initial focus is on Phase III programs, followed by mid-stage candidates, with the early-stage discovery programs handled last (LaMattina, 2011). These reviews are extensive and time-consuming, as they require careful consideration of scientific issues, such as efficacy and safety data for each program, as well as commercial issues such as potential duplication and strategic directions of the merged firm (LaMattina, 2011). This thinking, as described by TNT, is comprised of the decision-makers' narratives, forecasted actions, and rules. Narratives are a mixture of memories (visual, auditory, and other cognitive images), all laced together by emotions to form a mixture that far surpasses mere words and visual images in their ability to capture context and meaning (Beach, 2010). Narratives are the

vehicle for cognitively constructing the past, present, and future (Beach, 2010). Rules tell the decision-maker what to expect as a result of something he or she does, and what to expect as a result of actions by other people and the natural environment (Rutten et al., 2013). These rules are then applied to produce an action based on forecasts (or predictions) of what the future should look like. Drawing on the process model of the theory, our notion is that narratives of decision-makers comprised of experiences from former post-merger R&D portfolio failures, their ideas of what can be done today to prevent future failures, and how they envision the success of selecting the right portfolio to contribute to the success of the firm as well as themselves.

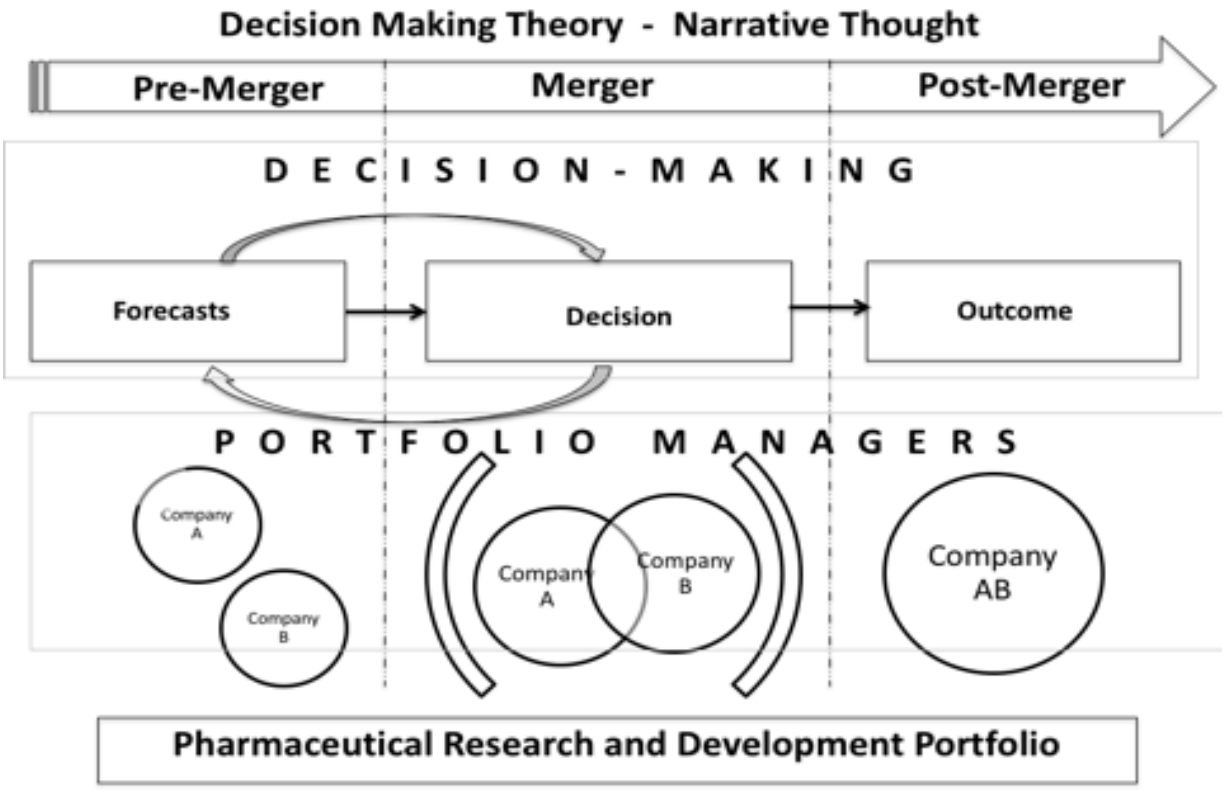

Figure 6 Theoretical Framework
(Derived from Beach (2010)

II.6 Literature Gap

According to Lamattina (2011), leaders of organizations who have completed multiple mergers may express the view: "We've done this before, and we know how to do it." However, prior literature reveals that the complexities of post-merger integration, coupled with the turbulence of R&D portfolio disruptions, ultimately lead to negative impacts to the R&D pipeline. Much of the PfM literature is based on a rational idea of how the involved managers make decisions based mainly on financial data to optimize resulting changes in the portfolio. A summary of the prior findings on PfM in practice, PfM and post-merger integration, R&D PfM and Pharma PfM in the literature are displayed in Tables 7, 8, 9 and 10, respectively. Henriksen and Traynor (as cited by by Martinsuo, 2013) found that despite the project PfM frameworks and their well-intended portfolio analyses and investment optimizations during portfolio planning, project PfM models alone don't allow for optimum PfM decisions. A six-year case study conducted by Smith and Sonneblick (2013) demonstrated that most managers felt that the PfM process was extremely political, and projects were selected based upon how well its proponents lobbied them in meetings. Despite these discoveries, the literature reveals that financial methods are still the most popular models for PfM. The supporting theories for these methods are economic-based, and provide little knowledge about the behaviors that drive the PfM decisions that are made after M&A. Linton, Walsh, and Morabito (as cited by Blau et al., 2004) revealed that economic analysis methods have been criticized for their rigid focus on single criteria decision making versus more realistic multiple criteria decision making.

Our study addresses the literature gap surrounding the lack of research on the actual behaviors that drive PfM decisions after a pharma merger. According to Martinsuo (2013), there is a lack of awareness of what managers actually do during the PfM process and the unique

conditions in which portfolios are managed are not fully known. Elonen and Artto (as cited by Martinsuo, 2013) revealed that portfolio managers grant an insufficient amount of attention to portfolio activities. Similarly, Cassiman et al. (2005) states that managerial time and effort spent on managing M&A's ex post may imply reduced attention to R&D projects. Our findings provide insights into the behaviors that drive portfolio managers' decisions, and help improve the quality of post-merger R&D PfM processes. We reveal the unspoken objectives of managers that influence portfolio decisions. This research addresses the gap in prior literature by applying a qualitative, multiple-case study research approach to understanding portfolio managers' behaviors while making PfM decisions during a merger.

Table 7 Summary of recent empirical research on PPM in practice
(Adapted from Martinsuo, 2013)

Reference	Data and methodology	Key findings	Emerging issues/new gaps
Aaltonen (2010)	Historical document-based event sequence study in a single pharmaceutical firm	Variation, selection and retention in the evolution of a portfolio. Co-selection and path dependency in portfolio decision making	Causalities and managers' intentions and actions in PPM require further research
Blichfeldt and Eskerod (2008)	Qualitative interview-based study with 30 firms in different industries	Projects/activities outside of the official portfolio consume and compete for resources, which affects PPM performance	Official PPM differs from the actual practice of PPM. Negligence of the actual reality endangers PPM success
Blomquist and Müller (2006)	Multi-method study: interviews and questionnaire	Project type explains certain middle managers' roles in PPM	Need to take into account project type in selecting PfM practices
Christiansen and Varnes (2008)	Qualitative, multi-method single-case study in one organization	Managers do not follow the rules agreed for PPM in their decision making, but they observe others, negotiate and debate, and learn	Portfolio decision making as a negotiation and learning process, despite the existence of formal rules. Also the business context/ situation matters
Kester et al. (2009)	Qualitative interview study in 11 multinational firms	Three genres of portfolio decision making: formalist-reactive, intuitive and integrative	Attention needs to be paid on how people make decisions in practice. More empirical research is needed
Kester et al. (2011)	Qualitative multiple-case study, four firms in different industries	Decision making both as rational, political and intuitive	Power and opinion-based decision making, besides evidence based. The model to be tested further
Killen et al., (2008b)	Questionnaire survey	Selected PPM practices are associated with better PPM performance	In-depth studies are needed to further develop frameworks of how PPM practice and performance are linked
Martinsuo and Lehtonen (2007)	Questionnaire survey	Goal setting, information availability and systematic decision making has a significant effect on PPM success	What project managers do have implications on the portfolio level too
McNally et al. (2009)	Qualitative embedded single case study	Managers' dispositional traits are proposed to be associated with project portfolio	Managers' analytic cognitive style, ambiguity tolerance and leadership style

Table 8 Summary of recent research on portfolio management and post-merger integration

Author	Research Method	Research Objective	Contribution
Getz, Zuckerman, DiMasi, and Kaitin (2009)	Quantitative	Drug development portfolio and spending practices after Mergers and acquisitions	Provided insights into better forecasting of drug development productivity and resource requirements following M&A transactions
Shibayama, Tanikawa, and Kimura (2011)	Qualitative	New perspectives for the management of M&A process: A merger case of a Japanese pharmaceutical company	Showed that engagement and non-rapid rationalization of the workforce can slow the execution of the merger process and delay efficiency savings, and consistently drive the merger process and place the merged firm on a solid foundation with strong commitment from all levels
Demirbag, Ng, and Tatoglu (2007)	Quantitative	Performance of M&A in the pharmaceutical industry: A comparative perspective	Revealed that no value creation was realized in terms of research productivity, return on investment, and profit margin

Table 9 Summary of key recent research on R&D portfolio management

Author	Research Method	Research Objective	Contribution
Van Bekkum, Pennings, and Smit (2009)	Quantitative	A real options perspective on R&D portfolio diversification	Contributed to real options theory by demonstrating the correlation between conditional and unconditional project and portfolio risk
Rutten, Doree, Halman (2013)	Qualitative	Exploring the value of a novel decision-making theory in understanding R&D progress decisions	Applied decision-making theory to explain how managers progress decisions are made in the context of the sunk costs principle
Menke (2013)	Benchmark Study	Making R&D portfolio management more effective	Provided recommendations on how to improve portfolio management processes to make them more effective

Table 10 Summary of key recent research on pharmaceutical portfolio management

Author	Research Method	Research Objective	Contribution
Bode-Greul, Nickisch (2008)	Qualitative	Value-driven project and portfolio management in the pharmaceutical industry: Drug discovery versus drug Development - Commonalities and differences in portfolio management practice	Described commonalities and differences of the portfolio management process in R&D and provides recommendations for effective portfolio management
Blau, Pekny, Varma, Bunch (2004)	Quantitative	Managing a portfolio of interdependent new product candidates in the pharmaceutical industry	Proposes a computational portfolio management approach that selects a sequence of projects
Smith and Sonnenblick (2013)	Qualitative	From budget-based to strategy-based portfolio management: A six-year case study	Provided insight into how a pharmaceutical company managed their portfolio and evolved involved into a holistic approach to portfolio management

II.7 Research Objective

Research Question. Most literature takes a somewhat methodological perspective on PfM, focusing on algorithms for optimizing portfolios and the general effectiveness of PfM (Kaiser et al., 2015). In this study, we take a different approach. We are less concerned about ideas of how portfolios are managed optimally. These ideas are financially and rationally focused and are prescriptive for how managers should behave. We are more concerned about researching how managers actually behave during the PfM process after a pharma merger. We used TNT to look into the cognition of how they carried out PfM processes. We also used TNT to explore the role of four universal human cognitive abilities: memory, perception, imagination, and decision making, and to learn how these abilities translate into narratives that influence the decisions of leaders within the pharma industry to help answer the following research question: How do

pharma R&D managers make portfolio decisions during a merger? We applied this narrative-based decision theory to help managers better understand how portfolio decision-makers may use past and present experiences to forecast the future and transform these strategic plans into actions that lead to optimum portfolio selections. These actions, especially when integrated with any of the common valuation models used for portfolio selection, may lead to better decision making that supports both short and long-term R&D growth. We provided insight for firms to learn what actually drive the behaviors of the managers that make portfolio decisions.

III METHODOLOGY

III.1 Research Design

The goal of this research was to discover how portfolio decisions are shaped by the behaviors of managers within the pharma industry during a merger. A qualitative multiple-case study approach was used for this study since contextual conditions are important, and the boundaries between a contemporary phenomenon in its real-world context were not clear (Yin, 2014). This approach was appropriate since this research aimed to determine what managers say they think and how they say they feel (Bellenger, Bernhardt, & Goldstucker, 1976). The unit of analysis is the R&D unit with various functional areas within small to large-sized firms within pharma industry. The unit of observation is the individual managers.

Process theory was utilized since the goal was to describe and explain the temporal sequence of events involved in the PfM decision-making process throughout a merger. An exploratory research approach was taken to discover the relevant events that might apply in other similar situations (Myers, 2009).

This research relies on an interpretive epistemology, since the goal was to understand phenomena through meanings that people assign to them (Myers, 2009). We interpreted managers' perspectives of their behaviors that drove portfolio decisions during a merger.

III.2 Research Method

A multiple case type 3 holistic study design using literal replication was used since similar results were predicted (Yin, 2014). Although portfolio decisions differed between firms, the resultant actions were similar, in that managers' behaviors shaped their portfolio decisions. Cases were selected based on Pettigrew guidelines (Pettigrew, 1990). Additionally, managers

were situated within the pharma industry and had encountered M&A within R&D functions. A case study report was constructed using a linear-analytic structure consistent with (Yin, 2014).

This empirical inquiry relied on multiple sources of evidence to increase confidence in the accuracy of the cases (Yin, 2014). Data was collected using interviews, financial reports, the FDA website, and direct observation. Interviewees consisted of portfolio executives and managers within R&D. In-depth semi-structured interviews were used to encourage participants to talk freely and to describe how they make portfolio decisions during a merger (Bellenger et al., 1976). Stebbins (as cited by Bellenger et al., 1976) defines the in-depth interview as an occasion for the subject to explore, clarify, and give consistency to his feelings in a way he never has had reason to do. Due to the confidential nature of a portfolio manager's decisions, in-depth interviews served as the most appropriate technique for this research to allow participants to express openly their experiences and feelings while making portfolio decisions.

Interviews were recorded using using an Olympus digital recorder (Model VN-722PC). Transcription software was used to transcribe interviews for each case. Field notes were captured during and after each case interaction.

A case study database was created to compile triangulated data. Interviews were transcribed and imported into a computer-assisted qualitative data analysis software that was used to arrange the narrative and numeric data to increase the reliability of the case studies (Yin, 2014). Case site and informant identities are not revealed, as anonymity was requested by all informants.

Case Selection. Exhibit C-1 of Appendix C outlines the criteria that were used for case selection in this study. Managers from firms were selected based on published M&A activities within the last 20 years. Additionally, all managers' firms reside within the pharma industry. A

total of eight managers from acquiring firms were chosen based on informants' portfolio decision making experiences during merger activities within the firm. There are a total of five managers from the acquired firms. There are a total of three mid-sized and five large-sized acquiring firms. There are a total of two small-sized, three mid-sized, and four large-sized acquired firms. Table 11 details the acquiring firms' acquisitions, including the size of both the acquiring and acquired firm, merger time period and cost range of acquisition. All of the acquiring firms in this study operate within the pharma space and maintain a portfolio of R&D products. At the time of this study, all acquisitions had been completed, and post-merger activities were underway. All acquiring firms still served as the parent company of all of its subsidiaries and had not been acquired by a larger pharma firm. Mergers and acquisitions for this study took place between 1995 and 2015. Acquisitions totaled approximately $180B.

Table 11 Background Data for Selected Pharmaceutical Firms

Acquirer	**Acquirer Size**	**Acquired**	**Acquired Size**	**Merger Year (range)**	**Acquisition Range (in dollars)**
PharmaAlphaI	Mid	ApharmaI	Small	Before 2005	<$10B
PharmaAlphaII	Mid	ApharmaII	Small	After 2005	<$10B
PharmaBeta	Mid	ApharmaIII	Mid	Before 2005	<$10B
PharmaGamma	Large	ApharmaIV	Large	After 2005	>$10B
PharmaDelta	Mid	ApharmaV	Small	After 2005	<$10B
PharmaEpsilon	Large	APharmaVI	Mid	After 2005	<$10B
PharmaZeta	Large	ApharmaVII	Large	Before 2005	>$10B
PharmaETA	Large	ApharmaVIII	Mid	Before 2005	<$10B
PharmaTheta	Large	ApharmaIX	Large	After 2005	>$10B
PharmaIota	Large	ApharmaX	Large	After 2005	>$10B

(Forbes.com)

Participants. Judgmental sampling, a technique Bellenger et al. (1976) describes as the selection of participants according to the judgment of some person knowledgeable in the area being studied or is involved in the particular subject, was used to target recruitment for this research. The participants for this study consisted of informants across both acquired and acquiring pharma firms who were employed at the firm during the merger, including pre- and post-merger activities. Additionally, informants were portfolio decision-makers for R&D products. A total of 13 informants from pharma firms in different geographical locations were selected for this study.

Data Collection. Three recruitment strategies were used for this study. The first strategy entailed recruitment using the professional social media site known as LinkedIn. The recruiter-lite product through LinkedIn was used to send email invitations to 45 candidates who met the screening criteria for this study. Of the 45 screened candidates, two informants were chosen. The second recruitment strategy involved solicitation through the researcher's professional network. The researcher sent the email invitation to former colleagues, co-workers, mentors, and professors. This strategy yielded seven qualified informants. The third recruitment strategy included snow-balling. The initial contact was made with members of the researcher's professional network, who then forwarded the email invitation to their respective networks. These prospects subsequently forwarded the email invitation to their respective networks. This recruitment effort resulted in a total of four qualified informants.

The email invitation used for this study is shown in Appendix E, Exhibit E3: Email Invitation. This email included an invitation for pharma managers to participate in this study, and provided a short sentence about the research goal. The subsequent paragraphs within the invitation described the interview process, informed consent and procedures for contacting the

researcher. Interviews were scheduled at a time convenient to both the informant and researchers.

Data was collected from all 13 informants using semi-structured and in-depth interviews. The interview protocol is outlined in Appendix B. When possible, interviews were conducted face-to-face. Due to constrained physical access to some informants, four of the interviews were face-to-face. One interview was administered by SKYPE, and eight were conducted via phone. Interviews conducted face-to-face took place inside the informant's office, or within a conference room located within the firm. All interviews took place Monday through Friday between 9:00 a.m. and 7:00 p.m. All Skype and telephone interviews took place in a private conference room at Georgia State University. Conference room phones were utilized. Interviews ranged from 37 minutes to 1 hour 31 minutes. Duration of all interviews totaled 9 hours and 53 minutes. Follow-up phone calls or emails were sent to participants to clarify information captured during the interview.

Firm data was collected from the FDA website. Firm financial data was also collected using financial websites such as Reuters.com and Yahoo Finance. When available, portfolio matrices and decision-trees were reviewed. Due to the sensitivity of the data collected, these artifacts were not allowed to be used as appendices in this study. As a result, the researcher took mental images of the data and noted the observations within the field notes.

Interview Protocol. Each informant was asked nine questions that contained a set of sub-questions to allow for free, open-ended responses. These questions were divided into three parts. Part I focused on the demographics of the informants, as well as an organizational aspect of PfM. Questions were asked regarding the merger impact on PfM, portfolio decision processes, and focus on goal from a firm and individual perspective. The intent of this portion of the protocol

was to ascertain whether or not pharma decision processes, as described by informants, align with the literature. Further, we aimed to gain the perspective of informants as it relates to the firm's portfolio condition, both past and future. Part II focused on the portfolio methods adopted by the firm, how the firm and individual deal with risks. The goal of this section was to determine if changes occurred within the methods across the different firms after the merger. Additionally, we aimed to determine if mergers influence informants' decision making processes. We also sought to assess the firm's risk profile pre-and post-merger. Another goal was to gain insight into how portfolio managers make difficult decisions during merger activities. Finally, part III focused on how informants personally manage portfolios. We asked questions that centered around individuals' behaviors and attitudes during portfolio decision making. The interview protocol is displayed in Appendix B, Exhibit B-1.

III.3 Data Analysis

Each interview was analyzed by listening to recorded audio files that were filed and assigned informant number. Field notes were tabulated and organized by informant to firm relationship to allow for content analysis. The transcribed interviews for each informant were coded by the researcher and the researcher's assistant to identify common themes within informants according to descriptive coding methods. Coding was accomplished after a series of 5 steps.

First, the researcher leveraged insight from pharma industry experts for first cycle coding. Sub-categories were used for responses that answered multiple sub-questions. Second, the researcher applied a content analysis technique and developed a set of word or phrase categories, based on each respondent's responses. Third, the researcher coded each response by the coding scheme. Fourth, the research assistant generated patterns to use for the second coding cycle. All

three parts of the interview protocol were categorized, and themes were identified. Lastly, the researchers collaborated on the determination of common themes until full agreement was reached.

The researchers achieved inter-rater reliability by reaching 95 percent agreement after first cycle coding and 99 percent agreement after second cycle coding. Cohen's Kappa Coefficient was 0.75, which denotes adequate agreement (Randolph, 2008).

Within-case analysis was used to identify how common narratives from different managers within pharma firms shape portfolio decisions during merger activities. A cross-case analysis was conducted to identify differences in informants' narratives from the acquiring versus the acquired pharma firms. A chain of evidence was created to allow others to follow the derivation of any evidence from initial research questions to case study conclusions.

Content analysis is defined by Berelson (as cited by Bellenger et al., 1976) as a technique for the objective, systematic, and quantitative description of the manifest content of communications. This technique was utilized to glean important responses from the interviews (Bellenger et al., 1976). The researchers followed the 7 steps for conducting content analysis, as suggested by Bellenger et al. (1976), which include: (1) specify needed data, (2) map out plans for tabulation, (3) lay out the skeleton of the outline, (4) fill in categories for each variable, (5) establish procedure for unitizing the material, (6) try out the analysis outline and unitizing procedure, and (7) use the analysis outline and interpret the results. Microsoft EXCEL and QSR International Pty Ltd.'s NVIVO Version 10, 2012 for Windows was the tool used to facilitate content analysis for this study.

IV RESULTS

In this study, all informants are represented as managers. Each manager and their respective firms have been given a pseudo name to maintain anonymity as requested by the informants. Managers are identified as "Informant," followed by a numeral. Acquiring firms will be identified as "Pharma," followed by a Greek numeral. Acquired firms will be identified as "APharma," followed by a roman numeral. Merger activities for this study include decisions made before, during and after M&A.

IV.1 Demographics

Managers for this study are categorized into two groups. Group one is composed of eight managers from acquiring firms. Group two consists of five managers from acquired firms. Other demographics include gender, race, education level, years with firm, and functional area of firm. Of the 13 managers, three are female and ten are male. Concerning race, all managers are Caucasian, with the exception one African-American manager. All of the managers have college degrees. Eight managers have doctoral degrees. Three managers have master's degrees, and two have bachelor's degrees. Four managers are or have been employed with the firm for greater than ten years. The remaining nine managers are, or have been employed with the firm for less than ten years. Eleven managers were employed at the executive-level. One manager was employed at the middle-management level. One manager was employed as a consultant.

During merger activities, managers worked within R&D across different functional areas. Two managers operated as c-suite executives. Seven managers worked directly within the PfM unit. One manager worked within legal, one within strategy and one within operations. Table 12 provides a breakdown of the managers' demographics grouped by the acquiring and acquired firms.

Table 12 Participant Demographics

Managers - Acquiring Firms						
Identity	**Department**	**Gender**	**Firm**	**Years with Firm**	**Ethnicity**	**Education Level**
Informant1	Legal	Male	PharmaAlphaI	>10	Caucasian	Doctorate
Informant2	Portfolio Management	Female	PharmaAlphaII	<10	Caucasian	Doctorate
Informant3	R&D	Female	PharmaAlphaII	<10	African-American	Bachelors
Informant4	Marketing	Female	PharmaAlphaII	<10	Caucasian	Masters
Informant8	Portfolio Management	Male	PharmaDelta	<10	Caucasian	Doctorate
Informant10	C-Suite	Male	PharmaZeta	<10	Caucasian	Doctorate
Informant11	Strategy	Male	PharmaEta	<10	Caucasian	Doctorate
Informant13	Operations	Male	PharmaIota	>10	Caucasian	Doctorate
Managers - Acquired Firms						
Informant5	C-Suite	Male	APharmaIII	<10	Caucasian	Masters
Informant6	Portfolio Management	Male	APharmaIV	>10	Caucasian	Masters
Informant7	Portfolio Management	Male	APharmaIV	<10	Caucasian	Doctorate
Informant9	R&D	Male	APharmaVI	<10	Caucasian	Doctorate
Informant12	Portfolio Management	Male	APharmaIX	>10	Caucasian	Bachelors

Tables 13 and 14 show the manager to firm relationships for this study. Table 13 represents managers from acquiring firms. Table 14 represents managers from the acquired firm. There are a total of 10 different mergers that are represented in this study. Two acquiring firms,

PharmaTheta and PharmaEpsilon, are represented in this study. However, these two firms are not listed in Table 13 because there are no managers in this study from the acquiring firms. There are three managers who were employed by firms acquired by the same firm, which we refer to as PharmaGamma and PharmaTheta, which represents two separate mergers. There was one manager employed by a firm acquired by PharmaEpsilon. PharmaAlpha will be referred to as PharmaAlphaI and PharmaAlphaII, which represents one firm with to separate mergers.

Table 13 Managers from Acquiring Firm

Manager	Acquiring Firm
Informant1	PharmaAlphaI
Informant2	PharmaAlphaII
Informant3	PharmaAlphaII
Informant4	PharmaAlphaII
Informant8	PharmaDelta
Informant10	PharmaZeta
Informant11	PharmaEta
Informant13	PharmaIota

Table 14 Managers from Acquired Firm

Manager	Acquired Firm
Informant5	APharmaIII
Informant6	APharmaIV
Informant7	APharmaIV
Informant9	APharmaVI
Informant12	APharmaIX

IV.2 Organizational Context and Processes

Mergers are known to complicate PfM within any industry. Within pharma, mergers happen almost yearly in effort to promote growth in one or many areas. For this study, we asked managers: "*What do you think led to the merger that has taken place within your firm?"* Figure 6 displays the three categories that were derived from the analysis. The three main merger goals as described by managers were to (a) gain a new footprint, (b) enter into a new therapeutic, and (c) strengthen the pipeline.

Goal of Merger

New Footprint. One of the common goals of the merger was to obtain a new footprint. This goal was stated for five of the 10 firms. These firms include: PharmaAlphaI, APharmaI, PharmaBeta, PharmaZeta, PharmaETA, and PharmaGamma. For this study, a new footprint involved the acquisition of new divisions outside of the core competencies of the firm, such as consumers or medical devices. The expansion of capabilities and opportunities to become the brand leader were also goals of the mergers.

New Therapeutic Area. Another goal was to obtain a new therapeutic area. Two of the 10 firms focused on this goal. These firms include PharmaDelta and PharmaEpsilon. In both cases, the firms sought entry into new markets outside of its existing capabilities. The goal of both firms was to obtain a presence in these new areas to expand market share.

Strengthen Pipeline. Three of the 10 firms commissioned to strengthen its pipeline through acquisitions. A strengthened pipeline indicates more viable and promising drugs will be launched. These firms include PharmaGamma, PharmaAlpha, and PharmaIota. These three

firms acquired competitors whose products were stronger and more robust. In all three of these cases, the acquiring firms were experiencing a weakened pipeline before the mergers.

Overall Goal of Merger. All three of the above-mentioned goals seek so expand capabilities and grow pipelines. Figure 7 shows the three merger goals by firm. Table 15 shows the categories and subcategories of the firms' goals. For each of the mergers, having the capacity to develop, launch and sell more products was a common goal. There did not appear to be any differences in firm goals as it relates to firm size or acquisition amount.

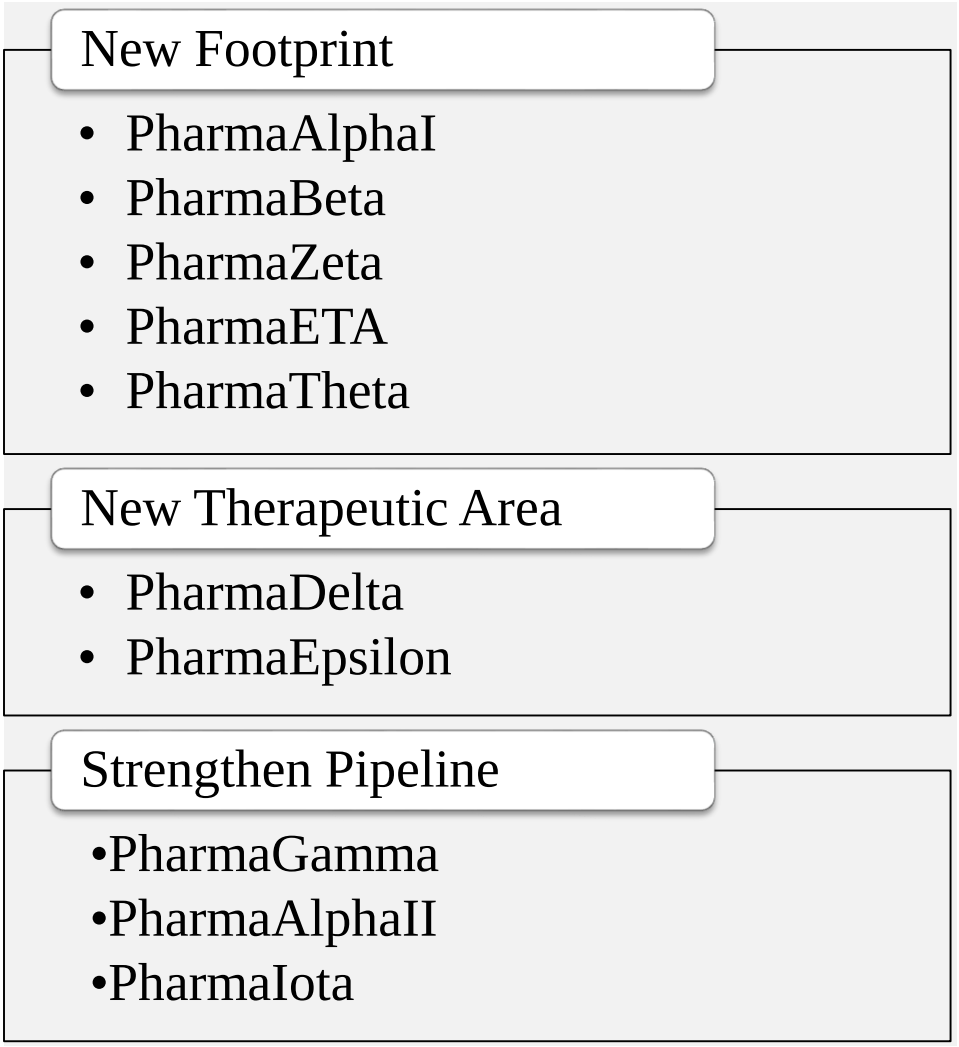

Figure 7 Goal of Merger – Firm Level

All of the managers had a clear understanding of their firms' goals for the merger. In each response, managers were able to communicate a clear strategy for the merger. The goal to establish more products align with the findings from the literature that states growth expectations of pharma M&A.

Table 15 Goal of Merger – Theme

Merger Goal	Subcategory	Theme
New Footprint	Expansion	More Drugs
New Therapeutic Area		
Strengthen Pipeline	Pipeline Growth	

Portfolio Condition. After discovering the goal to launch more products, we sought to understand the condition of the firm's portfolio through managers' lenses. Our first attempt to explore the narrative thought of managers was to inquire about their perspective of the firm's portfolio condition before the merger. We asked: *"What do you think will happen to the portfolio in the future?"* Table 16 summarizes managers' perspectives on the condition of their firm's portfolio before the merger and their forecasts of the firm's future portfolio.

Nine of 13 managers forecasted future growth for their firm's portfolio. Of the nine managers who forecasted future growth, five were from acquiring firms, and four were from acquired firms. Two of 13 managers forecasted a decline in their firm's portfolio. Of the two

managers, one was from an acquiring firm and one was from an acquired firm. One manager was uncertain about their acquired firm's future portfolio condition.

Table 16 Portfolio Condition of Firm

Acquiring Firm Managers' Perspectives of Portfolio Condition			
Manager	**Firm**	**Pre-Merger**	**Future Forecast**
Informant1	PharmaAlphaI	Strong	Growth
Informant8	PharmaDelta		
Informant11	PharmaETA		
Informant10	PharmaZeta		
Informant3	PharmaAlpha	Moderate	
Informant2	PharmaAlphaII	Strong	Decline
Informant13	PharmaIota	Strong	Uncertainty
Informant4	PharmaAlphaII	Weak	
Acquired Firm Managers' Perspectives of Portfolio Condition			
Informant5	APharmaIII	Weak	Growth
Informant6	APharmaIV	Strong	Growth
Informant9	APharmaVI		
Informant12	APharmaIX		
Informant7	APharmaIV	Moderate	Decline

Nine of 13 managers viewed the pre-merger condition of their firm's portfolio as strong. Of the nine managers who viewed their firm's portfolio as strong before the merger, six were from acquiring firms, and three were from acquired firms. Two of 13 managers viewed their firm's pre-merger portfolio condition as moderate. Of the two managers who viewed their firm's portfolio condition before the merger as moderate, one was from an acquired firm and one was from an acquiring firm. Two of 13 managers viewed their firm's pre-merger portfolio condition as weak. Of the two managers who viewed their firm's portfolio condition before the merger as weak, one was from an acquired firm and one was from an acquiring firm.

Informant5 of APharmaIII was the only manager from an acquired firm who viewed the firm's pre-merger portfolio condition as weak. Informant5 explained:

> *"We're seeing the same thing we've seen in so many other areas in pharma kind of repeating today, Catrina. The pipeline yield went way down. After years of spending hundreds of hundreds of millions of dollars on R&D, only one product had come out. For a number of years, nothing else came out."*

Informant5 forecasted that the firm's portfolio would grow post-merger.

Informant13 viewed his acquiring firm's pre-merger condition as strong. However, Informant13 was uncertain about the firm's future growth. Informant13 expressed concern for the possibility of drug terminations and divestments, as well as for the firm placing too much emphasis on blockbuster products. Informant13's comments suggest that the merger would result in fewer drugs based on his past experiences. When asked about the future condition of the portfolio, Informant13 stated:

> *"I think it will be for sure some cuts specifically on the smaller projects which are not historically from PharmaIota, according to the past. There is a lot of stuff which have already proven or sold to someone else, but I think this kind of concentration on the big product will go on. They are reviewing the portfolio*

> *carefully on regular basis so I think there would be further concentration on the big programs with smaller ones being sold."*

Informant4 viewed her acquiring firm's portfolio as weak pre-merger and also expressed uncertainty for the firm's future portfolio. Informant4's uncertainty in the firm's future portfolio stemmed from her past experiences with downsizing and a reduction in the sales force. Informant4 believed that the funding for future development could positively impact the future portfolio of a firm. A new theme, "product promotion", was identified while coding Informant4's responses. When a follow-up question was asked: "*Do you think the pipeline would sustain the firm's future if funding is provided for future development?"* Informant4 responded with:

> *"I certainly hope so. I guess it depends on how successful we were in promoting them. That's a deep question."*

During the face-to-face interview, Informant4 paused for a great length of time before answering this question.

Informant2 (of an acquiring firm) and Informant7 (of an acquired firm), were the only two managers who forecasted a decline in their firm's future portfolio. Informant7 provided the following explanation for his prediction:

> *"Often it depends on what decisions they make. When they make those portfolio decisions when they merge, they don't keep the pipeline of both companies. They whittle them down to a smaller number because it's not just additive."*

Informant7 emphasized the importance of decisions and its impact on the post-merger pipeline. Informant7 suggested that selecting the wrong products during merger activities could negatively impact a firm's portfolio. Informant2 forecasted a weakened pipeline due to the weaker pipeline

of the acquired firm. Informant2's forecast of a declining portfolio centers on her belief that R&D expenditures would decrease. This is supported by Informant2's response to her view of her firm's future portfolio:

> *"I'd like to think that PharmaAlphaII is going to continue to feel [therapeutic area] is an important place to be, and that there are not as many companies committed to [therapeutic area], so there's opportunity there but it will take a lot of investment, and that's the big question. I honestly don't know if the company will invest beyond the areas they're in right now."*

Informant2 and Informant7 had differing perspectives as to why their firms would experience a decline in its future portfolio. Their respective responses do not suggest that gender or level of education influenced the different perspectives.

All three of the female managers at PharmaAlphaII had different views of their firm's current and future portfolio condition. Informant2, Informant3, and Informant4s' views of the portfolio during the merger were strong, moderate and weak, respectively. Informant2 forecasted that the firm's future portfolio would decline. Informant3 forecasted that the firm's future portfolio would grow. Informant4 was uncertain about the firm's future portfolio condition. All 3 of the managers operated within different functional areas of the firm during merger activities. Refer to Table 17 to view managers' perspectives.

Table 17 Portfolio Condition Within Firm Analysis – PharmaAlphaII

Acquiring Firm Managers' Perspectives of Portfolio Condition			
Manager	**Firm**	**During Merger**	**Future Forecast (Post-merger)**
Informant2	PharmaAlphaII	Strong	Decline
Informant3	PharmaAlphaII	Moderate	Growth
Informant4	PharmaAlphaII	Weak	Uncertainty

Two male managers from the PharmaGamma and ApharmaIV merger had differing views of the firm's current and future portfolio condition. Informant7 viewed the current condition of the firm's portfolio as moderate. Informant6 viewed the current condition of their firm's portfolio as strong. Informant7 forecasted a decline for the merged firm's (PharmaGamma) future portfolio. Informant6 forecasted growth for the merged firm's (PharmaGamma) future portfolio. Both these managers operated within different functional areas for their respective firms during merger activities. The responses from both managers do not suggest that education level influenced their perspectives. Table 18 displays the responses of these two managers.

Table 18 Portfolio Condition Within Firm Analysis - PharmaGamma

Acquired Firm Manager's Perspectives of Portfolio Condition				
Manager	**Firm**	**During Merger**	**Merged Firm**	**Future Forecast (Post-merger)**
Informant7	APharmaIV	Moderate	PharmaGamma	Decline
Informant6	APharmaIV	Strong	PharmaGamma	Growth

Overall, nine of the 13 managers forecasted future growth for their firm's portfolio post-merger. A common theme among all nine managers is the belief that the firm would experience growth as a result of inheriting more drug products through M&A. Informant3 attributed PharmaAlphaII's post-merger growth forecast growth to a robust R&D pipeline. This is supported by her response:

> *"I think it will grow bigger. They have a lot of great products in store that are yet to come, a lot of applications that are in R&D."*

We asked Informant3 if she felt that the growth was a result of the merger, her response was:

> *"I think so, yeah. I think it's a result of the mergers, a result of the change in leadership and the business model of the company. I think that has a lot to do with the direction that the company is going."*

Informant3's response suggests that she attributes her firm's growth potential to new leadership and a new business model. Informant11 attributed PharmaETA's future growth to anticipated acquisitions. He stated:

> *"I think their portfolio is going to continue to be strong. They'll buy whatever they need to buy to continue that way."*

Informant5 introduced the role of luck in future portfolio growth. He states:

> *"I feel good about the portfolio; I feel very good about the level of science that's been advised. The reality of it is in our space, we are all subjects to a bit of luck with the right science at the right time, with the right team doing the development work."*

A common theme of the two managers who forecasted a decline in the firm's portfolio is the belief that viable overlapping drugs would be eliminated as a result of M&A and R&D expenditures would decrease. Figure 8 shows the common themes represented by all 13 managers. A common theme amongst growth forecasts includes (a) good leadership, (b) good (c) business model, (d) planned expansion, (e) good market differentiation, (f) and luck – the right science at the right time.

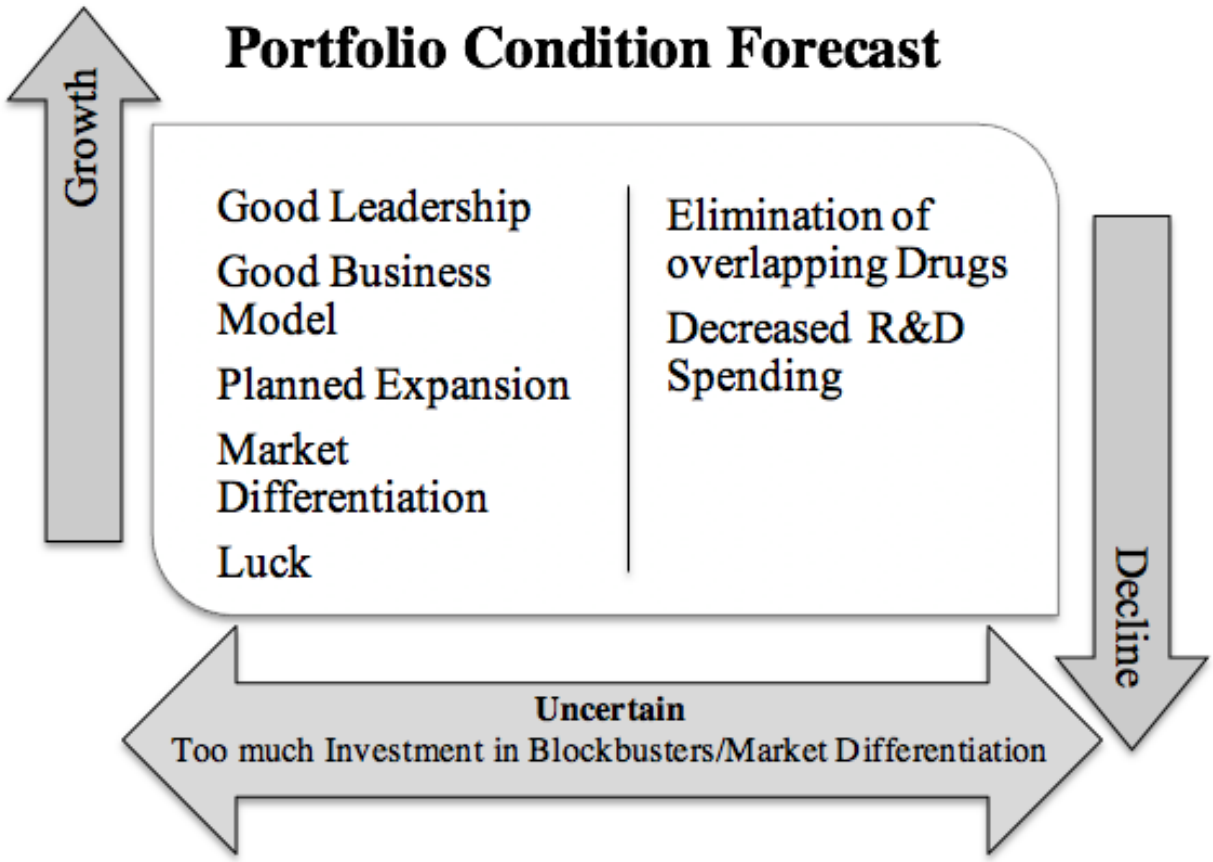

Figure 8 Common Themes Attributing to Future Portfolio Condition

Archived data was obtained to measure managers' forecasts against actual performance of the firm today. Appendix F, Exhibit F-1 shows the firm's revenue range pre- and post-merger, and whether or not the firm experienced growth or decline after the merger. Figure 9 shows the firm performance after the merger. Only half of the firms experienced post-merger growth.

It is important to mention the context of the informants' perspectives regarding the firm's future portfolio condition. Most managers forecasted portfolio growth as a result of having more drugs from the acquired and acquiring firms' combined portfolios post-merger. Portfolio growth in this context is the aggregate of the portfolios from Firm A (acquiring) and Firm B (acquired).

We do not believe informants considered the merged firm's resultant portfolio condition when responding to this question. The resultant portfolio consists of drugs selected after terminating or divesting drugs that overlap or do not align with the firm's strategy. The resultant portfolio is what gets R&D funding for further development and launch. We did not capture informant perspectives on the resultant portfolio, but rather the condition of the future portfolio prior to actual performance. This gap is worthy of further investigation in future research.

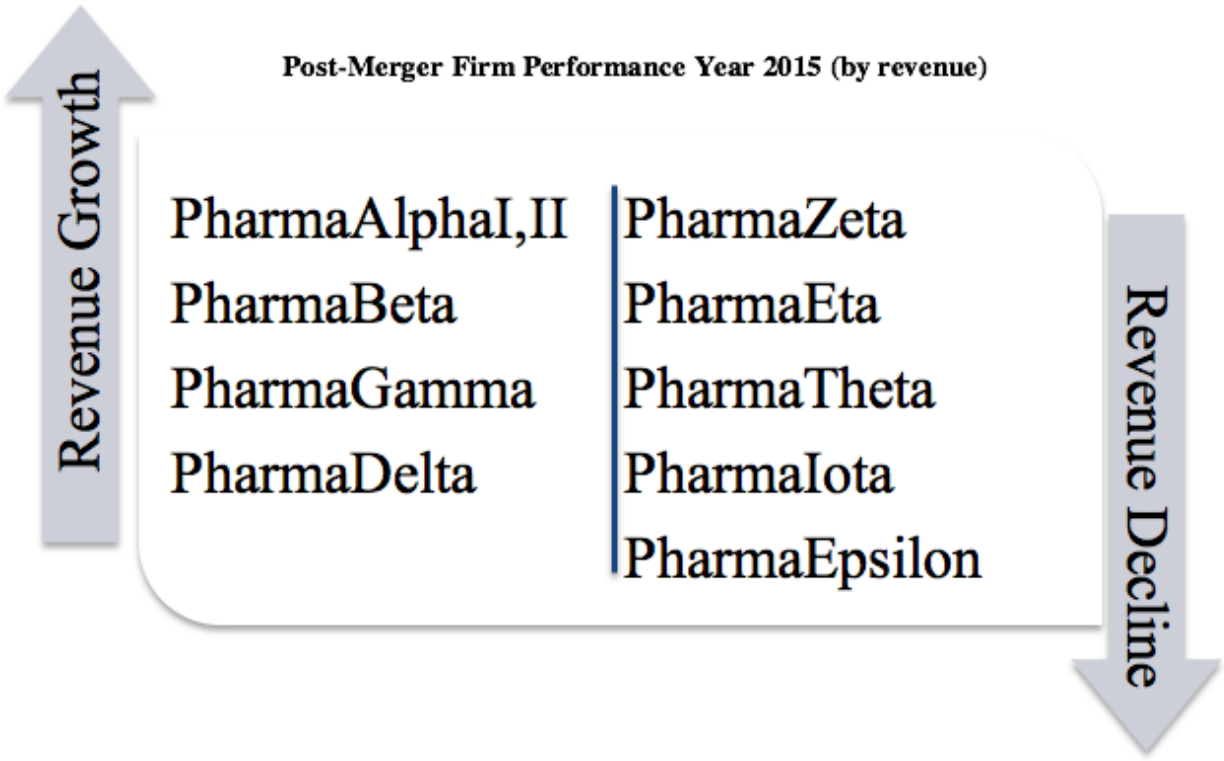

Figure 9 Post-Merger Performance

Portfolio Processes

Governance. To explore how managers actually make decisions during a merger, we sought to gain insight into pre- and post-merger changes in the portfolio processes. We asked managers: "*How are portfolio decisions governed within your firm? How were these decisions governed before the merger?"* All managers indicated that although they were responsible for making portfolio decisions, a governance board made the final decision. The governance board activities were the same before the merger across all firms. In addition to selecting and approving the final portfolio, managers reported that the governance board approves M&A transactions. In this study, managers provided similar responses to the composition of the governance board. Figure 10 shows the complexion of governance boards across all ten firms.

Similarly, these governance boards consisted of Investors (private or shareholders), Consultants, Medical Affairs, Board of Directors from the parent company, Executive Committee and Cross-Functional teams. Cross-functional teams included common departments, such as Clinical, Finance, Safety, Human Resources, Legal, Marketing, Quality, Regulatory, R&D, Supply Chain, and Product Development. In this study, senior managers or department heads from cross-functional teams served on the governance board. Most of these senior managers resided at the firms' headquarters.

Informant5 noted that the governance board at PharmaBeta was composed of mostly men. No other manager made this gender distinction for their respective firms.

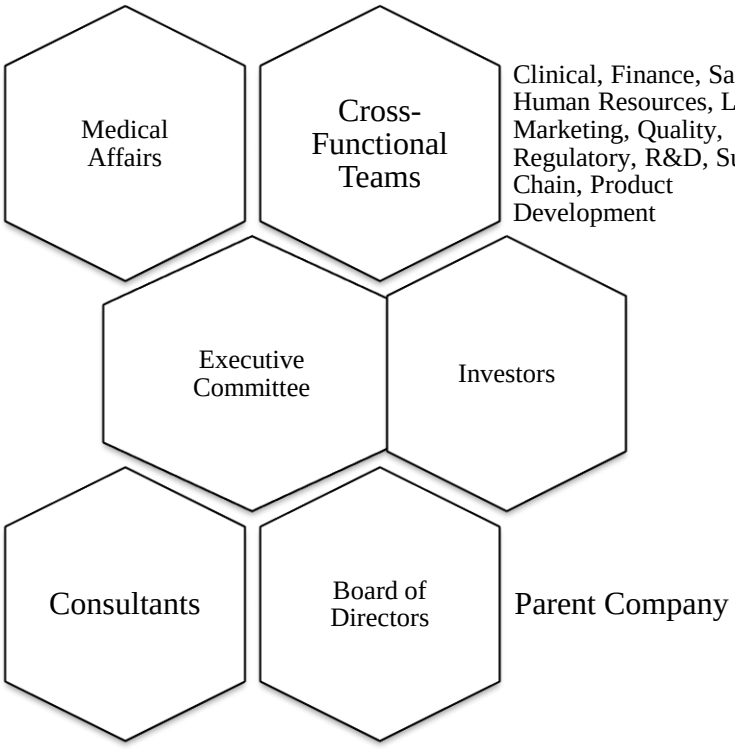

Figure 10 Governance Board Composition of Firms

IV.3 Portfolio Valuation and Selection

Portfolio Decision-Making Process. After understanding the composition of governance boards and how they operate within pharma firms, managers were asked: *"Can you describe how portfolio decision-making processes within firm X work?"* We followed the question with*: "How did the process work before the merger?"* It was discovered that decision-making processes at pharma firms occur iteratively throughout merger activities. Also, these processes are not sequential. For this reason, we have depicted these processes as events A through D that could occur at any interval during merger activities. The top four commonly used processes were to (a) apply financial models, (b) conduct portfolio reviews, (c) assess market impact, and (d) prioritize the portfolio.

Six firms applied financial modeling during the decision-making process. All firms that utilized this model did not change the process post-merger. Figure 11 shows the categories and subcategories of the various financial methods used by these firms. Firms looked at financial forecasts and development costs when making portfolio decisions.

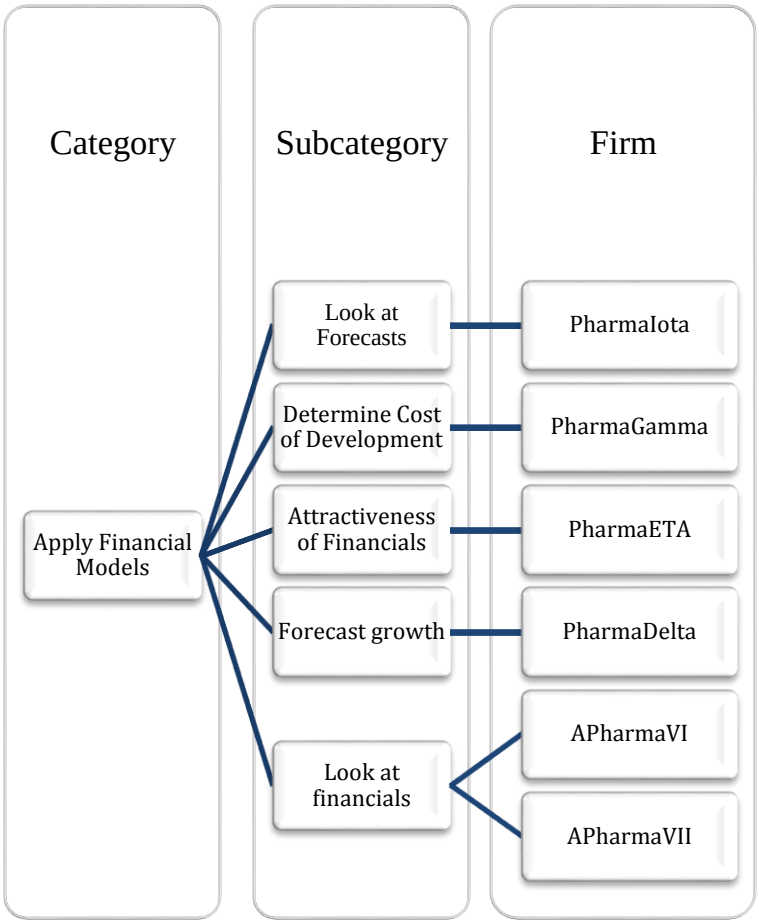

Figure 11 Pre- and Post-Merger Process Event A

Five firms conducted portfolio reviews at varying intervals throughout the year. During these reviews, managers presented their drug evaluations and recommendations to the governance board for final decision making. Figure 12 shows firms that utilized some form portfolio review methods during portfolio decision making. All firms that conducted portfolio reviews did not change this process post-merger.

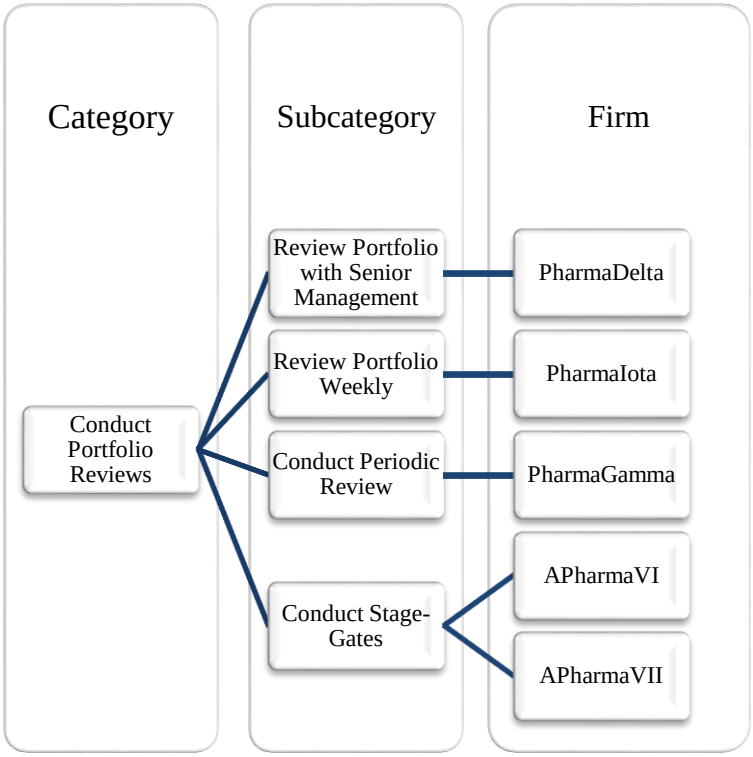

Figure 12 Pre- and Post-Merger Process Event B

Two firms assessed market impacts while making portfolio decisions. One of the firms, PharmaAlphaII, changed its post-merger decision-making process. None of the informants from PharmaAlphaII identified market impact as a component to decision making, as they had pre-merger. Figure 13 shows the firms who assessed market impact while making portfolio decisions during merger activities.

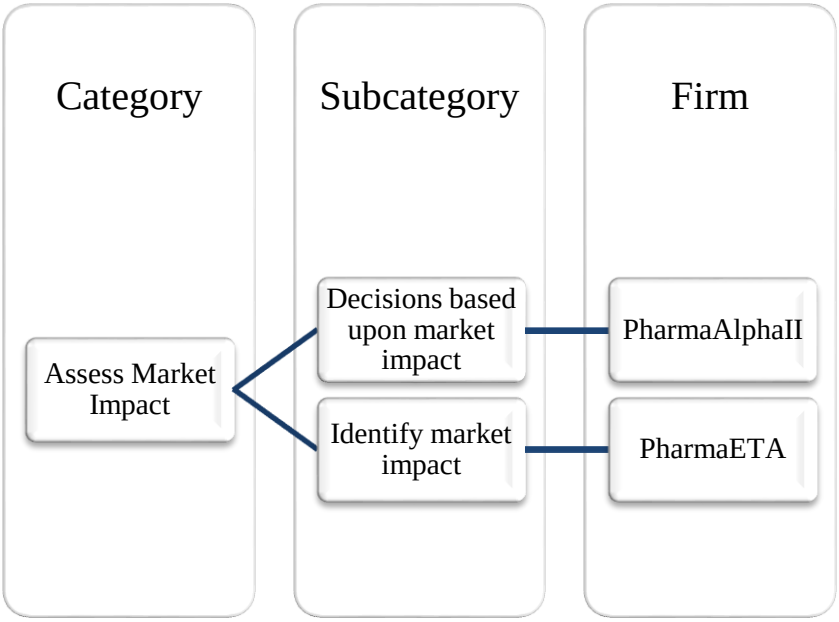

Figure 13 Pre- and Post-Merger Process Event C

Five firms prioritized its portfolio when making portfolio decisions. All firms that ranked and prioritized its portfolio did not change the processes post-merger. Figure 14 shows firms that prioritized the portfolio to select the most attractive drugs and introduce emerging drugs during merger activities.

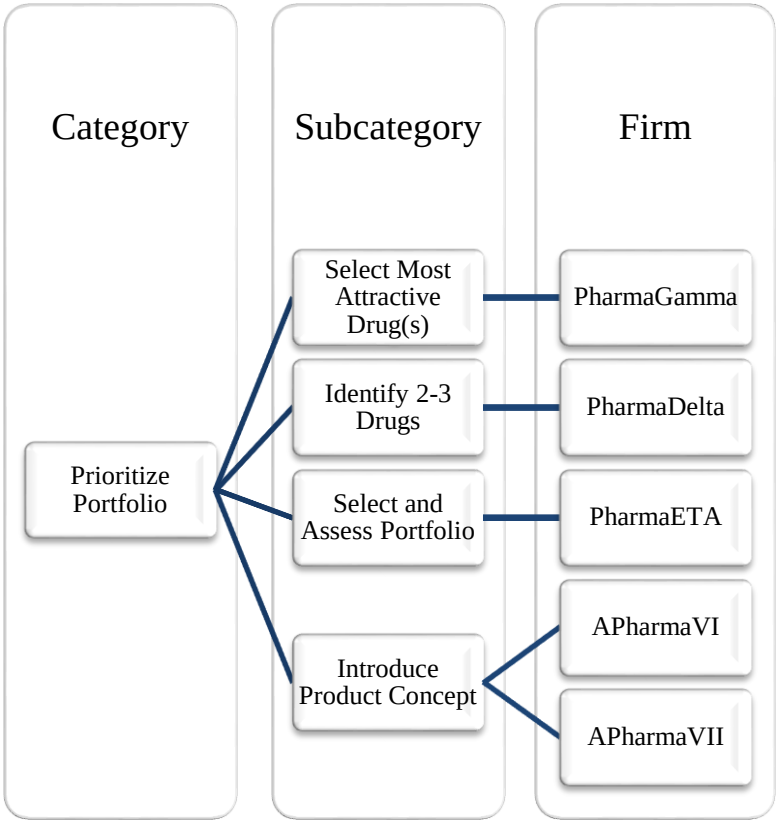

Figure 14 Pre- and Post-Merger Process Event D

Changes in DM Processes. The decision-making process did not change for seven of the firms after the merger. Of the seven firms with no change in the decision-making process, five were acquiring and two were acquired firms. The decision-making process did change after the merger for three firms. Of the three firms, one was an acquirer and the other was acquired. Table 19 shows a break-down of the firms that showed changes, as well as no changes in the decision-making process during merger activities.

Table 19 Change in Decision-Making Process by Firm

Firm	No Change in Process		Change in Process
Acquiring Firms	PharmaAlphaI PharmaDelta PharmaETA PharmaIota PharmaGamma		PharmaAlphaII
Acquired Firms	APharmaVI APharmaVII		APharmaIII APharmaIX

Pre-Merger Process Changes. Two of the three firms' processes that changed post-merger had pre-merger processes that were unstructured and carried out in silos. These two firms were PharmaAlphaII and APharmaIII. PharmaAlphaII and ApharmaIII's pre-merger decision-making process involved ad-hoc decision making with no buy-in from other teams. PharmaAlphaII's decision making before the merger was investor driven with no clearly defined decision-making processes. Informant3's perspective of PharmaAlphaII's pre-merger decision-making process as follows:

> *"To be honest with you, there wasn't really a clear cut process for the steps to go through, like first you contact this person then that person. I think over time based on trial and error and doing some of these we've formulated a process."*

APharmaIII's pre-merger decision-making process was also informal. Further, its pre-merger processes were political and inward looking. Informant5 described APharmaIII's pre-merger decision-making process as:

> *"It was a group of guys who got together and would come in and say yeah we like this program, no we don't really like this one. It was ad-hoc and informal. It didn't have input from stakeholders throughout the organization. I'm sure there was more data that flowed into it than we saw. I wasn't on that executive team of [small number]. I was that very next level in the organization reporting*

> *to that group. For a number of years until the leadership really settled back out at APharmaIII, it was an effort to use the data, but often seemed in support a pre-existing preference for the child of the clinical development programs or R&D programs from the company that you originated. That portfolio process became highly politicized of people from legacy PharmaBeta wanting to keep the PharmaBeta programs alive. Either because they believed in them or because they knew them. As I mentioned they're kind of their children or because they want to make sure that [site] stayed open."*

Pre-merger processes appeared to consist of smaller teams of executives and investors who made critical decisions with little to no buy-in from managers who have the most knowledge about the drug and its growth potential.

Post-Merger Process Changes. PharmaAlphaII and PharmaBeta showed significant changes in the decision-making process post-merger. PharmaAlphaII underwent a process improvement initiative post-merger that aligned with more common decision-making processes described by the other firms. PharmaAlphaII and PharmaBeta applied financial models and conducted portfolio reviews as a result of the merger.

Informant5 elaborated on why decision-making processes improved significantly at APharmaIII. Informant5 stated:

> *"I really think the recent progress and the recent refocusing that we've seen in the last [X] years has truly built shareholder value at APharmaIII. That didn't come about until the last exit of the old people. They kind of moved out, and all of the politics and personal ownership was put to bed. True professional [industry] leadership has a real strong history of the ability to assess programs. The lifeblood of all these companies, the future value of all these companies is really all about the decisions that are made during the portfolio management process. To do it in any way that allows those distractions- We're all human and we all bring that. You have to recognize that. To not make the effort to professionalize and really work through what assets the company has and the value of each of them, lines up against the skills sets of the organization and make those hard choices on where you're going to focus and invest hours."*

Post-merger processes seemed to work best when the leadership changed and politics were lessened. All of the managers emphasized the value of making good decisions for the portfolio so that long-term growth can be realized.

Emerging Theme. A theme emerged as managers described pre- and post-merger decision-making processes within their respective firms. Informant5 introduced the role of culture and its impact on his firm's pre-merger decision-making process:

> *"APharmaIII pre-merger, when I sort of realized the company grew out of a single drug that was unexpectedly successful in the treatment of [disease]. Really only looked there because of the vision of one physician. Didn't really work for the company, one external [doctor] who basically strong-armed the company into doing work. The first and only product the company launched was wildly successful. You had an organization where people had grown up and thought that was normal and didn't understand that most companies fail a lot more before they have that big hit, and have a lot of small hits before they have that big hit and have that balanced view. APharmaIII was a very inward- looking culture."*

Culture appeared to have an impact on how managers make portfolio decisions. Many firms don't seek out long-term R&D developments and the profits from short-term wins fall short of sustaining long-term growth.

Decision-Making Methods. Governance, decision-making processes, and methods are all included within the PfM process. We asked managers: *"What kinds of methods are being used within firm X for making portfolio decisions?"* We followed the question with*: "Were these methods used before the merger?"* Table 20 shows the firm whose methods changed or did not change during merger activities. Table 21 displays the different methods used across firm during decision-making processes.

Table 20 Change in Decision-Making Methods by Firm

Firm	No Change	Change
Acquiring Firms	PharmaAlphaI PharmaDelta PharmaZeta PharmaETA PharmaIota	PharmaAlphaII
Acquired Firms	APharmaIV APharmaVI	APharmaIX APharmaIII

The majority of firms (seven) showed no change in methods during merger activities. Three firms showed changes in methods post-merger.

Common Methods. Six firms used financial methods, such as ROI, NPV, and payback period when making portfolio decisions during merger activities. Managers across four firms relied on intuition as a method to aid them in decision making. Qualitative assessments were used by managers from three firms. Evidence-based decision making methods were used by managers from two firms.

Pre- and Post-Merger Methods. One or more of the common methods mentioned in the above section was used during merger activities across all firms. Most of the methods were used in both pre- and post-merger settings. Other methods presented within the literature were also used independently across firms. These methods included expert analysis and weighted scoring.

Table 21 Methods Used Across Firms

Category	Subcategory	Firm
Financial Models	NPV ROI NPV Sales Forecasts Payback Period Forecasts	PharmaAlphaI PharmaAlphaII PharmaGamma PharmaDelta APharmaIX PharmaIota
Intuition	Internal Thought of Leaders	PharmaDelta PharmaEpsilon PharmaZeta PharmaETA
Qualitative Assessments	Due Diligence Case-by-Case Analysis Evaluation Models Decision-tree	PharmaAlphaII PharmaDelta PharmaETA
Evidence-Based	Market Data Clinical Trial Data Historical Data	PharmaAlphaII PharmaETA

Effectiveness of Methods. After we confirmed that methods mentioned in the literature are being used by managers in this study, we asked managers: "*Do you feel these methods are effective?"* Table 22 show the responses from managers across various firms. Nine of the 13 managers stated that their firms' methods were effective. Three managers form acquiring and acquired firms felt their firms' methods were ineffective. One manager stated that their firm's methods are sometimes effective.

Managers who reported method effectiveness shared three common themes: use of (a) evidence-based methodology, (b) transparency, and (c) cross-functional buy-in. Managers who reported ineffectiveness shared one common theme: Failure to effectively integrate. Lack of transparency and not obtaining buy-in were other reasons for method ineffectiveness. Other

reasons provided by managers to explain method ineffectiveness were ineffective decision making, troubled pipeline, and merger complexity.

Ineffective Methods. Informant5 provided an explanation for the ineffectiveness of methods at his firm. He stated:

> *"It was just two vastly very different cultures. The attempt to juggle them without forcing the organization to become a single combined entity led to an extended period of failure to integrate. This led to, in my view, an extended failure to make tough decisions rapidly because you had to play the political game of is this decision a detriment of one of the two sides. How can I recruit enough strength from this other side in order to prevail? That affected even the portfolio management processes because you had so much personal ownership of the programs, that you were trying to prioritize in the portfolio."*

The failure to integrate was the primary cause of ineffective methods within firms.

Overall Changes. Our findings show that most of the methods and processes did not change post-merger, but half of the firms in the study experienced a decline in financial performance post-merger. Since most processes and methods remained the same post-merger, they must have been applied in a more rigorous manner. We posit that the merged firm's leadership (CEO, Governance Board) focused more on late-stage development, and terminated early stage developments that could have potentially resulted in long-term growth.

Table 22 Decision-Making Method Effectiveness

Acquiring Firms			
Firm	**Manager**	**Reason**	**Effectiveness**
PharmaAlphaI	Informant1	Uniform procedure Effective communication Early Buy-in	Effective
PharmaAlphaII	Informant2	Disciplined Non-biased	Effective
PharmaAlphaII	Informant3	Buy-in Collaboration Evidence-based	Effective
PharmaAlphaII	Informant4	-	Effective
PharmaDelta	Informant8	Transparency Accurate Forecasts Honesty Cross-functional buy-in Intuition	Effective
PharmaZeta	Informant10	Ineffective merger strategy Ineffective decision making	Ineffective
PharmaETA	Informant11	Use of metrics	Effective
PharmaIota	Informant 13	Diversified decision making	Effective
Acquired Firms			
APharmaIII	Informant5	Lack of transparency Failure to integrate No buy-in Merger complexity	Ineffective
APharmaIV	Informant8	Evidence-based validation post-decision	Effective
APharmaIV	Informant7	Troubled pipeline	Ineffective
APharmaVI	Informant9	Risk-based decision making	Sometimes
ApharmaIX	Informant12	Thoroughness	Effective

Firm Goals. After gaining insight into firms' processes and methods, we delve into the goals of the firm. Managers were asked: *"Have the goals of the firm changed since the merger?" If so, how?* All of the managers stated that goals of their respective firms changed after the merger (refer to Table 23). All managers from the firms provided various reasons for the change in goals. PharmaIota and PharmaAlpha goals became more patient focused. PharmaGamma,

PharmaEpsilon, PharmaEta, and PharmaDelta focused on expansion. PharmaBeta became more R&D driven. PharmaZeta changed its strategy.

Table 23 Change in Firm Goals

Firm	***Did firm's goal change after the merger?***
PharmaAlphaI	Yes
PharmaAlphaII	Yes
PharmaDelta	Yes
PharmaZeta	Yes
PharmaETA	Yes
PharmaIota	Yes
APharmaIII	Yes
APharmaIV	Yes
APharamIX	Yes
APharmaVI	Yes

We gained further insight into firms' goals by asking managers: *"Are the firm's goal long or short-term focused?* We followed with: *"Has this focus changed since the merger?"* We then asked managers: *"Do you feel your firm's goals are attainable?"* Table 24 shows the varied responses across all firms.

PharmaTheta was the only firm to change its focus (after its merger with APharmaIX). Its focus changed from long- to short-term. Informant12 elaborated that APharmaIX's pre-merger short-term focus was due to the year-over-year sales goals. ApharmaIX was long-term focused

post-merger because they had a new strategic vision. The focus of all of the other firms did not change after the merger.

Pre-Merger Goal Focus and Attainment. Eight managers viewed their firm's focus as long-term, with a heavy emphasis on R&D. Informant8's response aligned with all of the eight managers' perspectives supporting long-term focus:

> *"I think it's a near term which is squarely focused on getting this product approved. I think, yeah, going back to my earlier point, we still have very much of a long term play because this is one milestone. Potential approval is one milestone, but we're still very much focused on building and driving R&D internally. That requires much more longer-term thinking and planning this is a shorter-term focus. I think in that respect, our goals have always remained, and still remain more long term in terms of developing longer-term consistent value to our shareholders."*

Four managers viewed their firm's focus as short-term. One manager viewed their firm as both long and short-term focused.

Table 24 Firm Focus Pre- and Post-Merger

Managers' Perspectives - Acquiring Firms				
Informant	**Firm**	**Pre-Merger Focus**	**Post-Merger Focus**	**Attainable Goals?**
Informant1	PharmaAlphaI	Long	No Change	Yes
Informant3	PharmaAlphaII			
Informant8	PharmaDelta			
Informant11	PharmaETA			
Informant13	PharmaIota			
Informant2	PharmaAlpha2	Short		Uncertain
Informant10	PharmaZeta			
Informant4	PharmaAlpha2			Yes
Managers' Perspectives - Acquired Firms				
Informant5	APharmaII	Long	Same	Yes
Informant6	APharmaIV	Both		
Informant7	APharmaIV	Short		
Informant9	APharmaVI	Long	Same	Uncertain
Informant12	APharmaIX	Long	Short	No

Informant6 explained why APharmaIV's focus was both long and short-term focused:

> *"I would say 60:40, 60 being short term. When I say short-term, like two years to three years. Long term is like is three and above. It would be more executing smaller tactical projects to gain momentum, increasing net sales and increasing distribution as certain short-term goals. In addition, any quick wins in terms of reducing overhead, reducing destruction of products, managing cost, would have been more of those efficiency type projects were the short term. The same type of projects was long term as well. Sometimes a new product with new technology or new products that had to be reached in a brand new country would take long time. Just two new products and efficiency projects were implemented, but the time or duration to implement those in certain markets or certain type of products took longer time, so it became long term objectives."*

Nine of the managers felt their firms' goals were attainable. Three managers expressed uncertainty regarding goal attainment. The common theme amongst these three managers was a lack of R&D/innovation. Only one manager felt their firm's goals were unattainable due to the unrealistic component of the goal. Informant12 simply stated:

> *"I feel like they are way too far out of reach. They're incredibly optimistic, and it just isn't realistic at all that we can achieve those financial goals."*

We've learned that merged firms had a different goal structure post-merger. The new goals focused more on ROI. When a firm is more focused on financial goals, R&D expenditures get cut as a cost-saving measure. We posit that the lack of R&D funding contributes to post-merger portfolio shrinkage.

Firms' Risk Profiles. Firms have a propensity for dealing with risks differently. A firm is considered to be risk averse if it seeks to reduce uncertainty when faced with it. We asked managers: *"Is your firm more risk averse post-merger as it was pre-merger?"* Table 25 shows a summary of manager responses and their respective firm's risk profile.

Table 25 Risk Profile Post-Merger

Acquiring Firms		
Firm	**Summary of Managers' Perspectives**	**Risk Averse**
PharmaAlphaI	The Board of Directors and Investors are far more risk averse.	More
PharmaIota	Doing more risk management since the merger. Risk management is now applied to every brand.	
PharmaAlphaII	More risk conscious. Firm looks for mitigation strategies.	
PharmaDelta	Merger made firm think very carefully about portfolio decision making. Changed risk taking approach after the merger.	
PharmaZeta	In general, as firms become larger, they become more and more risk-averse.	
PharmaAlphaII	Taking more risks and changed how they look at R&D.	Less
PharmaAlphaII	The pharma division was growing but there wasn't a lot of activity there in terms of dynamic growth through acquisition. Firm rapidly acquired two more firms.	
PharmaETA	-	No Change
Acquired Firms		
APharamaIII	Firm wanted to win and wanted to take more risks but was afraid of failure. Firm was forced to take more clinical and regulatory risks.	Less
APharmaIX	The firm bases a lot of the decisions on numbers and valuations but it also doesn't allow any mistakes. Firm isn't very supportive of risks.	More
APharmaIV	-	
APharmaIV	-	No Change
APharmaVI	Small acquisition. Merger didn't make a difference.	

Ten of the 13 managers stated that their firm's risk tolerance changed after the merger. Seven managers indicated their firm was more risk averse after the merger. Three managers

reported that their firm was less risk averse post-merger. Three managers said their firms did not change its risk profile after the merger.

Firms that became more risk averse post-merger engaged in more risk management activities, especially within R&D. Managers of firms that became less risk averse post-merger all stated that their firms were willing to take more risks in exchange for growth opportunities.

There were no differences in risk aversion between acquired and acquiring firms. There were differences in the responses within the same firms. One of the three PharmaAlphaII managers viewed their firm as more risk averse post-merger, as opposed to the other two managers who felt their firm was less risk averse. The two managers with the same risk aversion perspective provided different justifications for their perspectives. Likewise, the two managers from the PharmaGamma/APharmaIV merger had varying perspectives of their firm's risk aversion. One manager felt the firm was more risk averse, while the other felt there was no change in the way it faced risks post-merger. The majority of managers, who were from either the acquired or acquiring firms that were large, stated that the firm had become more risk averse post-merger.

If firms become more risk averse post-merger, they are less likely to take risks on R&D drugs that may need further development or enhancement. We suggest that as pipelines are assessed with more rigor to rule out risky drugs, the portfolio shrinks and firms launch less drugs over a long period of time. This is another plausible explanation as to why portfolios shrink post-merger.

IV.4 Individual Behaviors

After gaining insight into managers' perspectives of the firms' goals, processes, and methods, we asked managers three questions relating to their individual behavior during merger activities within their respective firms.

Personal Goals. Theory of Narrative Thought states that values help form the narrative thought of individuals, which then influences their decision making. One of three questions we asked managers is: "*Have your personal goals changed since the firm has merged?"* Figure 15 displays the common themes of the managers' personal goals after the merger.

Seven managers indicated that a change in personal goals had occurred after the merger. Six managers said their goals had changed. All of the managers aligned their personal goals with that of the firms'. The subcategories generated during coding include: (a) gain more experience, (b) knowledge expansion, (c) enhance skillset and (d) job stability. Overall, most of the managers saw the merger as an opportunity to gain more experience to secure their careers.

Career Growth and Enhanced Skillet. Informant2 leveraged the merger by gaining experience for her next career. Informant2 shared how she plans her personal goal during merger activities:

> *"As you appreciate, it would be much of what happens in one's career sometimes driven by events you can't control as you say by a company getting bought or positioned being eliminated. I'm always of the mindset that I need to be my own advocate for where I might go next or what opportunity or risk I want to take. I look at that and see, can I put these pieces together and then, will that get me to where I think I want to go? It's funny you asked because I have been thinking a lot about, "Well, what will my next job be and what did that look like and what are pieces that I'm interested in?" I've been thinking a lot about where my current kind of interest is and even though I don't have a lot of formal experience there, I'm very interested in [industry], so I've been spending a lot of time with [department] colleagues at PharmaAlphaII just trying to learn and get involved to where I can."*

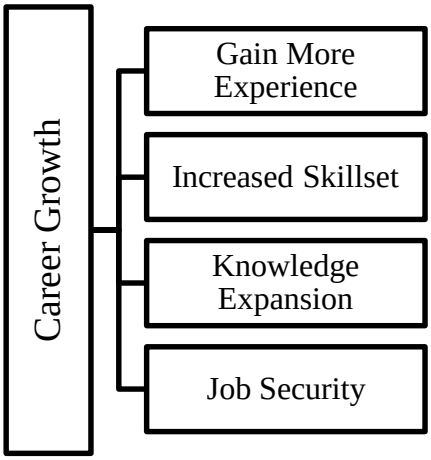

Figure 15 Managers' Personal Goals

Informant 3's personal goal strategy was similar to Informant2's:

> *"I think now that they have so many different avenues you can go down, and PharmaAlphaII offers so much training, there's a lot of things you can get involved in. When I started, I was just working with the established brands and products, as well as, like I mentioned the pipeline products. Now that I've been involved with that one [product], there's a [branch of medicine] side of it, and so now my focus has shifted to the [branch of medicine] side of it, so I'm kind of passionate about that. I really didn't know a whole lot about [branch of medicine], so now my goal is to learn more about that [branch of medicine] population, and [disease] and determine how I can add value to that."*

Informant12 shared the same personal goals as Informant3 and Informant2:

> *"It's going to force me to be a lot more patient. I'm not going to be able to achieve the things that I want to do in the time frame I need to, because they're just much more deliberate about how your career is going to move and how fast and in which directions. You have to just plan things out on a longer timeline to where you want to be versus at PharmaTheta, I think you could have done in a much, much shorter timeline."*

Job Stability and Knowledge Expansion. Informant4 aimed to increase her knowledge after the merger:

> *"It makes it more interesting; growing, doing things that are more impactful for the organization, have a deeper understanding of what's going on in the industry."*

Personal Stake in Decision Outcome. We asked managers: *"What's personally at stake when making portfolio decisions?"* Consistent with the change in personal goals as a result of the merger, managers considered their reputation when making decisions. Table 26 shows the managers' narratives and categories of what's personally at stake for them when making portfolio decisions.

Table 26 Personal Stake in Decision

Number of Informants	Subcategory of Narratives	Category
5	Good representation of client, reputation, more respect, integrity, good relationship with marketing, esteem	Reputation
7	Good guidance, good decisions realized, desire to make great contributions, avoid failures, concerned about losing, to know that I've done a good job, sense of building company and patient therapies, achievement, positive outcome, just want to succeed	Success
3	Bonus, income	Reward
3	Gaining more knowledge and experience, better career exposure, job security	Career Growth

Five managers felt their reputation was at stake while making portfolio decisions. These managers looked forward to the esteem of their leaders and colleagues as a result of a good decision. It was also important for the majority of managers (seven) to make a worthy contribution to the firm through their decision making. Managers sought to provide proper guidance to aid in final decision making that results in a viable portfolio. Most of these managers want to succeed in making the right decisions for the firm. Few managers (three) felt their income bonuses were at stake when making decisions.

When making portfolio decisions, two managers spoke strongly about their concern for human resources. Informant5 passionately expressed his personal stake in potential resource loss:

> *"There's nothing worse than having to let people go because the company bet on the wrong horse or the company made a bad decision. There's an awful lot more at stake than personal income. I'll survive, I'll go get another job. That's not an issue, in your term it hurts, but it's more really how it affects the company, especially small companies. They take a long time to recover from a major mistake or a major bad decision. That's the one thing. We're really here to build the company, to build the careers of the people who are committed to working alongside us as we build these places. To me that's an awful lot more painful to see that one got away than to see your bonus cut by 20%. Yeah, it's nice to get an extra 20% on your bonus, but it's a whole lot better to go out and hire 40 new people who might have been working at the coal industry."*

Likewise, Informant6 emphasized the importance of people in his decision making:

> *"I typically don't look at my personal part of it. I look at it from more of an outcome-based decision maker. If my decision is going to help the outcome I will do it and also very strong in terms of emotional intelligence, look at any impact on people. Those are the two that I would look at. Am I going to achieve the objective or the outcome? In the process, what I'm I going to actually lose, if any? Especially when it comes to people, I want to make sure that achieving the outcome cannot be by killing like 500 people in between. You got to make sure that you balance that in terms of what hardship my decision would bring to people and what is the positive outcome that would actually let."*

It was interesting to discover that managers don't only think of themselves when making decisions. They consider the livelihood of those around them as well. This discovery suggests that managers may make decisions in favor of people rather than of the firm.

Rewards & Recognition. After learning that reputation, success, reward and career growth are personally at stake when making decisions, we asked managers: *"Are you rewarded for the decisions you make?"* All managers are rewarded for decisions made, with the exception of Informant2 and Informant12. Figure 16 shows the four common rewards granted to respective managers. One of the two managers who were not rewarded indicated that there was no mechanism in place to measure success after the merger.

Most managers encountered tangible and intangible rewards as a result of making good decisions. Tangible rewards came in the form of financial incentives, such as bonuses and profit sharing programs. Intangible rewards included gaining the trust of governance boards that resulted in opportunities to learn cross-functionally and take on more decision-making responsibilities. Earning the trust of managers' respective leadership teams and being regarded in high esteem were other rewards. Interestingly, few managers stated that they were not penalized for bad decisions or outcomes. Rather, they were told to do better and try harder next time. It is also worth mentioning that only one manager viewed early stage success of the firm's portfolio as a reward.

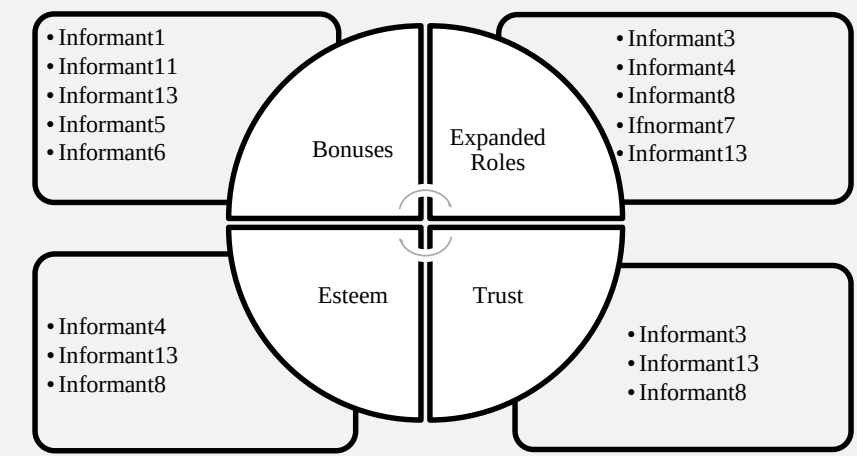

Figure 16 Managers' Rewards

Individual Decision Making. The next question directly addresses our research question: How do managers make portfolio decisions during a merger? We asked managers: "*Can you describe a recent portfolio decision?"* We followed the question with: *"Did the merger influence this decision?"* We captured each manager's approach to decision making and provided a general description of the decision scenario. Figure 17 displays managers' approaches.

The decision outcome presented by managers involved one of the following categories: (a) product licensing, (b) abbreviated new drug administration, (c) portfolio alignment, (d) portfolio strategy, and (e) new market entry. All managers felt their decisions were influenced by the merger, with the exception of Informant3 and Informant13. Across all firms, the governance board influenced managers' decisions.

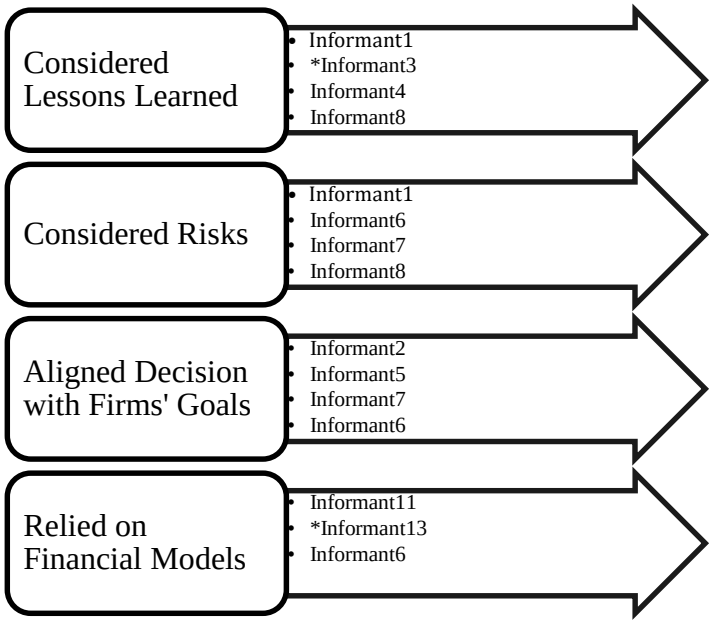

Figure 17 Managers' Approaches to Decision Making

*Decision making was not influenced by merger

Managers had four common approaches to decision making. Some managers adopted a combination of these approaches. One approach taken by four managers was to consider lessons learned from their decisions made during former mergers. Managers recalled how past mergers were approached and mimicked its success, as well as avoided its failures. These managers mentioned being more disciplined in their decision making. Prior to their merger experience, they reported ignoring warning signs of drugs that seemed promising.

A second approach was to identify risks. Four managers adopted this approach and generated risk responses for portfolio risks. Managers taking this approach mentioned fear of losing market share for making wrong decisions.

A third approach was to align the decisions with the firms' goals. The four managers utilizing this approach indicated that their decision making was heavily influenced by the acquiring firm's governance board. Further, decisions had to be tailored to meet the needs of the new leadership of the merged entity. Informant2 described how the merger influenced one of her recent decisions:

> *"The key reasons why senior management didn't support it really were multifold. One happened to be that the time at which this opportunity went in front of the executive committee and essentially the CEO and [his/her] senior team, the company was going through a global reorganization. Unfortunately, the individuals who were in part of the dialog and who have been involved or updated on the deal for the prior six months completely changed. You had a whole new group of decision-makers, stakeholders so I think that was a challenge. Then also, there were just very different priorities amongst that new group in terms of where they wanted to focus their respective resources."*

In many cases, the new leadership team and the change in firm goals changed how managers approached decision making after the merger. Informant6 indicated that a portfolio decision was made before the merger, but changed when the merger was announced. He stated:

> *"The new leader had a new plan for the organization which we all aligned on, which means we need to make these changes to make sure that we get behind it."*

The fourth approach was the reliance on financial models. Managers who adopted this approach practiced evidence-based decision making. These managers built financial models and assessed them against pre- and post-merger portfolios. Informant1 focused on being objective in his decision making and not allowing political influence to drive his decisions. He stated:

> *"We tried to be as objective as possible and just based it on the data, as opposed to being influenced by the politics."*

Managers sought out ways to apply evidence-based approaches to decision making.

Difficult Decision Making. The complexities of mergers can create an environment of uncertainty and complexity where managers can be faced with difficult decision making. For this reason, we aimed to determine how managers make decisions when faced with uncertainty. The previous responses provided insight into the general decision-making approaches taken by managers. To gauge managers' decision-making approaches when faced with uncertainty, we asked managers: *"Can you describe a situation in which you were confronted with a difficult portfolio decision during a merger?"* We then asked managers: *"Were you satisfied with the decision?"* We captured the manager's decision scenario and elements that made the decision difficult. We then classified their risk responses into two main categories: (a) avoid and (b) accept.

For this study, we define risk avoidance as making a change to the portfolio decision. Risk acceptance is proceeding with the decision as planned and having a response plan in place in the event the risk occurs. Table 27 shows the managers' risk responses when making difficult decisions during a merger.

Lack of agreement between decision-makers was key to making managers' decisions difficult. When describing the complexity of a decision, Informant8 concluded with the following statement:

> *"I'd say the dichotomy in beliefs within the team made it a very challenging situation and decision."*

The level of risk associated with the decision also complicated managerial decision making. Managers who were faced with risky decisions avoided the risks. Other complexities included fear of making wrong decisions, lack of experience and complexity of matrix organization. Decisions that involved drugs in phase I (early stage) under constrained R&D budgets also complicated managerial decision making.

One manager noted their intuition went against the evidence presented, hence making the decision extremely difficult. This manager accepted the risk and carried out the decision.

All managers were satisfied with the decision they'd made when faced with uncertainty. Six managers accepted risks and carried out their decisions. Four managers avoided risks and made new decisions.

Although most managers' firms were more risk averse post-merger, the majority of managers took more risks when making complex decisions during merger activities. This finding contradicts literature that reveals managers adopt a firm's risk aversion during decision making. Although we've found that managers align their goals with that of the firms' while making decisions, they tend to abandon their firm alignment when faced with uncertainty. We elaborate further on this finding in a later chapter.

Table 27 Managers' Risk Approaches to Difficult Decision

Informant	Decision	Reason for Difficulty	Risk Response
Informant2	Partnership	Risky negotiation	Avoid
Informant3	Terminate Drug	Lack of agreement between decision-makers	
Informant13	R&D Site Closure	Complexity of Decision Approval process	
Informant1	Divest generic drug	Risky investment	
Informant8	Delay Launch	Lack of agreement between decision-makers Intuition conflicted with evidence	Accept
Informant6	Global Expansion	Lack of experience	
Informant7	Product Development	Constrained R&D budget	
Informant11	Drug Selection	Phase I Development	
Informant12	Manufacturing Site Closure	Fear of making wrong decision	
Informant4	Terminate promotion of drug	Complexity of matrix organization	

Managers' Past Experiences. To further explore TNT, we asked managers: *"Do you think your past experiences influences your portfolio decisions now?"* We captured narratives from 10 managers and displayed them in Table 28.

Table 28 Managers' Narratives - Influence of Past Experiences

Informant	Quotes
Informant1	"Yes, past experiences inform portfolio decisions. Lessons learned from previous deals make me look at deals differently today."
Informant2	"Yes, in terms of experience. Have objectivity but experience has impact on how to position the opportunity or head off challenges. Think about how things could potentially occur just based on experiences I've had."
Informant3	"Yes, previously did what you were told to do. Once importance is understood, can make better decision making. You look at things from a different aspect when you're a little bit more seasoned than when you start off."
Informant4	"Yes, can provide insight now. I have more knowledge. I am able to pinpoint "go"/"no go" decisions."
Informant5	"Yes, absolutely. Once burned, twice shy. I view the future through prism of the past. The lessons you've learned, good or bad, influence every decision we all make."
Informant6	"Yes, knowledge from years at previous pharma firms. Also experiences from training classes."
Informant7	"Yes, past experiences about culture of R&D. I make recommendations based on experience. I've learned from 6 previous M&A."
Informant8	"Yes, past experience in different therapeutic areas are good. Important to consider other viewpoints. Allow you to play out scenarios. Leveraging past experiences is important."
Informant11	"Yes, ability to be objective and neutral."
Informant12	"Yes, I've learned throughout my career. Each time a product is evaluated I learn. You're learning from your past experiences and picking up on things that maybe you hadn't the previous time but this time you're looking for this time."
Informant13	"Yes, absolutely for sure. I gain new knowledge. It never stops. Would make decision differently 10 years ago than now. In the past, I was focused on gut feelings rather than facts. Gut gives you more truth in private life but not in business."

Consistent with TNT, all managers said past experiences influence their portfolio decisions today. Managers' narratives also revealed that past experiences inform their portfolio decisions today. Many of the managers adopted strategies that have worked at other firms to aid them in post-merger decision making at existing firms. Most of the managers utilized past experiences as a mechanism for foreseeing risks and planning risk responses.

In all instances, managers drew from past experiences to forecast the outcomes of their decisions. Many managers felt past experiences helped them play out scenarios of expected outcomes that enabled them to make better decisions. Lastly, when managers recalled failed experiences, they avoided a similar decision that led to a failed outcome. Similarly, managers who experienced failed outcomes avoided similar decisions that led to the failure. Informant5 shared how past experiences influence his decision making today with the following explanation:

> *"If you've had trouble with one of the agency's divisions or teams, inflexibility from that decision, you're not comfortable going there again. The same way if you've had success with a disease state or success with a group at the agency or success with a group of clinical researchers, it tends to become kind of a favorite of well I know how to do that one, I think I can do that one well. Let's go back and swim in that same pool again."*

Informant13 discussed how his past experiences influence decisions today. Informant13 stated that decisions made in the past were based on gut feelings, and decisions made today are based on the outcome of the past:

> *"You never decide along this kind of stuff, but by the time we make decision and there's a thorough discussion about every single aspect, you can raise your opinion about it and raise your gut feeling as well based on your experience. But clearly the bigger value is from the facts before the gut feeling. Even in the past, we make decisions based on gut feelings. Today everything is more based on what it was in the past."*

Consistent with TNT, all managers made similar statements regarding how their past experiences influences how they make decisions today. We posit that in the context of a merger, managers make decisions based upon the outcome of a decision made in a previous merger. Even when evidence lends to the type of decision that should be made, managers will bypass that evidence and mimic the decisions from previous outcomes that were favorable.

IV.5 Merger Impact

Portfolio Growth/Decline. Prior literature informs us that R&D portfolios shrink after M&A. We asked managers: *"In short, do you feel the merger will result in more or fewer drugs being funded, developed, and launched?"* Table 29 displays managers' perspectives on impact of merger to drugs.

Table 29 Managers' Portfolio Forecasts Post-Merger

Informant	More or Less Drugs	Theme
Acquiring		
Informant1 Informant3 Informant11 Informant8	More	Grows pipeline Increases revenue and investments
Informant2 Informant4 Informant10	Less	Decreases R&D Expenditures Terminates drugs
Acquired		
Informant7	Less	Decreases R&D expenditures and investments
Informant5 Informant6 Informant12 Informant13	More	Grows pipeline Enables market expansion Provides more resources

Eight managers felt the merger would result in more drugs being funded, developed and launched, while three managers felt it would result in less drugs. All managers, except one, from acquired firms felt the mergers would result in more drugs. Four managers from acquiring firms felt the merger would result in more drugs, while three felt it would result in less drugs.

Managers who believe the merger would result in more drugs felt the mergers would grow the R&D pipelines. Their belief is that the merger would provide more human and capital resources to enhance R&D capabilities. These managers also felt the merger would enable market expansion into new therapeutic areas. The belief of these managers is that the mergers would make the firm bigger and less risk averse. Informant3 mentioned that her firm's willingness to accept more risks after the merger would grow the firm's pipeline:

> *"I think they're going to take risks in the future to bring these things to market and re-strategize how they're brought to market."*

Managers who felt the merger would result in less drugs believe the merger would negatively impact R&D funding. Additionally, these managers felt drugs would be terminated due to overlap. Although the portfolio would result in less drugs after the merger, Informant2 felt that patient focus was more important than pipeline growth in terms of quantity. She states:

> *"I think it's not so much about numbers anymore. I think it really is about what is going to make a difference to the patient or the patient's family, patient group type of scenario. I may think that market place is very different now."*

Informant1 emphasized the importance of pursuing and funding drugs that were the main driver of M&A. Informant1 provided the risk in acquiring firms for the sake of portfolio growth without a clear strategy in his response:

> *"If you cut R&D especially along those brands, you undercut the purpose for acquiring those companies unlike other models where you might have come across this in your research where companies are just buying other companies and as a way, that is their R&D. They're just buying existing portfolios in companies and they're putting almost zero in the research and development side. That hasn't been our experience but I certainly know that is a model and that's actually an interesting model. An analogy would be if you just instead of drafting rookies, you just go and get free agents, right? interesting that some companies are really leveraging up that way and just saying we have no R&D besides acquiring companies. Who knows which one will succeed or not?*

It's worth mentioning that while most managers perceived that mergers would result in more drugs, we interpret their perspectives as looking at the new merged firm as having more drugs than their previous (acquired or acquiring) firm. Further investigation into how managers conclude that mergers result in more drugs is needed given that evidence suggests otherwise.

Firm Challenges. One of our final questions to managers was: *"Have mergers made your portfolio decision making more challenging?"* We've charted these challenges in Table 30 and categorized them into five categories: (a) unclear strategy, (b) hidden product issues, (c) termination of drugs, (d) new culture and (e) different data systems.

Table 30 Merger Challenges

Informant	More Challenging	Theme
Informant2	Need clarity on strategy. What does M&A look like? Strategic view isn't always conveyed. What opportunities are you seeking?	Unclear strategy
Informant8	The more products, the more resources are required. Do we value more breadth in multiple disease areas or in one?	
Informant5	Competitive landscape changes dramatically. May not make decisions based on current landscape.	
Informant1	Lack of focus on which therapeutic area to focus on. Harder to get drugs approved outside of therapeutic focus.	
Informant3	Inherited issues. Legacy behind product, history of product.	Hidden product issues
Informant4	Lack of outside data.	
Informant7	Have to cut a lot of drugs.	Termination of drugs
Informant11	Overlapping drugs.	
Informant12	Decision by committee. Countless number of people involved. Too much Pre-work involved. Twenty-five chefs in the kitchen instead of one. Everyone feels responsible. There are 20-30 people asking when, where, why, how from too many committees.	Different culture
Informant6	Making the decisions in new culture is what makes it difficult.	
Informant13	Acquired firms using different data analysis systems and tools.	Different data analysis systems

All managers from acquiring and acquired firms stated that mergers made their decision making more challenging. Four managers' merger challenges stemmed from not having clarity on the the new firm's strategy. These strategies included the merged firms' focus, expected outcome, and resource commitments.

Two managers stated that the firm's new culture made decision making complex and convoluted. For these managers, the merged firms' governance boards were too large and different leaders had preferences for which drugs were selected for the portfolio. Informant12 provided insight into the impact of having too many decision-makers:

> *"You have 25 chefs in the kitchen instead of one. It's a constant struggle, because everyone feels as though they are the ones that are responsible for it. Every step and every stage you go through, you have 10 or 15 or 20 people asking you why and where and how come and did you do this and did you think of that. It's a nonstop barrage through several different committees that you've answered the question four times over. You consider things and don't have it in writing and they keep drilling you on the same topics. It's just a lot of extra work."*

This culture of "decision by committee" make decision making long and frustrating.

Two managers from the same acquiring firm had challenges with not knowing the true history of the acquired firm's drugs. Informant4 spoke of her firm making decisions to proceed with development and launch of a product with the expectation that it would generate a lot of revenue even when forecasted data showed that it would not. Informant4 elaborated on this challenge by stating how leaders make a decision that doesn't support the data:

> *"You make this decision. You think it's going to be a big product that will generate a lot of money but here is market research that's telling you it's not."*

One manager from an acquiring firm experienced challenges with having a different system for analyzing data than that of the acquired firm. Information between these two merged firms is shared by exchanging excel spreadsheets. This manual method of information sharing made it difficult to analyze data in the same manner.

Suggested Merger Improvements. Following our merger challenges question to managers, we asked managers: *"What one thing would make portfolio decision making less*

challenging?" All managers provided suggestions for making M&A less challenging for decision-makers.

The most common feedback from five managers was the need to neutralize and streamline the portfolio decision-making processes. The necessity to make unified decisions is critical for the success of a merged portfolio. Managers stated that the criteria for decision making should be merged and adopted so that the expected outcomes can be based off of the same data. The need to be objective and neutral when selecting the portfolio from the merged entity was also suggested. One manager suggested that this could be best achieved by allowing a third party firm to make portfolio decisions after the merger. Another manager emphasized the need to analyze data in the same manner after the merger. It was also suggested that firms consider acquisition of firms that possess products that align with the firm's long term goals. Informant1 stated that by communicating the firm's strategy, managers can make better decisions. Informant1 suggested:

> *"I think in terms of portfolio management, it's helpful to have a sort of "Okay, here's where we're going, here's what we want to do" because then people can make decisions about "do we want to keep maintaining those drugs or keep any effort around those drugs or not."*

The second most common feedback from three managers was the need to explore the true costs of the acquisition. These costs included cost of the merger and R&D development. Managers suggested that the acquiring firm ensure there is adequate cash reserves to fund the merger and sustain R&D after the merger. Managers advised that acquiring firms should look at synergies and acquire firms that help close the gap and meet long team goals. Informant7 provided what he felt was key to maximizing synergies. Informant7 advised:

> *"If you have a merger and you already have an ophthalmic group and then you buy another ophthalmic group, then there's obviously going to be layoffs in both groups for you to get that synergy and those are the ones that are the most difficult. That's where you make the most mistakes."*

Informant7 recommends firms engage in what he calls a "bolt-on' merger, where its buys and acquires a new company and add it to something to complete the gap. Informant7 provided an example of a pharma firm with an ophthalmic unit buying another ophthalmic unit that completed or extended the ophthalmic portfolio. Further, managers suggested that firms consider the risks of cutting early stage R&D development to gain short-term wins with later stage developments. It was also suggested that R&D personnel not be eliminated after the merger so that knowledge is not not lost during merger activities.

Another common suggestion from two managers was to perform due diligence on the firm to be acquired before the merger. Managers also suggested that decision-makers aggressively explore all of the data for the drugs being acquired. Managers from acquiring firms suggested that acquired firms be transparent and forthcoming about potential drug issues. Informant6 stated that it is important for leaders to practice transparency at the firm level. Informant 6 revealed:

> *"Transparency as a leader behavior within the organization would actually help in decision making because there is nothing to hide. People are very transparent about what's going on and sharing the information and the facts to a point where we could really make a decision. There are other factors as well, since you asked for one I'm saying transparency."*

Although managers demonstrated some level of frustration with pharma mergers, it was interesting that none of them suggested that mergers cease. Instead, all of them openly provided suggestions for making M&A better. This observation signals that managers feel mergers can result in firm growth if firms look deeper into its merger strategies and make the necessary

adjustments to enhance merger effectiveness. We have included managers' suggestions for improving merger acvtivities in Table 31.

Table 31 Suggested Improvements for Merger Effectiveness

Informant	Suggested Improvements	Theme
Informant2	Look at clinical phase programs. Consider development costs. Too much focus on enhancing R&D capabilities.	Explore true lifecycle costs
Informant7	Get the synergies. Create savings to fund merger (usually done by shaving resources). Keep productive paths of R&D groups intact. When R&D takes a cut, future developments are at risk. Don't kills everything in early stage R&D. Don't get rid of R&D staff that knows most about the asset.	
Informant8	At pre-clinical stage, make tougher decisions early on. New indications. Make decision if we can afford the investment.	
Informant 3	Be transparent. Perform Due diligence. Research the agency.	Transparency
Informant6	Transparency – know what's really going on. Share the facts.	
Informant4	Outside data would make it more successful. Expand knowledge if successful.	Due Diligence
Informant5	Equivalent information across both firms so that the team are making decisions from the same depth. Ability to gain seamless equivalent basis of knowledge. Bring forward streamlined portfolio decisions templates. Unified decisions.	Neutralize and streamline portfolio decision-making process
Informant11	Have 3rd party do the evaluation for portfolio selection.	
Informant12	More streamlined approach. Less people making decisions. Right people involved in decision making. Decision-makers weighted towards acquiring firm.	
Informant13	If companies share same systems, data analysis done the same way. Data and optimization would make it better. Long process to connect all internal systems to one. One service organization with long-term outlook.	
Informant1	Inherit products that are part of firm's long-term goals. Can make better decisions about keeping and maintaining drugs.	

V DISCUSSION

The findings from this study address the research question: How do pharmaceutical managers make portfolio decisions during a merger? In this section, we conclude our learnings and collectively reveal insights gained by listening to managers and analyzing their responses through the lens of TNT. We discuss contributions to the area of PfM by discussing the gaps in the literature that lack how pharma managers actually make portfolio decisions during merger activities. Further, we provide suggestions for how pharma firms could approach future M&A such that R&D portfolios are not negatively impacted. We also provide managerial implications and limitations of the study. Lastly, we provide a reflection of the engaged scholarship experience from a practitioner's perspective.

V.1 Decision Making and Goal Alignment

Many pharmaceutical news outlets report M&A activity, including predictions for rumored acquisitions of giant firms buying smaller or competitor firms. Within these outlets, the acquiring firms consistently report the goal of the M&A as an attempt to grow the firm's pipeline and enhance R&D capabilities. The findings from this study support this claim, in that the overall goal of a merger is to achieve firm growth. Other goals, such as acquiring a new footprint and advancing into new therapeutic areas, also align with prior literature on the goals of M&A. Firms aim to be long-term focused pre- and post-merger, with great intent to enhance R&D capabilities. Firms aim to make these goals attainable.

Although firms share a common goal to enhance the pipeline by engaging in M&A, their goals change after the merger. Through exploration, we've discovered that the strategy of the firm is changed by the new leadership of the merged firm. Firms also become more R&D driven with the new leadership team. Although financial growth is still the ultimate goal of firms, a new

goal emerged that also focuses on patient disease. Also, firms are focused on the expansion of therapeutic areas.

Managers in this study said they align decisions with their firms'. While this is evident under pre-merger conditions, managers deviate from alignment with firm goals when making decisions under post-merger conditions. One possible explanation for this finding is that most managers, along with the firm, change their goals after a merger. We suggest that the complexity of a firm's post-merger goal realignment, coupled with a more career-focused manager, contributes to a misalignment of firm/manager goals. As a result, managers guide their decisions heavily based upon what they feel would benefit their career and lead to job security. Manager's post-merger focus on careers could interfere with their ability to make more rational decisions during a merger.

V.2 Managers' Portfolio Perspectives

With a common goal to achieve firm growth, we gained insight into how managers view their firm's portfolio condition pre- merger, as well as their expectations of the portfolio post-merger. We found that the majority of managers from acquiring and acquired firms predicted that their firm's portfolio would have more drugs funded, developed, and launched as a result of the merger. Very few managers predicted a decline in the merged portfolio, despite the literature's claim that R&D expenditures and pipelines typically decrease after M&A. One possible explanation for this perspective is that managers engage in system one thinking, where fast, contextual stories lead them astray because they are not aware of their own errors (Kahneman, Lovallo, & Sibony, 2011). Managers subconsciously envision the coupling of two firms' portfolios, which logically would result in two portfolios within one firm. Managers

imagine the merged firm as having more drugs and capabilities. This explanation is supported by responses from two informants in this study. Informant 13 states:

> *"I will say, more drugs, better drugs, more revenue and better cash flows. Could think less because you clear out the portfolio first and you look for redundancies. You don't keep everything that was there in the past but then there's the joined forces, you can do better and you can do more."*

Informant6 states:

> *"The beginning of the merger will always look like it's more, but then it balances out."*

Both managers' initial responses were that the merged firm's portfolio would result in more drugs. However, the latter part of their responses supports system two thinking, where they reflect and think about how the portfolio would actually result in fewer drugs. Throughout this study, we have consistently discovered contradictions where managers' perspectives and actual behaviors differ.

We researched financial performance of firms in this study and found that half of the firms' revenues declined post-merger. We found that smaller pharma firms experienced more growth than larger pharma firms. FierceBiotech reported that the pharmaceutical giant Pfizer, since its mergers, has been mired by poor performance in R&D for more than a decade ("What can Gilead, Biogen, and Celgene teach Big Pharma," 2015). Despite prior research on pharmaceutical M&A, firms still believe they will grow after M&A, especially within R&D.

Consistent with TNT, managers forecast the future condition of the portfolio based on their past experiences with M&A within their existing or past firms. It was discovered that managers, prior to making a prediction, recall events of past mergers failures or successes, and form an opinion about a future outcome based on that experience.

Managers also have a notion that the future of a portfolio is heavily based on luck. This belief is consistent with Cohen, March, and Olsen (1972) who state that often what gets decided depends strongly upon timing and luck. Managers feel that even when evidence shows that drugs have a promising future and are selected for a portfolio, they could potentially result in failed performance. A possible explanation for this occurrence is the manager's limited focus on adherence to standardized process and methods for portfolio selections. March (1991) states that organization decision making involves more than just valuation methods and processes. March (1991) also states that decision-makers are forced to make decisions based on information provided to them and that better decisions are be made when a holistic view is granted. We posit that managers' decisions should go beyond portfolio selection. Managers should also contribute towards decisions regarding the merger strategy of the firm so that a more holistic approach to portfolio decision making can be taken.

It is worth mentioning that portfolio forecasts can differ between managers within the same firm. We discovered that managers from different functional areas within the same firm had differing opinions of the firm's pre- and post-merger portfolio condition. This finding suggests that individuals have their own internal pre-defined criteria for defining a successful portfolio. Given this, even prescribed decision-making methods cannot ensure an unbiased, objective approach to portfolio decision making. This could be a key discovery as to why R&D portfolios decline after M&A. If standard methods and processes are followed, the introduction of biases into the portfolio decision-making process could be detrimental to a firm if managers' goals are not aligned with the firms'. Depending upon managers' attitudes about the merger and their personal values, their goals can vary. One informant from this study reveals that his personal goals

are influenced by how he envisions the future. Informant7 says the following when asked if his personal goals had changed post-merger:

> *"I guess it depended on how you felt about the mergers and acquisitions and whether you the acquiree or the acquirer, and how you were personally affected by it. If you were treated well and promoted or given a good position at the merger and acquisition, then obviously you were going to feel a lot better about it. Your goals were going to be good."*

Managers' interests align with that of the firms'. However, as the informant above suggests, their goals change after the merger. Post-merger, managers seek to gain more experience by securing new roles within the merged firm in efforts to expand their knowledge. This suggests that managers align their portfolio decisions with their personal goals. This discovery helps explain why portfolios decline post-merger, in that managers' biases could negatively impact the portfolio decision-making process. This claim is supported by Kahneman et al. (2011), who reveals a study by McKinsey where more than 1,000 major business investments showed that when organizations worked at reducing the effect of bias in their decision-making processes, they achieve returns up to seven percentage points higher.

V.3 Decision-Making Processes and Methods

The decision-making processes are relatively the same across firms pre- and post-merger. Firms institute a governance board of functional leaders and investors to make final portfolio decisions. Managers follow the traditional economical decision-making processes and methods as outlined in the literature. Managers also partake in the traditional annual portfolio review meetings, and assess market conditions to assist with prioritizing the portfolio. Most managers feel methods are effective. We confirmed that methods were most effective when an evidence-

based approach is taken, and when there is transparency with the data. When buy-in is obtained across multiple functional areas, better decisions can be made because of the varying perspectives of drug's potential risks and growth opportunities.

Decision-making methods are ineffective when there is a failure to integrate the culture and systems used to analyze drug data. We learned that the culture of a newly merged pharma firm is highly political and sometimes negatively influences portfolio decisions. This finding is consistent with experimental evidence provided by Weber and Camerer (as cited by Oh et al., 2014), that the conflict between the organizational culture of two firms involved in a merger can contribute to post-merger performance deterioration. The complexity of the integration from the merger contributes towards method ineffectiveness because the acquiring firm's leadership team dominate the decision-making process by bypassing the processes set forth by the firm's governance board.

We observed that managers do not always rely on processes and methods to aid in portfolio decision making. Our study reveals that the legacy and new management team rely heavily on intuition as a method for making portfolio decisions during merger activities. This approach is consistent with the pyramid of decision approaches presented by Schoemaker and Russo (1993), where intuitive decision-making is often undertaken when faced with pressure and complexities as a result of mergers. The reliance on intuitive decision making by leaders often interfered with evidence-based recommendations brought forth by managers. They sometimes follow gut feelings, and seek out drugs that align with their own personal interests. One informant mentioned that managers within his firm treat drugs like their babies. He states:

> *"These research programs become people's children, their babies. If somebody had a personal investment in an idea, it's very hard to give that up."*

This statement suggests that managers seek further development of drugs they've envisioned to succeed, despite evidence-based data that suggest otherwise. Managers fall into this confirming evidence trap, which Hammond, Keeney, and Raiffa (2006) defines as seeking out information that supports managers' existing instincts or point of view while avoiding information that contradicts it. Through the lens of TNT, managers engage in this type behavior when they've experienced previous success in continuing on with development of less than promising drugs or with drugs that seemed promising pre-merger. This behavior leads to R&D investments that are potentially wasted on drugs that may never produce long-term value. Over time, R&D budgets diminish and long-term investments can no longer be funded. For this reason, R&D portfolios decline.

When there are changes in the decision-making processes and methods post-merger, they tend to be drastic. Pre-merger processes of less experienced pharma firms involve a small number of decision-making executives who make ad-hoc decisions based upon external influences, with no buy-in from other internal managers. Post-merger, firms adopt a more traditional approach to decision making. However, the new leadership team of the merged firm is prone to take a biased approach towards portfolio selection. Despite the evidence-based recommendations for the merged portfolio, managers tend to terminate early-stage development and focus more on the later stage ones that could launch to market faster. This action contradicts the stated goals of the firm's post-merger long-term focus on R&D and the goal of the merger to enhance R&D capabilities. Hitt, Hoskisson, and Ireland (1990) states that if top-level managers have a low commitment to innovation, they will provide few rewards and incentives for creating and championing innovations. This supports our finding that managers consider what's personally at stake for them when making portfolio decisions. Managers sometimes select drugs

for a portfolio that are championed by senior managers who have direct influence over their careers. Further, we observed that managers will not reveal all of the evidence for a drug that has potential issues when they know investors and executives are in favor of it. We propose that this behavior occurs when managers fear their reputation or job will be negatively impacted. Paese, Bieser, and Tubbs (1993) identify this behavior as framing, where managers avoid risk when they perceive having something to gain. We posit that managers will not position a drug for a portfolio if they do not feel they have anything to gain.

V.4 Making Decisions under Uncertainty

There is a change in a firm's risk aversion after the merger. Large acquiring firms tend to become more risk-averse after M&A. Acquiring firms are less supportive of taking risks and became more conscious of them post-merger. Informant7 from the acquiring firm, PharmaZeta, stated that large acquiring firms take less risks:

> *"I think as a general statement, the larger a company is, the more risk averse it gets."*

This claim is supported by Hitt et al. (1990), who found that large firms are more risk-averse than risk–taking after an acquisition. A noteworthy change in firms as it relates to risk is that risk management is implemented across all brands post-merger, versus a pre-merger risk focus on blockbuster drugs. Contrary to Hammond et al. (2006) who stated acquired firms find themselves stuck in the status quo trap after a merger because they don't want to rock the boat, half of the acquired firms in this study become less risk averse post-merger. More importantly, more acquired firms also experienced post-merger growth than acquiring firms.

The literature suggests that managers' risk tolerances align with that of the firms'. We examined managers' approaches to risks while making decisions when faced with uncertainty and discovered that more than half of the managers became less risk-averse when making difficult decisions during merger activities. Further, managers put the firms' portfolios at risk, as well as their jobs, financial rewards, and reputation. A possible explanation for this behavior is a finding by Paese et al. (1993) that reveal managers seek risks when they perceive they have something to lose. We posit that when faced with uncertainty during a merger, the negative framing that prior mergers have presented sparks an insecurity in managers, causing them to make irrational decisions. This behavior could negatively impact a firm's portfolio, given that evidence from Eisenhardt (1985) (as cited by Hitt et al., 1990) suggests that financial performance outcomes are a function of managerial behavior.

V.5 How Managers Make Portfolio Decisions

This study addresses a gap in the literature that, to our knowledge, does not reveal how managers actually make pharma portfolio decisions during a merger. Our evidence reveals that managers make decisions by first recalling positive and negative outcomes from previous mergers and other work experience. These past experiences are then utilized to plan risk responses that will dictate their decisions. Managers use their imagination to plan scenarios for both negative and positive outcomes. Managers constantly align their personal goals, such a career growth, with how they feel the merged portfolios will perform. If they feel the portfolio will not succeed, they seek out opportunities to learn new areas of the merged firm before restructuring occurs that usually results in workforce reduction and R&D site closures. If the merged portfolio looks promising, they align themselves within the firm where they feel there's job security.

With the expectation of a promising future, managers are more risk conscious when making decisions, and continuously adjust their decisions until the portfolio seems attractive. While making these decisions, managers consider the risks to their reputation, financial stability, and career. On occasion, managers "ethically manipulate" data to influence senior managers' final decision. According to Paese et al. (1993), this positive framing is a risk aversion behavior that managers demonstrate when they seek to gain something such as financial rewards, esteem or job promotion.

Managers consider job stability when making portfolio decisions. When they feel the decision outcome may not be favorable, they leave the firm before the decision outcome is realized. Managers feel they lose before the merger even takes place when they foresee uncertainty with the merger. This finding addresses the gap in the literature that calls for the investigation of managers' motives during decision making, as identified by Walter and Barney (1990). We support the views of Schweizer and Patzelt (2012) that overcoming managers' perceptions of uncertainty during the post-acquisition period is central to their firm commitment.

V.6 Merger Decision-Making Challenges

We've identified five distinct challenges that encumber managers' portfolio decisions: (1) unclear strategy, which entails lack of clarity in merger strategy and lack of focus on which therapeutic area(s) to focus on; (2) hidden drug issues, which involves that lack of transparency from the acquired firms in disclosing known product issues and the legacy of the product; (3) termination of R&D drugs, which usually results in the termination of the wrong overlapping drug, or drugs that require long-term development; (4) new culture, which lacks integration of processes and a dominating decision-making process from the leadership team of the acquiring

firm; and (5) different data analysis systems, which forces the acquiring firms to interpret portfolio data from a different analytics tool with different portfolio decision-making criteria.

These challenges make managerial decision making more difficult and prolongs the process of portfolio selection. We offer suggestions for overcoming these challenges in a later section.

V.7 Key Findings

This study explored how managers make portfolio decisions during a merger. We've presented our findings and have discussed our interpretation of managers' perspectives through the lens of TNT. A few key themes emerged from this study that are worth mentioning.

Rigor and Lack of Integration. Since methods and processes remained about the same throughout the merger, we speculate that they were applied with greater rigor and lacked integration. This is evident by the recurring challenges revealed by managers that exacerbated decision-making during mergers. Expansion in the number of managers making decisions for one portfolio from two merged firms created cultural conflicts that prolonged decision making. Since the merged firm comprises of decision-making managers from acquired and acquiring firms, the new governance board demanded a more thorough product analyses due to an imbalance in knowledge about the history and performance of the drugs. The merged firm's CEO was likely focused more on ROI, which forced managers to terminate or divest risky drugs. As a result, fewer drugs made it to late stage development which resulted in a decline in the R&D portfolio.

Biases. Throughout this study, we observed that managers were unaware of their own biases. There was disparity in managers' perspectives and their actual behaviors. Managers felt they were objective and unbiased when making portfolio decisions. Although they felt politics, culture, and post-integration challenges made their decision making difficult, they did not demonstrate they were aware that these challenges impacted their decision outcomes. Further, they did not feel the merger affected their decision making. For example, all of the managers stated adherence to standard decision-making processes, methods, evidence-based decisions, and alignment with firm goals. However, when faced with uncertainty, all of the managers admitted that past experiences influenced their decision making. Further, many of the managers stated that they are guided by their intuition and gut feelings when making portfolio decisions. Additionally, all of the managers stated that something was personally at stake for them when making portfolio decisions. Managers' biases can impact their portfolio decisions. Until managers are aware of these biases, they will not consciously take measures to minimize them. Unless these biases are addressed, firms may continue to see a decline in R&D portfolios.

Differing Portfolio Perspectives. Managers had an overwhelming difference in perspectives of the condition of the firms' current and future portfolios. Twice, we found that managers within the same firm viewed the pre- and post-merger condition of their firm's portfolio differently. This finding erupted an alarming theme since all managers claimed to measure portfolios against standard criteria. If the portfolio criteria within firms are the same, how could managers have varying perspectives on its condition? The different within-firm perspectives pose a problem for decision making because managers inject their internal criteria into the portfolio decision-making process. By doing so makes it impossible to objectively evaluate a portfolio and maintain neutrality in portfolio selections. Further, managers within the

same firms had different perspectives on the firm's goal focus. Managers who view their firms as long-term focused will likely favor early-stage developments, while managers who view their term as short-term focused will likely favor later- stage developments. A lack of unified portfolio success criteria makes it impossible for managers within the same firm to evaluate portfolios in a similar manner.

V.8 Managerial Implications

Mergers and acquisitions will not cease within the near future for the pharma industry. Pipelines may continue to be affected if firms fail to adjust their R&D strategies when engaging in merger activities. We've captured some suggestions that may aid firms and managers in overcoming decision-making challenges during merger activities.

First, we suggest that firms neutralize and streamline the portfolio decision-making process during merger activities so that decision-making criteria from the acquired and acquiring firms can be weighed against the same criteria. We've concluded from our findings that portfolio selection during merger activities is best accomplished by allowing a third party firm to make recommendations for the merged portfolio.

Second, prior to the acquisition, investors and finance teams should consider the true costs of the acquisition, which include inherent costs of the merger and R&D sustainability. We suggest that the M&A strategy team seek to fulfill a capability or product gap when engaging in M&A activities, rather than a quest to target acquisition of a competitor in efforts to dominate the market. Long-term growth and patient focus should be an integral part of the merger strategy.

Lastly, due diligence should be as granular as possible to uncover hidden product issues. Firms should equip their staff to audit laboratory notebooks, regulatory submittals, raw data from all development phases (Phase I, II, III and clinical) and patient complaints.

V.9 Contribution to Knowledge

We contribute to the literature on portfolio management by explaining how portfolio decisions made during a merger could attribute to the disruption of R&D portfolios after M&A. We also provide suggestions to help minimize these disruptions. Our research provides insight into the actual cognition of the managers making portfolio decisions, and identify what elements go beyond their thoughts. Our findings provide insight into what actually influences the behaviors of the managers that make portfolio decisions, and how these behaviors motivate their decisions. We determined what changes occur within the portfolio management process after the merger that could possibly impact the way decisions are made during a merger. Our insights reveal what could account for the shrinkage of a portfolio, in terms of managerial decision making.

V.10 Limitations

A limitation of our research is that it includes managers from both the acquiring and acquired pharmaceutical firms with varying sizes. Another limitation is that this study uses a qualitative approach of inquiry. This study does not include a quantitative or mixed methods approach. Sampling presents a limitation since a small sample of 13 informants was used in this study. Lastly, this study includes pharmaceutical firms that specialize in human drug products. Veterinarian pharmaceutical firms were excluded from this study.

V.11 Future Research

Researchers could apply a quantitative approach to measure pre- and post-merger R&D portfolio performance against portfolio decisions. A longitudinal study could be conducted to look at R&D pipeline selection against performance after M&A. A quantitative research study could be conducted to determine if M&A changes the risk-taking culture within a firm.

V.12 Conclusion

While managers apply financial-based approaches to portfolio decision making, the interplay of manager and firm goals heavily influence their decisions during a merger. The empirical findings from this qualitative study suggest that many influences, such as personal goals, biases, integration complexity, risk aversion, culture, and new leadership impact how managers make portfolio decisions. We contribute to the literature on portfolio management by providing insight into how pharma managers make portfolio decisions in the context of a merger.

Three key findings emerged from this study. First, rigor and lack of integration in decision-making processes influence managers' decisions. Second, managers are unaware of the biases that adulterate their decisions. Their perspectives on how they make decisions differ from reality. Third, managers inject their personal criterion, along with the firms', into portfolio evaluations when making decisions.

Through exploration of TNT, we provide insight on how pharma managers actually make portfolio decisions in the context of a merger. Prior to the merger, managers form an opinion of how the merged portfolio will perform. Based on their attitude about the merger, they adjust their risk aversion according to what leads to better job security, career growth, and financial rewards. Through their past experiences with M&A, managers recall experiences and guide their

portfolio decisions to align with prior favorable outcomes. Managers rely on their intuition and gut feelings to inform their propensity to take more or fewer risks.

Most managers predicted that M&A would result in more drugs despite evidence that R&D performance decline post-merger. Half of the firms in this study experienced a decline in revenue post-merger. Smaller firms experienced revenue growth.

Since the economy will continue to dictate merger activity, firms should consider adjusting their acquisition strategy to include R&D pipeline development. Firms should implement strategies to overcome merger challenges and balance out decision-making power. Finally, firms should consider long-term growth during portfolio selection instead of a quest to gain short-term wins.

V.13 Engaged Scholarship Perspective

As a present day portfolio management consultant and former R&D scientist, it was interesting to uncover the hidden influences on my decision making. Prior to this study, I was unaware of my biases. I considered myself as an evidence-based practitioner who made decisions based solely on facts. When I played a role in a pharmaceutical merger, I experienced some challenges but didn't have the knowledge or insight to attribute it to lack of integration. I viewed challenges as growing pains. Interestingly, I believed that I'd based decisions on facts. However, throughout this research endeavor, I've recalled instances where I'd certainly framed R&D studies to align with the goals of my leader. The insight gained from this study has truly made me a better portfolio decision-maker today.

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APPENDICES

APPENDIX A

Exhibit A-1: Compositional Style Elements

(Mathiassen, Chiasson, and Germonprez (2012), Mathiassen (2015))

A (Area of Concern)	Portfolio Management
P (Problem Setting)	Pharmaceutical Research and Development (R&D) Portfolio Management
F (Conceptual Framework)	Theory of Narrative Thought (Decision-Making Theory)
RQ (Research Question)	How do pharmaceutical R&D managers make portfolio decisions during a merger?
M (Research Method)	A qualitative, multiple-case study with the R&D portfolio managers as the unit of observation
C (Contribution)	C(Fa): Deep Dive into Post-Merger Pharmaceutical R&D Portfolio Management to provide empirical insights into what's actually being done during portfolio decision making C(P): Plausible Explanations for shrinkage of R&D Portfolios

Exhibit A-2: Antecedents of TNT

(Beach, 2010)

Theory	**Description**	**Reference**
Image	The basic idea of image theory is that that your store of knowledge can be partitioned into three image categories: value, trajectory, and image, because they are your vision of what constitutes a valuable and properly ordered course of events. Image theory posits two kinds of decisions: adoption decisions and progress decisions. The former is about adding new goals or plans to the trajectory and strategic images; the latter is about evaluating the progress of plan implementation toward goals.	Beach 1990 Mitchell 1990
Recognition	Assumes that the context in which a decision is to be made provides information that allows the decision maker to access his or her past experience and existing store of knowledge in order to determine what to do	Simon 1979 Klein 1993 Klein 1996
Scenario	Describes how plausible stories can be constructed to forecast the future and guide planning.	Jungermann 1985 Thüring 1987
Explanation	Interprets and evaluates new information to integrate it with their general knowledge about human behavior into an evolving explanation about what happened and why.	Pennington and Hastie 1986, 1988,1992
Argument	The central idea of these theories is that the decision maker assesses the decision situation and, drawing upon past experience and general knowledge, formulates a course of action that meets the demands of the situation.	Lipshitz 1993 Svenson 1992 Montgomery 1993
Reflexivity	The idea is that that decisions produce changes the market, which in turn changes subsequent decision behavior.	Soros 2008
Incremental	Incremental evaluation is reflected in the idea that plans to address the undesirable (flawed) portions of a forecasted future (to "repair" the forecast), with the result that, when it arrives, the actual future usually is not all that radically different from the forecast, improved but still much the same. Incremental implementation is reflected in the idea that feedback during plan implementation allows the decision maker to take stock and adjust what he or she is doing—sometimes changing direction if necessary or stopping if the result is good enough.	Lindbloom 1959 Connolly 1988
Deontology	Influence of moral obligation and commitment on human behavior.	Etizioni 1988, 1993

APPENDIX B

Exhibit B-1: Interview Protocol

(Adapted from Kester et al. (2011)

Interview Protocol

1. Introduction by interviewer
   An electronic recording device will be used to capture the content of this interview. This recording will remain confidential, and will only be accessible to myself. Your responses will be assigned a code using random numbers and letter that will only be known by the investigators. The recordings and documentation from this interview will be kept on an encrypted hard drive until the conclusion of this study. You should have received a copy of my informed consent document informing you of the following: (1) your participation in this study is strictly voluntary and that you may terminate this interview at any time, (2) content from this interview will not be shared with other interviewees within this study, and anonymity will be maintained for the reporting of this study, and (3) there is not intent to inflict any harm. Your signature and transmittance of this form to me indicates that you understand the terms of this research and your rights as a participant.

   We will begin the interview shortly. You have been selected to interview as a result of your role in the portfolio management process at _____ pharmaceutical. Our research study will focus on the decision making of managers during a pharmaceutical merger. I will ask you approximately 9 questions that contain a set of sub-questions. These questions will be divided into 3 parts. Part I will focus on the organizational aspect of portfolio management. Part II will focus on the portfolio valuation and selection methods adopted by your firm. Finally, part III will focus on how you personally manage portfolios (i.e. decision making, selection, etc.). The interview will be interactive and engaging. Please feel free to answer freely. There are no right or wrong answers. I am interested in your perspectives and insights. The duration of this interview should span between 45-60 minutes. In the event that the interview time is elapsed, I will ask your permission to continue or request to schedule a follow-up interview. Thank you for your participation in this research study.

Part I. Organizational Context and Processes

2. Role and responsibilities
   2.1. What is your role within firm X?
   2.2. How long have you been with the firm?
   2.3. Are you from the acquired or the acquiring firm?

3. Merger Impact on Portfolio Management
   3.1. What do you think led to the merger that has taken place within your organization?
   3.2. What is your view of the condition in which the firm's portfolio is in today?
   3.3. What do you think will happen to the portfolio in the future?

4. Portfolio Decision Processes
   4.1. Can you describe how portfolio decision-making processes within firm X work?
      4.1.1. How did this process work before the merger?
   4.2. How are portfolio decisions governed within your firm?
      4.2.1. How were these decisions governed before the merger?
   4.3. How was the portfolio selection process before the merger?
   4.4. How is the portfolio selection process now?

5. Organization and Individual goals?
   5.1. Have the goals of the merged firm changed?
      5.1.1. If so, how?
   5.2. Have your personal goals changed since the firm has merged? If so, what changed and why?
   5.3. Is the firm's goal long or short-termed focused?
      5.3.1. Has your firm's goal changed since the merger? i.e. short vs. long
   5.4. Do you feel your firm's goals are attainable?

Part II. Portfolio Management

6. Methods
   6.1. What kinds of methods are being used within firm X for making portfolio decisions?
      6.1.1. Were these same methods used before the merger?
      6.1.2. Do you feel these methods are effective?

7. Portfolio Selection
   7.1. Can you describe a recent portfolio decision?
      7.1.1. What was your role in the decision making?
      7.1.2. What influenced this decision?
         7.1.2.1. Did the merger influence this decision?
         7.1.2.2. Would this decision have been different before the merger?
      7.1.3. Who was involved in making the decision?

8. Dealing with Uncertainty and Complexity
   8.1. Is your firm more risk adverse post-merger as you were pre-merger?
   8.2. Can you describe a situation in which you were confronted with a difficult portfolio decision during the merger?
      8.2.1. Why was this decision difficult?
      8.2.2. Were you satisfied with the decision?

Part III. Individual Behaviors

9. Individual Portfolio Decisions Aspects
   9.1. Do you think your past experiences influences your portfolio decisions now?
   9.2. Are you rewarded for the decisions you make?
   9.3. What is personally at stake when making portfolio decisions?

10. Closing Questions
   10.1. In short, do you feel the merger will result in more or fewer drugs being funded, developed, and launched?
   10.2. Have mergers made your portfolio decision-making more challenging? If so, what one thing would make these decisions less challenging?

APPENDIX C

Exhibit C-1: Case Selection Criteria

Number	Factor	Criteria
1	Acquired	Manager from a firm that acquired another firm.
2	Acquired	Manager from a firm acquired by another firm.
3	Horizontal Merger	Manager was employed during a merger that occurred between two firms within the same sector (pharmaceutical industry).
4	Industry	Manager was from one or more of the following industries: Pharmaceutical, Biotech
5	Decision-maker	Manager makes R&D portfolio decisions.

APPENDIX D

Exhibit D-1: Quality of Case Study Research

(Adapted from Yin 2014)

Criteria	**Rationale**
Justification for case research	A statement of why the case method was adopted appeared in the research together with a clear explanation of why the case research method is appropriate.
Reasoning for using a case research method provided.	A statement of why case method was used.
Unit of analysis	Unit of analysis explicitly stated
Theory vs. phenomenon	Was the research grounded in existing theory or phenomenon?
Sampling strategy	How did the researcher(s) decide on which case(s) to choose?
Number of cases	How many cases were examined in the research?
Triangulated data sources	Was there more than one source of data used to validate the research findings?
Data analysis	How were the research results presented?

APPENDIX E

Exhibit E-1: Informed Consent Document

Informed Consent

Title: Managing Pharmaceutical Research and Development Portfolios: An Empirical Inquiry into Managerial Decision Making in the Context of a Merger

Principal Investigator: Danny Bellenger, PhD.
Student, Principal Investigator: Catrina Jones

I. Purpose & Procedure
You are invited to participate in a research study because you have been identified at a portfolio decision-maker residing in the R&D, marketing functions or portfolio management functions. Your participation is voluntary and information obtained from this study will be anonymous and confidential. The purpose of this study is to explore the behaviors and actions of managers while navigating throughout the portfolio management process. The initial interview will request approximately 60-90 minutes of your time.

II. Procedure
If your decision is to participate in this research study, you will be asked to meet with the researcher (and possibly a research assistant) for an information-gathering interview via phone and face-to-face. This interview will be conducted in a private session, either in the participant's office or another setting suitable for private conversation free of interruption and eavesdropping. Interview sessions will be scheduled and conducted according to the participant's and researcher's mutual availability. The researcher will make every effort to give preference of time and location to the participants' needs when possible.

You will be asked a series of questions that you will be allowed to answer freely. Your responses will be written in a notebook and electronically recorded. The researcher may alter the interview questions based on your responses, but will remain within the interview protocol established for this research study. Periodically you may be asked to repeat or clarify your responses. The purpose of this request is to provide clarity and understanding to the researcher. Once all of the questions have been addressed, the researcher will review her notes with you to ensure your responses have been accurately captured.

III. Risks and Benefits
For this study, no foreseen risks have been identified other than those that could occur in everyday life. Your participation may not benefit you personally, but we are hoping that our findings provide insights on how mangers make R&D portfolio decisions after a pharmaceutical merger. These insights may aid in providing gaps in the portfolio management process that attribute to the decline of R&D productivity after a merger.

IV. Voluntary Participation and Withdrawal
Participation in this research is voluntary. You are not required to participate in this research study. Your decision regarding participation will not be shared with your employer. If you decide to participate in this research study and change your decision, you have the right to terminate your participation at any time. You may opt out of questions and exit the survey without any penalty or loss of benefits to which you are otherwise entitled.

V. Confidentiality
Your records will be kept private to the extent allowed by law. The principal and student investigator, as well as a research assistant, will have access to the information you provide. Information may also be shared with those who make sure the study is done correctly (Georgia State University Institutional Review Board and the Office for Human Research Protection). We will use a coded study number in place of your name on study records. The information you provide will be stored electronically on a firewall and password-protected computer. Your code identification will be kept in a separate, password-protected file. Your name and other data that may associate you with this study will not appear when we present this study and publish its results. The findings will be summarized and reported in group form. You will not be identified personally.

VI. Contact Persons:
You may contact any of the researchers conducting this study at any time.

Contact information:
Catrina Jones, cjones183@student.gsu.edu, (678) 592-1619
Dr. Danny Bellenger, dbellenger@gsu.edu, (404) 401-2424

If you have questions or concerns about your rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at (404) 413-3513 or svogtner@gsu.edu.

VI. Copy of Consent Form to Subject:
We will provide you a copy of this signed consent form for your records.

If you are willing to voluntarily participate in this research study, please sign below:

Participant _____ Date: _____

If you decline to participate in this research study, no further action is requested. Thank you for your time and consideration.

Exhibit E-2: Contact Summary Form

Contact Summary Form

Contact Date: _____

Contact Name: _____

Site: _____

Contact Phone: _____

Written by: _____

1. What were the main issues or themes that struck you in this contact?

2. Summarize the information you got (or failed to get) on each of the target questions you had for this contact.

Question Category	**Summary Response**
Organizational contexts and processes	
Portfolio selection	
Dealing with uncertainty and complexity	
Individual portfolio decision aspects	
Organization and individual goals	

3. Anything else that struck you as salient, interesting, illuminating or important in this contact?

4. What new (or remaining) target questions do you have in considering the next contact with this site?

Exhibit E-3: Email Invitation

Dear [Manager]:

You are invited to participate in a research study that will explore the portfolio decision making of managers within a pharmaceutical firm during a merger. As a manager, you are in an ideal position to provide insights from your own experiences.

This study will involve an interview of approximately 9 questions consisting of sub-questions. The interview is informal and will take approximately 45-60 minutes of your time. We are simply trying to capture your experience as a portfolio decision-maker. Your responses to the questions will be kept confidential. Each interviewee will be assigned a number code to help ensure that personal information is not revealed during reporting.

Your participation in this study is completely voluntary. If you feel uncomfortable answering any questions, you may withdraw at any time. There is no compensation for participating in this study. However, your participation will be a valuable addition to our research and the findings could lead to greater understanding of portfolio management in the context of a merger.

If you are willing to participate, please suggest a day and time that best suits you and I'll do my best to be available. If you have questions at any time about the interview and its procedures, you may contact Catrina Jones at the email address specified below.

Thank you very much for your time.

Sincerely,
Catrina Jones
Doctoral Candidate, Georgia State University
cjones183@student.gsu.edu

APPENDIX F

Exhibit F-1: Pre- and Post-Merger Firm Performance

Firm	Pre-Merger Revenue	%Growth or Decline in Post-Merger Revenue (range)	Post-Merger Firm Performance (in terms of overall revenue)
PharmaAlpha I	<$10B	<30%	Growth
PharmaAlpha II	<$10B	>30%	Growth
PharmaBeta	<$10B	>30%	Growth
PharmaGamma	>$10B	> 30%	Growth
PharmaDelta	<$10B	<30%	Growth
PharmaZeta	>$10B	>30%	Decline
PharmaETA	>$10B	>30%	Decline
PharmaTheta	>$10B	<30%	Decline
PharmaIota	>$10B	<30%	Decline
PharmaEpsilon	>$10B	<30%	Decline

VITA

Catrina Marie Jones was born in Saginaw, Michigan, where she worked as a research co-operative student at Dow Corning Corporation while attending high school. Upon graduation, Catrina traveled to Atlanta, Georgia to receive her Bachelor of Science in Chemistry from Spelman College. Catrina returned to the Midwest to work at DuPont Automotives as a research technician. After marrying, she returned to Georgia to work at Novartis Pharmaceuticals Corporation. During her 8-year tenure there, she obtained an M.B.A from Keller Graduate School of Management. After holding positions in R&D for 13 years, Catrina transitioned to a career in portfolio management consulting, a role she has been performing for the past 7 years.

Catrina maintains certifications as a PRINCE2 Practitioner, Project Management Professional (PMP), SCRUM Master, and Six Sigma Black Belt from the Institute of Industrial Engineers. Catrina co-authored a publication for the Journal of Banking Regulation with 2 of her cohorts and dissertation chair titled "*Did Dodd–Frank miss the mark? Financial experts' and regulators' perspectives on resolution plans."*

Married since 1996, Catrina resides in Suwanee, Georgia with her husband and two children.