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Organizational Strategy Under Institutional Pluralism: A Latent Variable Analysis Of Institutional Effects On Organizational Behavior In The United States Pharmaceutical Industry

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ORGANIZATIONAL STRATEGY UNDER INSTITUTIONAL PLURALISM: A LATENT VARIABLE
ANALYSIS OF INSTITUTIONAL EFFECTS ON ORGANIZATIONAL BEHAVIOR IN THE UNITED
STATES PHARMACEUTICAL INDUSTRY

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ABSTRACT

The United States pharmaceutical industry is a dynamic organizational system populated by organizations pursuing different strategies to reach different goals. The aim of this dissertation is to examine the organizational field of the pharmaceutical industry to determine if categories of pharmaceutical organizations exist based on organizational strategy. This project applies the theoretical constructs of organizational fields and institutional logics developed by institutional theorists to examine the institutional effects on organizational strategies. This is a mixed methods project using historical analysis, latent class analysis, and case studies to evaluate the drug development process. The findings of this study show field level institutions do affect organizational strategy and contribute to organizational diversity within a field. However, the findings suggest the influence of institutional logics is neither straightforward nor without organizational costs. The general findings of my research show organizations benefit when their dominant logic aligns with the dominant logic of the field; while, misaligned logics require organizations to pursue alternative tactics to legitimize their strategies.

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LIST OF ABBREVIATIONS

| | |
|-------------|--|
| ACCME | Accreditation Council for Continuing Medical Education |
| ADR | Adverse Drug Reaction |
| AMA | American Medical Association |
| ANDA | Abbreviated New Drug Application |
| ATC..... | Anatomical Therapeutic Chemical |
| BLA..... | Biologic License Application |
| DTCA | Direct to Consumer Advertisement |
| FDA..... | Food and Drug Administration |
| FTC | Federal Trade Commission |
| HMO | Health Maintenance Organization |
| KOL | Key Opinion Leader |
| NDA..... | New Drug Application |
| NME..... | New Molecular Entity |
| OTC..... | Over-the Counter |
| PBM | Pharmacy Benefits Manager |
| PDUFA | Prescription Drug User Fee Act |
| PAO..... | Patient Advocacy Organization |
| SEC | Securities and Exchange Commission |
| SIC | Standard Industrial Classification |
| WHO..... | World Health Organization |

CHAPTER 1

INTRODUCTION

Several highly publicized events have raised public concern over organizational practices within the United States pharmaceutical industry during the past few years. One of the most recent incidents was the accusation of price gouging by executives at Turning Pharmaceuticals last fall (Ramsey 2015); however, the practice of acquiring the patent rights on a drug and then raising the drug's price to generate profits is not uncommon. In 2011, Gilead spent \$11 billion to acquire Pharmasset Inc., a small biotech company started by researchers at Emory, for the intellectual property rights to the hepatitis C drug it was currently testing (Tirrell 2011). Gilead currently prices Sovaldi, the brand name of the approved hepatitis C drug, at approximately \$84,000 for a 12-week treatment course (Express Scripts 2015). Gilead publically argued the high cost of the drug was due to the high cost of research and development; however, the available information on Pharmasset Inc. indicates the research cost for developing Sovaldi up to phase II clinical trials was only between \$300 and \$500 million (Sachs 2015).

The Sovaldi case reveals two reasons behind the high cost for prescription drugs in the United States (1) market factors of speculation and (2) pharmaceutical corporations acting strategically in pursuing organizational goals. As a small research company, Pharmasset Inc. lacked the organizational capacities of a large multinational corporation, such as Gilead, to manufacture and mass market a product. Pharmasset approached Gilead in 2004 with a buyout offer after the compound for Sovaldi had been developed

but prior to the completion of clinical testing. However, rather than make an offer significantly lower than the eventual purchase price, Pharmasset's founder and largest stock holder quoted \$400 million as an acceptable offer at the time, Gilead waited until clinical trial data showed Sovaldi was a marketable product before making the acquisition bid (Berkort 2011).

This example indicates the United States pharmaceutical industry is a dynamic organizational system populated by organizations pursuing different strategies to reach different goals. The aim of this dissertation is to examine the organizational field of the pharmaceutical industry to determine if categories of pharmaceutical organizations exist based on institutionalized organizational strategy. This project applies theoretical constructs developed by institutional theorists to examine how expectations from different stakeholders create organizational fields of institutional pluralism legitimating multiple organizational strategies.

Institutional theory research in organizational studies seeks to understand organizational behaviors within the broader cultural context of a society. Key areas of work within the theory are the institutional logics perspective and organizational fields. The institutional logics perspective argues organizations align with societal logic orders, whereby it is possible to identify which logic order dominates an organization's strategy. The organizational field is an analytical tool for evaluating how actors outside an organization influence organizational behavior. Organizational field researchers examine power relations to identify key stakeholders and the methods employed externally that influence organizational strategy.

Drawing from an historical analysis and prior organizational research, I argue that the organizational field of the pharmaceutical industry in the United States is composed of several key stakeholders: pharmaceutical corporations, the federal government, third party payers, professional medicine, and patients. These stakeholders coexist in an interdependent system with varying levels of power that allow certain stakeholders influence over other stakeholders and the ability to shape field structure. Drawing from the institutional logics perspective, I propose that these stakeholders adhere to different logic orders, which results in an organizational field of institutional pluralism that legitimates multiple organizational strategies.

I use a mixed methods approach to evaluate my propositions by conducting three distinct research projects. First, following the recent work of Neil Fligstein and Doug McAdam (2012) that sought to develop a cohesive field theory approach for institutional analysis, I conduct a historical analysis of the United States pharmaceutical industry. The purpose of the historical analysis is to show that the pharmaceutical industry is a distinct organizational field and to examine the changing field dynamics to identify the logic orders and key stakeholders in the current field. The second project is a quantitative analysis using a dataset of information on approved new drug applications by the Food and Drug Administration and annual corporate financial data from a sample of pharmaceutical corporations between 1997 and 2014. The purpose of the quantitative analysis is to examine the sample of pharmaceutical corporations for latent classes and determine if the identified factors of organizational strategy act as mechanisms creating organizational heterogeneity within the field. The final research project is four case studies drawn from the classes identified through the latent class analysis. The main

purpose of the case studies is to evaluate if differences in organizational strategy can explain class separation. The second purpose of the case studies is to compare the identified organizational strategies with the framework of institutional logics to evaluate if logic orders differ between classes.

This dissertation is organized around these three research projects. Chapter 2 presents an overview of institutional theory in organizational studies. I review the literature on the specific components of the theory that are relevant to my work and list the guiding questions of the project as well as the more detailed theoretical propositions that I evaluated. Chapter 3 examines the major contemporary stakeholder relationships in the pharmaceutical industry. Since this project was focused on pharmaceutical organizations, I restricted my analysis to the direct relationships between pharmaceutical organizations and the other main stakeholders in the field: the Food and Drug Administration, professional medicine, patients, and the pharmaceutical supply chain. Chapter 4 is the historical analysis. In this chapter, I present evidence showing the pharmaceutical field developed as the result of distinct historical events and collective action by the key stakeholders mentioned above. The changing field dynamics over the past century indicate the field structure was continually reshaped by external factors and altering power relationships in way that allowed multiple organizational strategies to emerge.

Chapter 5 is the quantitative analysis of the drug submission and corporate financial data. I use factor analysis to evaluate the data for latent constructs that can be identified as organizational strategies. I use the identified strategies to build a structural equation model that represents a coherent latent strategic framework within the field. The

final model provides the variables used to conduct a latent class analysis that reveals two organizational categories.

Chapter 6 is four cases studies, two from each latent class. Analysis of the case studies provides contextual data on the specific organizational strategies of organizations in each class. The qualitative data indicates the dominant institutional order of organizations differs between classes, but that this difference is not the sole factor driving class separation. The final chapter is a comprehensive evaluation of the historical, quantitative, and qualitative data. My central conclusion is that institutional effects do result in divisions within the field based on latent organizational strategy; however, it is the processes of legitimation, rather than logic orders, which drive organizational subgrouping in the field.

This project provides several contributions to the organizational studies literature. One contribution is a novel approach to mixed-methods analysis that addresses the challenge institutional theorists face in measuring institutional effects (Greenwood et al. 2014, Schneiberg and Clemens 2006, Scott 2014, Thornton et al. 2012). Bazeley's (2015) review of mixed methods research published in the top organization and management journals revealed that most previous work utilizes a priori qualitative analyses to inform the direction of quantitative research. This introduces the potential of selection bias if the observed differences are not causal to the category separation. For this project, I sought to reverse the common practice by using a quantitative analysis to direct the qualitative analysis. Rather than relying on a priori indicators of institutional orders, I sought to evaluate if a latent class analysis would indicate existing subgroups within the field using common organizational practices as indicators. This methodology

aligns with the conceptual approaches proposed by researchers in the strategy-as-practice literature (Vaara and Whittington 2012).

Another contribution to the literature is that this study addresses the issue recently raised by Greenwood et al. (2014) that current organizational research focuses primarily on the construction and maintenance of institutions rather than how institutions actually effect organizations. Recent scholarship in the field of family business has illustrated how the intersection of family and market institutions directly effects organizational strategy in family firms, creating strategies that differ from publically traded companies (Cannella et al. 2015, Gomez-Mejia et al 2011). While these studies in family business cut across industry categories, my project adds to the literature by exploring the effects of institutional pluralism on organizations within the same industry.

The findings of this study show institutions do affect organizational strategy and contribute to organizational diversity within a field. The data indicate common organizational practices do form coherent and divergent organizational strategies within a field. However, the findings also suggest the influence of institutional logics is neither straightforward nor without organizational costs. The general findings of my research show organizations benefit when their dominant logic aligns with the dominant logic of the field; while, misaligned logics require organizations to pursue alternative tactics to legitimize their strategies.

CHAPTER 2

INSTITUTIONAL THEORY AND ORGANIZATIONAL STUDIES

2.1 Introduction

Sociologists argue that institutions are pivotal social phenomena that have multidimensional effects on society; but institutions are latent constructs, which complicates research seeking to understand their affects (Berger and Luckmann 1967, Parsons 1980, Scott 2014, Weber 1978). Institutional theory is a branch of organizational studies that focuses on analyzing institutional effects on organizations. The broad goal of institutional theory is to understand how institutional effects produce similarities or facilitate differences between organizations in the same environment. Through the application of institutional theory as a framework for analysis, previous researchers have gained valuable insights on organizational processes and structures (DiMaggio 1991, Rao et al. 2003, Scott et al 2000). Moreover, recent developments and studies using institutional theory indicate the theory continues to hold value for future work (Greenwood et al. 2014, Powell and Sandholtz 2012, Quirke 2013).

The goal of this project is to explore if institutions influence the strategy of pharmaceutical corporations. Institutional frameworks become incorporated into organizational fields through stakeholder evaluations and expectations, and differences in stakeholder power can lead to contradictions within a field as organization's struggle to develop a consistent strategy to meet competing demands (DiMaggio 1991, Scott et al 2000). The pharmaceutical industry in the United States is an organizational field with

competing institutional frameworks where multiple stakeholders hold different interests in the outcomes of pharmaceutical research and on the behaviors of pharmaceutical corporations.

Organizational strategy is one element of organizational behavior theoretically subject to institutional effects. I choose to focus on organizational strategy because unlike other aspects of organizational behavior, such as informal organizational culture, strategy is constrained by the basic functions of an organization. The basic practice of a research based pharmaceutical corporation is to develop marketable drugs that are advancements over current treatments to improve patient lives. Since research based pharmaceutical organizations operating in a capitalist market need to meet this expectation for survival, identifying strategies used to achieve this goal provides a good source of material for examining institutional effects. My central question is that if different institutional logics exist within the organizational field and provide legitimacy to a range of strategies, then will pharmaceutical corporations adopt different strategies of drug development or is there a dominate institutional framework creating isomorphic pressure to adopt strategy. As an exploratory project, I constructed two guiding questions drawn from the literature to serve as the general frameworks of the analysis.

Question 1: Do multiple institutional logics exist in the pharmaceutical organizational field and serve as potential sources of legitimacy for different organizational strategies?

Question 2: Is pharmaceutical development an interorganizational¹ negotiation between field stakeholders whereby strategic action by pharmaceutical

¹ The term interorganizational denotes organizational processes that require organizations to cooperate, collaborate, or interact directly to achieve a desired outcome at either the firm or organizational field level.

corporations is necessary to address the claims of the other stakeholders in the field: regulators, physicians, patients, and investors in order for a new product to be successfully legitimized and adopted?

These questions frame my central arguments as an institutional analysis project and position pharmaceutical corporations as the site of evaluation within the organizational field. From these general questions, I develop two sets of specific theoretical propositions, presented later in the chapter, to evaluate the quantitative and qualitative data collected.

The counter argument to institutional theory is that organizational strategy results from the aggregate of individual choices; therefore, similarities between organizations are the result of market constraints or opportunities specific to industry and organizational types but not attributable to latent conceptual frameworks. The organizational environment affects strategy through options for action presented to managers following rational decision-making processes not influenced by ideological trends or culture (March 1988). Organizational success or failure, then, depends on the ability and skills of organization members over normative evaluations by outside stakeholders. This framework for organizational studies treats organizational strategy as calculated and impersonal but this stance is problematic because organizations are composed of individuals who bring differing perceptions and connections with the social world into the organization (Meyer and Rowan 1977, Selznick 1949). Even within the same

For example, the interaction between the FDA and a pharmaceutical corporation seeking approval for a new drug is an interorganizational situation.

company, the rational decision of one manager might not be viewed as rational by another manager.

The embeddedness of individuals within culture implies that broader social ideologies become incorporated into organizations; therefore, the perspective of organizational strategy as constructed by aggregating individual choices is rather sterile. Institutional theory offers a framework for explaining organizational strategy that recognizes the complexity of interactions between individuals, organizations, and society and provides the tools for analyzing how similarities between organizational strategies can result from societal level forces outside of the individual's direct perception. This chapter provides a brief history on institutional analysis in organizational studies and discusses the contemporary theoretical concepts from institutional theory applied to explore organizational strategy in the U.S. pharmaceutical field.

2.2 Early Perspectives in Institutional Analysis and Organizational Studies

Institutional analysis is fundamental to the discipline of sociology and a topic discussed by many classical theorists. Emile Durkheim reified institutions as social facts reflecting collective understanding and affecting individual behavior. In the preface to the second edition of *The Rules of Sociological Method*, he advocated institutional analysis as central within the discipline writing, "sociology can then be defined as the science of institutions, their genesis and their functioning" (1981: 45). Max Weber contributed the process of rationalization and ideal types to institutional analysis while additionally recognizing the interdependent quality of their relationship with society (1978). Weber's detailed analysis of bureaucratic structure and authority systems was foundational to multiple branches of organizational studies (Perrow 1986). The work of Karl Marx

demonstrated a multilevel institutional analysis between capitalist economies, organizations, and workers (Adler 2009). Finally, Scott (2014) noted Herbert Spencer's application of an organic framework to social systems, highlighting the concept of interdependence between systems components, as seminal to understanding modern sociological work on institutions.

Later scholars in the 20th century appropriated these classical insights on institutions within their research agendas and began focusing on the institutional analysis of organizational behavior. Talcott Parsons (1980) integrated the concepts of Weber and Durkheim to develop his functional perspective that highlighted institutionalization as a key force creating and maintaining social order and solidarity. His AGIL model, based on functionality within a system, proposes organizational behavior develops from a link between functional requirements and structural arrangements. Berger and Luckmann (1967) incorporated institutionalization into their broad perspective on the social construction of reality, arguing that institutions act as elements of social control by shaping individual perception and knowledge through channeling conduct in predetermined directions. Organizational strategy then is viewed a product of pre-existing cultural expectations. Parsons' and Berger and Luckmann's conceptualizations on institutionalization framed institutions as macro-level elements for analyzing the construction of social structure and how organizations are integrated into societies.

Other modern theorists incorporated the institutional perspectives of classical scholars into their frameworks for understanding organizations as units of analysis. Philip Selznick was one of the most important figures in the early school of institutional analysis (Scott 2014). Selznick's (1949) classic study on the Tennessee Valley Authority

proposes organizations can become institutionalized through a “process of organic growth, wherein the organization adapts to the strivings of internal groups and the values of the external society” (Perrow 1986: 167). Selznick’s work, and that of his students, demonstrated that while organizations hold formal and official goals, interactions with interests internal and external to the organization result in organizations being guided by objectives other than those officially promoted (Scott 2014). Organizational strategy then, instead of being merely a means to an end can become the end in itself when organizational behavior becomes oriented to self-sustainment.

The work of James March and Herbert Simon (1958) represents another important branch of organizational studies. March and Simon focused on the decision-making process within organizations and, following Weberian thought, attempted to incorporate rationalization into their explanations of organizational strategy (Perrow 1986). Their work focused on how organizational structure simplified decision-making for individuals by restricting the number of appropriate choices. The “garbage can” model is their well-known concept of organizational strategy and argues solutions are generated every day and stockpiled, thrown in the garbage can. When managers encounter problems, rather than delegating employees to find a solution, they pull a pre-existing solution out from the garbage can. The “garbage can” model represents the most significant contribution of March and Simon’s work, the application of bounded rationality to organizational strategy, that lead to richer analytical techniques for empirically analyzing the allocation of attention in organizations (March 1988, Scott 2014).

Another pivotal contribution of Selznick, March and Simon, and their contemporaries was expanding the field of organizational research by reframing

organizations as open systems as opposed to previous scholars who analyzed organizations as closed entities. This development allowed researchers to incorporate non-organizational factors from the external social environment into explanations of organizational behavior. An example of later work drawing on these developments is Paul Hirsh's (1975) comparative study between the phonograph record industry and pharmaceutical manufacturing, which demonstrated the ability of organizations to control aspects of their external environments that affect profitability. Importantly, Hirsh (1975) showed how these external factors could be products of social construction, such as the social prestige of the industry, in addition to technical or material factors. His findings indicated organizations within each industry developed similar strategies while the strategies were different between industries.

Some critics of these early open system researchers, however, pointed out their work was still focused on explaining organizational strategy from the point of individual organizations instead of considering organizational strategy as a product of collective behavior. For example, Selznick's research on the TVA was viewed as typical of the exposé style research conducted by early institutionalists (Scott & Davis 2016). Perrow (1986), for instance, criticized the early institutional school for this, stating the "school's view of organizations and society fails to connect the two" (173). This line of criticism paved the way for the development of three notable theoretical frameworks in the 1970s: resource dependency, population ecology, and institutional theory, which sought to address the complex interdependent relationship between organizations and their environments by analyzing multiple organizations to find patterns of behavior.

2.3 Neoinstitutional and Institutional Theory in Sociology

Contemporary institutional theory is a field of organizational studies that frames organizations as open systems embedded within the larger social structure of a society. The value institutional theory adds to organizational studies is the understanding that cultural factors, such as differences in power relations between stakeholders, impact organizational strategy on multiple levels by affecting individual perceptions of legitimate organizational activities and goals, the role of organizations within society, and the social structure supporting or constraining organizations (DiMaggio 1991, Fligstein 1991). Institutional theorists seek to understand how institutions and institutional processes in the organizational environment collectively affect organizations instead of focusing on explaining behaviors as firm specific behaviors (Scott 2014).

2.3.1 Early Works and Theoretical Cohesion

The origins of contemporary institutional theory lie in four studies conducted during the late 1970s and early 1980s. While these four articles overlap conceptually, they were not written intentionally as a cohesive collection for an emerging theoretical paradigm. They are now considered the foundational works of the “new institutionalism in organizational analysis” not only because of their direct influence on subsequent work but because DiMaggio and Powell (1991) grouped them together as the first section of their edited volume intended to delineate neoinstitutionalism as a distinct research paradigm. As DiMaggio and Powell pointed out in the introduction to their anthology, one of the needs for the book was to distinguish and consolidate sociological institutionalism from the institutional work of scholars in other disciplines. To facilitate this goal, they categorized work beginning with Meyer and Rowan’s 1977 article

“Institutionalized Organizations: Formal Structure as Myth and Ceremony” as new institutionalism, or neoinstitutionalism, while older work was labeled old institutionalism.

However not every scholar accepts that there is a theoretical distinction between old and new institutionalism. Philip Selznick (1996), who DiMaggio and Powell labeled as a prominent old institutionalist, notably objected to this categorization scheme and instead argued the work of current institutionalists represented the expansion and development of sociological institutionalism in general not the emergence of a distinct research paradigm. While there continues to be scholarly debate between the demarcation of the terms new institutionalism and neoinstitutionalism, the work of sociologists in institutional theory since these early papers has become theoretically cohesive and recognizable as a distinct research field within organizational studies in general (DiMaggio and Powell 1991, Hall and Taylor 1996, Tolbert and Zucker 1996, Scott 2014). I agree with Selznick’s point that the term neoinstitutionalism is a semantic distinction rather than the demarcation of a novel theoretical field, so I use the general term institutional theory throughout this project to represent the collective work within this branch of organizational sociology.

The first pivotal article of institutional theory is the classic paper by John Meyer and Brian Rowan (1977) who departed from existing organizational research paradigms by emphasizing how organizations were guided by both informal (symbolic) and formal (rational) properties. Meyer and Rowan’s research revealed that the importance organizations place on symbolic value could extend to an organization adopting an institutionalized practice even if it decreased operational efficiency. At the same time, organizations can engage in the processes of decoupling, which is the public adoption of

a practice without implementing it. Decoupling provides organizations with a crucial advantage because it “enables organizations to maintain standardized, legitimating, formal structures while their activities vary in response to practical considerations” Meyer and Rowan (1977: 357). Meyer and Rowan framed institutionalism as a social mechanism external to the organization and functioning as a rational myth that generated isomorphism, organizational uniformity, within the organizational environment. “Institutionalization involves the processes by which social processes, obligations, or actualities come to take on rulelike statuses in social thought and action” (Meyer and Rowan 1977: 341). In other words, organizations will adopt practices because of normative pressures to avoid the social label of a deviant or non-adopter.

Tolbert and Zucker (1996: 178) derived three major effects Meyer and Rowan’s article had on research at the time connecting organizational behavior to institutions: organizations are driven to adopt formal structures regardless of their efficacy to increase legitimacy and survival, the social evaluation of an organization is partially an evaluation on the appropriateness of the organizations formal structure, and the relationships between daily activities and formal structure may be negligible or “loosely coupled.” Meyer and Rowan’s (1977) work represented a key departure from other organizational studies by focusing on the impact of symbolic structures in organizational behavior and moving organizational studies beyond analyzing organizations individually to analyzing organizations as embedded in relational networks.

The second important article on institutionalization is by Lynne Zucker (1977), who was a student of Meyer’s (Scott 2014). Zucker (1977) drew on the then recent developments in ethnomethodology to develop a micro-level understanding of

institutionalization as a process that she tested in a laboratory experiment. Zucker (1977) argued institutionalization was a process of objectification involving three aspects of cultural persistence: transmission, maintenance, and resistance to change. The importance of Zucker's (1997) work was in operationalizing institutionalization as a measurable property and reframing institutions as a variable of degrees, rather than a binary event. Assessing institutional effects through a continuum allows researchers to study how institutions produce differences between organizational strategy rather than treating institutional effects as uniformly homogenizing. In her later work, Zucker developed an expanded model of the institutionalization process that included innovation, habitualization, and sedimentation as additional components to objectification (Tolbert and Zucker 1996).

One of the most well cited and influential articles of institutional theory (and the only work of institutional theory I've seen covered in an introductory sociology textbook) is Paul DiMaggio and Walter Powell's (1983) article on institutional isomorphism. DiMaggio and Powell elaborated on the macro level nature of institutional effects on organizational strategy by arguing institutions act as isomorphic factors on firms. They defined three mechanism of institutional isomorphism: coercive, mimic, and normative. Coercive isomorphism occurs through external acts of regulation. Mimic isomorphism is the result of uncertainty resulting in organizations adopting the practices of successful organizations to deal with ambiguity. Finally, normative isomorphism is the result of cultural affects, primarily stemming from professionalization. Together these pressures operate to create organizational homogeneity.

In their seminal work on institutional isomorphism, DiMaggio and Powell also proposed the concept of organizational fields as a framework for the institutional analysis of organizations. Organizational fields are defined as “those organizations that, in aggregate, constitute a recognized area of institutional life: key suppliers, resource and product consumers, regulatory agencies, and other organizations that produce similar services or products” (DiMaggio and Powell 1983:148). The utility of the organizational field framework for organizational studies is that framing organizational analysis around an issue or process, as opposed to organizational types, reveals a wider range of environmental factors and actors affecting organizational decisions; furthermore, the organizational field framework underscores the need to consider historical context when evaluating organizational behavior. As Scott (2014: 51) nicely summarized, “Organizational fields help to bound the environments within which institutional processes operate.”

The fourth foundational article is Richard Scott and John Meyer’s (1983) work “The Organization of Societal Sectors.” In this article, Scott and Meyer proposed a framework for the institutional analysis of organizations that was similar to DiMaggio and Powell’s (1983) organizational field. Scott and Meyer created a typology perspective arguing both technical and institutional forces shaped organizations and then proposed the concept of societal sectors to understand this dynamic system. Societal sectors were “defined to include all organizations within a society supplying a given type of product or service together with their associate organizational sets: suppliers, financiers, regulators, and so forth” (Scott and Meyer 1983: 129). Like the organizational field framework, the

boundaries of societal sectors were functional, signifying that organizations operated in interdependent systems not limited by geographic proximity (Scott and Meyer 1983).

2.3.2 *Further Cohesion and Contemporary Directions*

Several scholars since Powell and DiMaggio's (1991) first attempt at consolidation have developed other metatheoretical frameworks for institutional theory. Richard Scott's three pillars is one well-known model utilized by researchers to study institutional effects on organizational strategy. Scott (1995, 2001, 2014) originally proposed the three pillars almost 20 years ago as a method to integrate the major concepts in institutional theory and since then has adapted and modified the framework to incorporate developing research and criticisms. The basic argument of Scott's framework is that all institutions use the same set of processes to construct social structure and three pillars categorize these processes: regulative, normative, and cultural-cognitive. These pillars are similar to the three isomorphic mechanisms identified by DiMaggio and Powell (1983) but the pillars framework defines each pillar through multiple dimensions as an analytical approach for evaluating the distinct processes that lead to the construction of organizational strategy and the effects of institutional intersections on organizations.

The *regulatory pillar* gives prominence to the explicit regulatory processes of an institution (Scott 2014). Organizational research applying the regulatory pillar focuses on the rules, laws, and sanctions institutions impose and frames the logic of such institutions as instrumental, or technical. Differences in power are important factors to measure because coercion is the dominant mechanism of regulatory institutions. The *normative pillar* focuses on how institutions construct rules and procedures as a relationship to

social obligations (Scott 2014). The normative framework evaluates organizational strategy as the result of appropriateness and organizational legitimacy is tied to moral assessments made by actors within the institutional system. The *cultural-cognitive pillar* stresses how institutions create meanings through shared conceptions of social reality (Scott 2014). Orthodoxy is the cultural-cognitive mechanisms used to generate compliance suggesting organizational strategy is the result of normative pressures because deviant actions are simply inconceivable by decision-making actors within organizations.

While distinctive features define the three pillars, Scott argued that “in most empirically observed institutional forms, we observe not one, single element at work but varying combinations of elements” (2014: 70). The three pillars framework views specific institutions as composed of elements from all the pillars but Scott pointed out current institutional analysis research tends to focus on explaining institutions through only one pillar, which one varies by discipline and researcher interest. This is a significant component of the framework because the misalignment of these pillars within an organizational field can generate contradictions and conflicts leading to institutional change (Scott 2014). The three pillars framework is a valuable analytical tool for institutional analysis and studying institutional effects on organizations but it is not as efficient for studying organizations subject to competing institutional claims, referred to as situations of institutional pluralism. The institutional logics perspective is a metatheoretical framework that better addresses the development of organizational strategy under institutional pluralism.

The origin of the institutional logics perspective is the article written by Roger Friedland and Robert Alford (1991) for Powell and DiMaggio's (1991) anthology (Thornton et al. 2012). The article was a theoretical departure from the other works in the book and proposed a logic of institutions framework that, while not immediately taken up by other scholars, has become an important and distinct perspective within institutional theory over the past decade (Thornton et al. 2012). Friedland and Alford (1991:248) defined an institutional logic as "a set of material practices and symbolic constructions which constitutes its organizing principles and which is available to organizations and individuals to elaborate." This conceptualization of institutions departed from the contemporary perspectives by arguing that institutions were limited to a core societal level set and that institutions encompassed material practices as well as symbolic systems.

The most important aspect of the institutional logic perspective is the conceptualization of society as an interinstitutional system, meaning that the institutions within any given society are interdependent with one another and change subject to historically contingent affects (Thornton and Ocasio 2008, Thornton et al. 2012). Conceptualizing society as an interinstitutional system shifts the focus of analysis from institutions as having homogenous effects on organizational strategy to analyzing differences in organizational strategy as emerging from contradictions between institutional orders (Thornton and Ocasio 2008). Instead of being subject to the effects of a singular institutional order, organizations are reframed as affected by multiple institutional orders, placing them in positions of institutional pluralism; however, organizations are argued to align more strongly with one logic order over the others,

resulting in the ability to categorize individual organizations by a dominant logic. Differences between institutional orders result in conflicts at the organizational level and produce heterogeneity within an organizational field because the salience of each logic order varies between organizations and because organizations possess partial autonomy that allows for organization in the same field to pursue dominant organizational strategies aligned to different logics.

The concept of partial autonomy addresses how organizations negotiate institutional contradictions. As Thornton et al. (2012) stated individuals and organizations assume multiple roles and identities in society that can lead to contradictions between identity and behavior. The concept of partial autonomy originates in the earlier work of Meyer and Rowan (1977) on decoupling and proposes that while institutions constrain actors, this constraint operates as a mechanism of degree providing actors with the ability to loosely couple, or decouple, their identity from their behavior to negotiate contradictions. Congruently partial autonomy also allows for organizational heterogeneity because actors subject to the same competing institutional pressures have the ability to respond differently. The institutional logics perspective is a valuable expansion of institutional theory for conducting an organizational analysis in a complex system because it departs from the earlier emphasis on the uniform effects of institutions while still incorporating the significance of culture in affecting organizational strategy.

In summary, institutional theory has become a dominant paradigm in organizational sociology (Scott 2014, Scott and Davis 2016, Thornton et al. 2012). Core components include the recognition that symbolic and cultural mechanisms impact organizations in multiple ways, that organizations are not isolated entities but embedded

in complex interdependent systems, and that the effects of institutions operate on multiple social levels with differing strengths between organizations in the same environment. The remainder of this chapter focuses on the following four concepts within institutional theory: institutions and institutionalization as a dynamic social process, organizational fields as a level of analysis, legitimacy as a symbolic mechanism guiding organizational behavior, and organizational decisions as strategic actions shaped by the cognitive framework of institutional orders.

2.4 Institutions and Institutionalization

This project is an institutional analysis, which requires me to identify measurable factors of institutional effects. It is difficult to measure institutions primarily because they are latent social constructions. The difficulty of the task is compounded by the fact that while institutions are a basic concept in sociology, researchers do not use a uniform definition for the term nor is the scholarly usage of the concept consistent (Abrutyn 2014, Clemens and Cook 1999, Hall and Taylor 1996, Jepperson 1991, Scott 2014, Thornton et al. 2012). Therefore, it is necessary to review the various definitions of institutions and institutionalization used in previous organizational studies and develop a definition of institutions for this study that allows me to address the issues set forth in the guiding questions.

2.4.1 Conceptualization of institutions in Early Institutional Theory

In general institutional theory in organizational studies adheres to a constructionist frame of institutions as macro level social forces external to the organization that affect organizational behavior through cognitive-cultural mechanisms which both constrain and construct perceptions of normative processes and structures of

action. The constructionist perspective of institutions in institutional theory originates from the work of Berger and Luckmann (1967). They stated institutions were the result of habitualized actions that become typified through reciprocation in social interaction; this conceptualization frames institutions as predetermined patterns of behavior that are historically contingent and mechanisms of social control (Berger and Luckmann 1967).

Institutionalization is a process of social interaction because many habits develop in society but not all habits become institutions; institutionalization occurs only when a habit becomes objectified (Berger and Luckmann 1967). Objectification is a state where participants conceive of the action reflexively and when society members who are not participants in the interaction recognize the habit (behavior) as distinct from the individuals engaging in the activity. An institution then is a social mechanism external to and coercive of the individual through normative processes (1967:58). The example Berger and Luckmann (1967: 58) use to explain their concept is paternity. Paternity is institutionalized because when a man states he is the father of a child, members within the society who are strangers understand the meaning and associated role of that claim.

Ronald Jepperson's (1991) article in Powell and DiMaggio's anthology takes Berger and Luckmann's concept as a starting point for consolidating the various definitions of institutions used in the institutional theory literature up to that point. Jepperson's article is now widely cited in the field as providing the definitive conceptualization of an institution. According to Jepperson (1991), the core definition of an institution is "an organized, established, procedure" (143) where "routine reproductive procedures support and sustain the pattern" (145). Jepperson provides a list of common

institutions in society ranging from social abstractions, for example marriage, to specific behaviors, for example a handshake.

There are several key conceptual ideas behind Jepperson's varied list about how institutions should be defined and measured by researchers. First is "whether we consider an object an institution depends upon what we are considering to be our analytical problem" (Jepperson 1991: 146). Operationalizing institutions around the research question frames them as relative constructs existing within a specific context; therefore, an institution can be more than a binary state, an institution can be dimensional relative to the framework of analysis, as Zucker (1977, 1991) argued. Another key point is that because institutions are macro level structures they "are not reproduced by 'action,' in this strict sense of collective intervention in a social convention" (145), rather Jepperson argued that taking action is a departure from institutionalized behavior. As normative constructs within social structure, institutional reproduction occurs through conformity that makes action a deviation from expectations.

Jepperson (1991) viewed theoretical conceptions of institutions that defined institutions primarily as taken-for-granted structures as problematic because the concept taken-for-granted was ambiguous and framed institutions as background elements rather than dynamic phenomena. Institutions do not just constrain actors; they also empower actors creating a constraint/freedom duality. Jepperson stated institutions possess a taken-for-grantedness that is distinct from comprehension, conscious awareness, and evaluation: "Institutions are taken for granted, then, in the sense that they are both relative fixtures in a social environment and explicated (accounted for) as functional elements of that environment" (1991:147). Institutions are taken-for-granted macro-level

structures, but this is not their defining property; institutions create opportunities for actions by providing alternative paths. These alternative paths are actions that have not been institutionalized. Within organizational studies Jepperson noted rules and cognitive frameworks are considered the basic elements of institutional effects but cautioned on measuring institutions as property variables for legitimacy, formal organization, and context since determining causality is problematic because institutions do not operate solely as top-down mechanisms. This last viewpoint reflects the process of institutionalization discussed by Berger and Luckmann (1967) that individual habits can diffuse through society from bottom-up processes to become institutions.

Zucker (1977) pointed out a key factor of institutions in organizational studies is how institutions persist even if they are suboptimal. Like Jepperson (1991), she viewed institutionalization as a matter of degree, specifically between three processes: cultural persistence, maintenance of culture, and resistance to change. Moreover, in agreement with Berger and Luckmann (1967) she argued that institutions must be perceived as exterior and objective to the individual. Zucker's (1977) classic article focused on the micro foundations of institutions and in the reprint for Powell and DiMaggio's (1991) anthology, she added postscripts that address some conceptual issues with definitions for institutions in institutional theory since the publication of the original paper.

The importance of Zucker's (1991) postscripts is two specific problems in how the organizational literature treats macro level institutionalization. First, the existence of institutionalization as a social factor is simply taken-for-granted; by this, she argued not enough research focused on the organizational level to unpack the process of institutionalization. Second, institutionalization was confounded with resource

dependency perspectives; by this Zucker pointed out that the diffusion of technical processes between organizations is not necessarily a result of institutional influence but may represent the rational adoption of a technical advancement or innovation. In other words, if a practice spreads through an organizational field, institutionalization should not be the default explanation; the new practice could be a real improvement in organizational practices that places non-adopters at a competitive disadvantage. Zucker's central point with these two critiques is organizational researchers need to pay attention to the micro foundations of institutions to avoid treating institutions as black boxes at the organizational level. Zucker took up her own critique a few years later by proposing a component process of institutionalization that framed institutionalization as a stage process, allowing for analysis of institutions at various points in their development (Tolbert and Zucker 1996).

2.4.2 Conceptualization of Institutions from Outside Institutional Theory

Applying a clear definition of institutions is important for sociological analysis because institutions link micro level processes of individual cognition with the macro level processes of social structure. Mary Douglas (1986: 46) asserted, "minimally an institution is a convention" which provides the cognitive structure to legitimize a social grouping. Douglas' (1986) perspective reflects the general framing of the concept in institutional theory by arguing institutions are not just practical social arrangements, which she contrast to an economic view, institutions have cultural meanings.

Institutions become embedded in society not as passive elements but as systems that structure social life beyond daily routines (Douglas 1986). Douglas' comparison of wine classification between the Bordeaux region of France and Napa Valley vineyards

illustrated how institutional systems defy rationalization because neither classification system is logically superior and both created distinct cognitive schemas and industry practices (1986: 105-108). What was important to the vintners in Douglas' study was how the institutional framework provided the means to construct categories of wine within their region by structuring the knowledge of differences between wines. The systems of wine classification also shaped the organizational identity of the vintners: French wineries were defined by wine type while California wineries were categorized by operational scale and scope. The fact these two categorization systems were not compatible illustrates Douglas' central point that institutionalization is not a process of universal logics or economic rationalization but a culturally specific phenomena. The effect of institutions to create and shape actors identities is a pivotal concept other researchers have also found occurring in diverse settings including French cuisine (Rao et al. 2003) environmental forestry organizations (Bartley 2007) and accounting firms (Greenwood et al. 2002).

Douglas North (1990) applied the concept of institutions to organizational strategy from an economic perspective. In North's (1990) view institutions exist prior to organizations as frameworks in which organizations develop and the relationship between institutions and organizations is one of interdependence. "Both what organizations come into existence and how they evolve are fundamentally influenced by the institutional framework. In turn they influence how the institutional framework evolves" (North 1990: 5). A key aspect of North's (1990) framework is how institutions function as constraints and determine the opportunities in a society while leading to the creation of organizations that take advantage of those opportunities. "The major role of institutions in society is to

reduce uncertainty by establishing a stable (but not necessarily efficient) structure to human interaction” (North 1990:6). North’s concept of institutions is more formal than the other perspectives presented; however, this more structured relationship between institutions and organizations is important to consider when conducting a quantitative analysis of institutional effects on organizational strategy.

2.4.3 An Alternative Conceptualization of Institutions

Before condensing these perspectives on institutions and institutionalization into the framework for this project, I think it is valuable to mention some dissenting viewpoints on institutions. Seth Abrutyn’s (2014) recent work provides a concise summary of the criticisms against the concept of institutions applied within much of institutional theory and organizational studies. Abrutyn (2014) pointed out the concept of institutions is not theoretically problematic for most sociologists but when confronted by Jepperson’s (1991) list of institutions the question arises “Are institutions so broadly defined that the differences between collectives, patterned action, role positions and ideologies are less important than their similarities?” (6).

Abrutyn’s aim was not to dismiss the work of institutional theorists but to argue these scholars overemphasize the cultural aspect of institutions by broadening the concept of institutions to frame them as dynamic mechanisms around singular phenomena. Abrutyn (2014) argued that there are a finite number of institutions and institutions are distinct societal level phenomena that affect both structural and cultural elements. To clarify Abrutyn’s position, a kinship system is an institution but marriage is not an institution; marriage is only a component within a society’s kinship institution. Applying Abrutyn’s definition to Douglas’ winemaker example results in neither winemaking

tradition being an institution; instead, French winemaking becomes a component within the French market institution and California winemaking becomes a component within the American market institution. Hence, Abrutyn's concept of institutions aligns with the perspective of historical institutionalists who view institutions as broad and stable societal level structures that are not reducible to smaller parts.

2.4.4 Conceptualizing Institutions for this Project

This project adheres to the dominant conceptualizations of institutions found in the institutional theory literature. I conceptualize institutions as macro level phenomena exerting influence on multiple social levels: individual, organizational, field, and societal, and not limited to a small set of societal institutions. Institutions shape cognition through both material and symbolic mechanisms. Institutions shape material aspects through practices and cultural structures, and symbolically institutions provide meaning systems for interpretation and understanding (Thornton et al 2012). Institutions create social stability by laying out "the rules of the game" (North 1990), providing structure in daily life that goes beyond simple routine. Institutions are more than social conventions; they provide meaning and structure to social interactions beyond single events.

Institutions constrain perception and action but also support and empower actors (Scott 2014) by providing mechanisms for agency. Institutions legitimize social structures and behaviors but constrain actors by limiting choices to a range of legitimate options. This form of social control is neutral but can create negative or positive outcomes depending on social context. Institutions can provide paths for innovation when actors find a more beneficial or rational process than the current one and require conscious action to deviate from the taken-for-granted route. Institutions help reduce

uncertainty and risk by providing templates for decision-making through the construction of normative expectations. Institutions can also empower individual actors by providing them with the context and tools to initiate change.

Institutionalization is a social process that, once achieved, embeds the institution in society in a taken-for-granted manner; however, embeddedness does not guarantee the institution will continue to exist. Deinstitutionalization can, and has, occurred (Dacin and Dacin 2008, Davis et al 1994). Institutions change due to both endogenous and exogenous factors; therefore an institutional analysis should frame the institution under study as historically contingent (Thornton et al. 2012). Institutions are also subject to change through collective behavior. These mechanisms indicate that while institutions provide stability for society they not are stable phenomena themselves. Rather institutional maintenance, or reproduction, is an active and interdependent process.

The institutions within a society are interdependent. Change in one institution can diffuse into other institutions. This interdependence between institutions also means actors can find themselves in positions where competing institutional demands create contradictions for action. These situations can illuminate the salience of a specific institution for making decisions as well as expose the complexity of the underlying institutional structure.

I apply my conceptualization of institutions on two levels. First, I propose the use of pharmaceuticals is institutionalized in U.S. society through the acceptance of what some scholars refer to as *pharmaceutical regimes* (Busfield 2010, Conrad and Lieter 2008, Williams et al. 2011). The pharmaceutical regime is an *institutional regime* whereby individuals accept pharmaceuticals as a legitimate treatment method for

conditions of illness and disease or expect pharmaceutical usage to improve their general quality of life. Institutional regimes occur around social phenomena when the institutional rules and sanctions for inclusion exist outside of any specific organization and monitoring occurs through collective action within a strategic action field (Jepperson 1991).

The purpose of utilizing the concept of pharmaceutical regimes is to construct the boundaries of pharmaceutical development outside of pharmaceutical organizations. The pharmaceutical regime exists at the societal level; therefore, the drug development strategies of pharmaceutical corporations include the social negotiation for the inclusion of a specific product into the regime, in addition to pharmacological development. The acceptance of any one pharmaceutical product is not taken-for-granted but subject to challenges requiring strategic action at the organizational level to convince other stakeholders within the organizational field. This indicates that the structure of the organizational field is dynamic with differing levels of influence between stakeholders based on power and claims of authority. Therefore, for the inclusion of a new product within the pharmaceutical regime it is necessary to legitimize a product to all of the stakeholders.

The second conceptualization of institutions I propose comes from the institutional logics perspective, which I discuss in detail later in the chapter. Here institutions are conceptualized as combinations of social phenomena connected within a dominant meaning system referred to as a logic order. Relevant to this project, these logic orders serve to legitimize specific organizational structures and practices within society. I assert the competing institutional logics within the organizational field result in

pharmaceutical corporations adhering to a finite number of organizational strategies that align with specific logic orders in order to gain legitimacy with the other stakeholders: the Food and Drug Administration, medical professionals, patients, corporate owners, and third party payers.

Logic orders serve as a normative force within an organization by creating the templates for appropriate decision-making. Therefore, I propose that analyzing the research and development decisions of a pharmaceutical corporation should reveal what logic order dominates that organization's strategy. My reasoning is institutionalization results in organizational practices becoming routine, therefore, when analyzed over time patterns of different practices should emerge within and between organizations.

2.5 Organizational Fields and Institutional Pluralism

The purpose for applying the organizational field framework in this project is to frame pharmaceutical development as a collective process. Pharmaceutical development in this respect does not refer to pharmacological discovery but the interorganizational process necessary to bring a new drug into the pharmaceutical regime. The organizational field framework allows me to incorporate non-pharmaceutical organizations in the process of drug development because these organizations are stakeholders in the pharmaceutical regime. These stakeholders also bring different logic orders into the pharmaceutical field through their membership in other fields. This makes the pharmaceutical field a site of institutional pluralism. I propose it is because of institutional pluralism that pharmaceutical corporations have the opportunity to adopt an organizational strategy from a set of legitimate models.

2.5.1 The Development of Organizational Fields

A strength of institutional theory compared to other organizational theories is the awareness that organizational decisions are subjectively influenced by divergent internal interest, differences in power relations, and historical contingencies. The realization that a diverse range of external forces affects organizational strategy led institutional theorists to develop complex frameworks for understanding how organizations function as embedded entities. In their seminal work on institutional isomorphism, Powell and DiMaggio (1983: 148) proposed the concept of organizational fields to link the impact of institutions to organizational behaviors. The utility of the organizational field framework for organizational analysis is that positioning organizations within a relational network, as opposed to focusing on the operations of a single organization, reveals a wider range of environmental factors affecting organizational strategy. The organizational field framework provides researchers with a better understanding on why organizations with dissimilar goals would collaborate to accomplish a given task and expands the level of analysis beyond direct connections to larger fields of influence.

Institutions are the structures that guide behavior within an organizational field. Early research on organizational fields highlighted how cultural-cognitive, regulative, and normative structures provided collective meaning and stability within the field (Wooten and Hoffman 2008). The decision to adopt a specific practice was framed as an isomorphic process where the effect of the organizational field was to confer external legitimacy on the organization. While decision-making occurred within the organization, early theorists argued strategy was guided by the institutional framework of structured decision-making not by objective assessments of efficiency. DiMaggio's (1991) article

on the emergence of public art museums in the United States exemplifies this early approach in reach applying organizational fields as the level of analysis.

DiMaggio (1991) noted that two competing ideologies about the purpose of public art museums existed during the early 20th century period when these organizations were being founded: museums as educational centers displaying replicas of famous works versus museums as centers of connoisseurship containing only original pieces. The convergence of museums around the curator model (connoisseurship ideology) occurred in conjunction with the rise of professional museum curators and the influence of external funding organizations controlled by wealthy donors. DiMaggio proposed that because the conflict between ideologies did not occur within individual museums, different stakeholders in the field were able to work collectively to construct the organizational environment at the field level.

Isomorphic pressure defined organizational strategy based on the connoisseurship ideology as the only legitimate model for public art museums. Museums following the education ideology faced a crisis of legitimacy that effectively cut them off from necessary revenue streams. This example also illustrates another important aspect of the organizational field framework, the need to consider historical context when evaluating organizational behavior because the widespread rise in art museums was partially due to gilded age tycoons seeking ways to create public legacies. Scott et al. (2000) demonstrated in detail the value of historical context for analyzing organizational strategy in their detailed examination of hospital changes in the San Francisco Bay Area during the last half of the 20th century.

Scott et al. (2000) studied institutional change by analyzing health care organizations in the San Francisco Bay Area between the mid-1940s and mid-1990s. One portion of their analysis focused on the organizational field and the effects field level changes had on individual hospitals. The data revealed a field of three competing logic orders: professional dominance, federal responsibility, and managerial-market orientation (Scott et al. 2000: 316). Within the period of the study, each of these institutional orders experienced a time where it was the dominant logic of the field; however, all three logic orders were always present to some degree in the field. Scott et al (2000) categorized this field level phenomenon as institutional fragmentation: a measure of degree to which field participants confront a coherent institutional environment. They drew several conclusions from these findings. Related to institutional theory the data indicated the factors leading to the decline in one logic order were not necessarily the factors leading to the subsequent rise of the new dominant logic order. Specifically they point out the decline of the professional dominance logic was followed by the rise of the federal responsibility logic, but the federal responsibility logic was intentionally constructed to maintain professional dominance. The incongruence in institutional change also demonstrated how exogenous factors affect field structure as illustrated by the shift from federal responsibility to managerial control, which originated with economists questioning the efficiency of public health and regulatory structures.

DiMaggio's (1991) study of public art museums and Scott et al.'s (2000) study of hospitals in the San Francisco Bay Area illustrate another key component of organizational fields: the process of field demarcation is flexible. Powell and DiMaggio's (1983) original definition constructed organizational fields as relational networks, which

makes the boundaries not only porous but also definable around empirical conditions determined by the researcher's analytical focus (Scott 2014). This allows the demarcation of organizational fields around a broader range of potential measures than the market-exchange relationship definition of industry sectors.

2.5.2 Demarcating Organizational Fields

Charlene Zietsma and Thomas Lawrence (2010) stated field boundaries and practices are interdependent. "Thus we adopt an understanding of fields as co-evolutionary systems in which boundaries and practices exist in a recursive relationship significantly affected by the heterogeneous boundary work and practice work of interested actors" (Zietsma and Lawrence 2010:191). Demarcating the boundaries of an organizational field through practice underscores the importance of embedded and collective action for analyzing organizational strategy. Organizations face behavioral constraints as embedded actors by the institutionalized structure of legitimate practices while at the same time, the structure only gains institutionalized legitimacy through collective recognition. Zietsma and Lawrence (2010) expanded DiMaggio and Powell's (1983) conception of the organizational field by adding this recursive element to the framework which explains how the boundaries of organizational fields are beyond market-exchange connections and can encompass activities tangentially connected to the production of a commoditized good or service.

Current research utilizing organizational fields has also shifted from the isomorphic perspective of early studies towards a view of fields as contested arenas. Reframing the relationship between institutions and organizations as both dynamic bottom-up and top-down processes was pivotal to this expansion of the organizational

field framework (Scott 2014). One of the ways researchers have demonstrated fields are dynamic structures has been through the analysis of the conflicts and change that accompany a shift in the dominant institutional order within an organizational field. Roy Suddaby and Royston Greenwood's (2005) study of organizational change within Canadian accounting firms is a clear illustration of the contested process of institutional change within an organizational field.

The institutional change observed by Suddaby and Greenwood (2005) was the expansion of accounting firms from provided financial services to offering legal advisement on financial and tax matters. Within the organizational field of financial service firms, accounting firms and law firms were two stakeholders originally offering different services and adhering to different logic orders. The acquisition of a legal firm by a major accounting firm represented a violation of the jurisdictional borders between accounting and legal firms (Abbott 1988). Suddaby and Greenwood (2005) revealed stakeholders within the field contested this acquisition because it violated the accepted institutional logics governing accounting firms. Accounting organizations re-established field stability by employing rhetorical strategies that redefined the institutional logics of accounting firms to incorporate the role of legal advisement on financial matters. This example illustrates another question raised by contemporary research on organizational fields: if organizational fields are sites of conflict and negotiation, is field stability better framed as a temporary truce, or settlement, between stakeholders (Reay and Hinings 2005, Wooten and Hoffman 2008).

As Trish Reay and Bob Hinings (2005: 354) stated "Actors within a field recognize the dominance of one institutional logic during times that we can characterize

as relative stability, even though all actors may not agree with that dominant logic.” The lack of agreement required by actors to achieve field stability poses another direction for organizational field research to move away from organizational isomorphism towards explaining organizational heterogeneity. The concept of institutional pluralism provides the conceptual framework to expand the organizational field concept as contested arenas where stability is only temporary outcome of settlement negotiations. The institutional logics perspective argues that in situations of institutional pluralism an organization will use practices aligned to different institutional orders but adopts one logic order as the dominant order for overall organizational strategy (Thornton et al. 2012). Expanded to the organizational field level this would explain heterogeneity between organizations of the same type because in a field where multiple logics exist organizations could adopt differing dominant logics and still maintain legitimacy.

2.5.3 Institutional Pluralism within Organizational Fields

Michael Lounsbury and Ellen Crumley’s (2007) research on the mutual fund industry demonstrates how heterogeneous organizational fields emerge and continue to exist in a state of institutional pluralism. Mutual funds originated in Boston in 1924 and operated under a strategy of conservative trusteeship (Lounsbury and Crumley 2007). Around the middle of the century, developments in statistical techniques and economic theory operated as exogenous factors generating new practice strategies for mutual fund management. These new practice strategies were contradictory to the Boston model of passive investing; however, unlike nouvelle cuisine (Rao et al. 2003) or offering legal advice (Suddaby and Greenwood 2005), the new active money management model did not replace the old model but was incorporated into the mutual fund field as valid

alternative for mutual fund management (Lounsbury and Crumley 2007). The current mutual fund market is an organizational field where several institutionalized strategies for mutual fund management coexists. The “Process Model of New Practice Creation” Lounsbury and Crumley (2007) proposed as an explanation for the rise of actively managed mutual funds also reinforces the broader claim that organizational fields are dynamic structures that engender conflict and where stability occurs through a negotiated settlement between stakeholders.

Another recent article by Mary Dunn and Candace Jones (2010) examined institutional pluralism within formal medical education in the United States. Dunn and Jones found that the strategies of medical education programs in the U.S. were contested between institutional logic orders of science and care. Understanding how these competing logics coexisted required analyzing the historical context of the formal institution of medicine in the United States. Dunn and Jones (2010) stated the logic of science originated during the 19th century professional project developing formal medicine while the logic of care was incorporated into formal medicine through the rise of public health as a discipline in the 20th century. Their analysis on the frequency of these logic orders in medical journals indicated that while the logics were dominant at different points in time both were continually present with vocal advocates continually seeking to promote whichever position was not currently in favor.

At the organizational level, recent work by Walter Powell and Kurt Sandholtz (2012) on the emergence of the biotechnology sector in the United States revealed institutional pluralism at the field level allowed the development of two distinct organizational strategies. Powell and Sandholtz (2012) analyzed the organizational

practices of 11 prominent early biotechnology firms with founding dates between 1968 and 1981. Because biotechnology was an entirely new field, these early firms lacked an institutionalized template of legitimized organizational strategy; furthermore, as a developing field the contested dynamics between stakeholders had not reached a period of settlement. Based on the data, Powell and Sandholtz (2012) concluded these organizations adhered to two distinct and legitimate organizational strategies drawn from models legitimated outside of the field: organizational strategy based on a logic of science and organizational strategy based on a logic of commerce. Furthermore, Powell and Sandholtz demonstrated that the background of the firm founders' heavily influenced the organization strategy adopted by a specific firm. Firms founded by academic researchers were more likely to adhere to an organizational strategy that aligned with the logic of science. While firms founded by venture capitalist or pharmaceutical executives were more likely to an organizational strategy that aligned with the logic of commerce.

In summation, organizational fields are a well researched and valuable component of institutional theory. The concept allows organizational researchers to recognize the importance of organizational embeddedness and reinforces the conceptualization of institutions as dynamic phenomena. Additionally, the incorporation of institutional logics and institutional pluralism within the organizational field framework provides an avenue for institutional theorists to address strategic agency at the organizational level.

2.6 Organizational Agency and Strategic Action

In order to interpret organizational categories as influenced by institutional effects, the organizations studied have to possess some flexibility in adopting organizational strategies. A key component of this project is the proposition that

pharmaceutical corporations, or the actors within them, possess decision-making agency in regards to the overall strategy of an organization. There are multiple factors researchers have used to indicate organizational agency. I chose to collect corporate financial data and information on the drugs approval by the Food and Drug Administration as measure of organizational decisions that could reveal variations in strategies between pharmaceutical corporations.

Using FDA approval information as data on organizational strategy aligns with the strategy-as-practice approach developed within the strategic management literature (Vaara and Whittington 2012). The strategy-as-practice perspective argues that strategy can be invisible because it has become institutionalized; therefore, analyzing common practices at the organizational field level can reveal distinct strategies if groupings of practices emerge across organizational boundaries. Since regulatory approval is a constraint placed on all pharmaceutical companies, how organizations manage the FDA submission process is an ideal common practice to analyze for latent strategies at the field level.

Furthermore, the FDA approval process is a dynamic interaction between an organization and the FDA that requires strategic action on the part of both organizations (Babiarz and Pisano 2014, Monahan and Babiarz 2014). Companies do not haphazardly submit drugs for approval but engage with regulators through a multi-year process that starts with the submission of an investigational new drug application to begin clinical trials with the end goal as approval of a new drug application (NDA). In addition to being a lengthy and uncertain process, drug approval is also expensive making it unlikely a company would not manage the process internally or attempt to monitor best practices

within the field (Babiarz and Pisano 2014); therefore, it is logical to expect organizational strategies are exists within this practice.

2.6.1 Bringing Agency into Institutional Theory

The main strength of institutional theory, the recognition that culture shapes organizational behavior, poses a problem for organizational analysis because it risks framing organizations as over socialized. “In other words, the theoretical accomplishments of institutional theory are limited in scope to the diffusion and reproduction of successfully institutionalized organizational forms and practices” (DiMaggio 1988: 12). This problem originated when early institutional theorists tackled the structure agency debate by claiming that structure trumps agency because institutional effects were isomorphic forces on organizations. However, as researchers expanded beyond studies of isomorphism to explore institutional change, creation, and destruction, the need for incorporating agency into the theory became apparent (DiMaggio 1988, Lawrence, Suddaby, and Roy 2009, Oliver 1999, Scott 2014).

To address this deficiency, DiMaggio (1988) proposed the concept of the *institutional entrepreneur*: organizational actors “who have an interest in particular institutional arrangements and who leverage resources to create new institutions or to transform existing ones” (Maguire, Hardy and Lawrence 2004: 657). The concept has led to a distinct subfield of literature analyzing the actions of specific agents towards changing institutional structures (Hardy and Maguire 2008) but is criticized for framing institutional entrepreneurs as heroic actors and ignoring their embedded institutionalized context (Lawrence, Suddaby, and Leca 2009). Another early approach for incorporating agency into institutional theory stems from the work of Christine Oliver.

Oliver (1991) stated institutional theory had not fully addressed agency or interest driven action by organizations but the theory was compatible with these concepts. Applying concepts from resource-dependency theory, she constructed a typology of five strategic responses organizations could have to institutional processes: acquiesce, compromise, avoid, defy, and manipulate. Oliver (1991) defined in detail the tactics and strategies for these five responses as well as the differences in institutional structures that are more likely to engender specific responses. In his review of Oliver's work, Scott (2014) provided examples of research applying each strategic response and supporting the overall validity of concept. In general, Oliver's (1991) framework for strategic action indicates that the more complex an organizational field is, the more ability, and likelihood, individual organizations will engage in acts of non-conformity; i.e. engage in strategies of compromise, avoidance, defiance, or manipulation.

Jens Beckert (1999) presented a dissenting viewpoint from DiMaggio (1988) and Oliver's (1991) approaches and argued instead that "under market conditions, institutional rules and strategic agency can be conceptualized as two coordination mechanisms that destabilize each other, but, nevertheless, remain interdependent" (779). According to Beckert (1999), the attempts to introduce agency through periods of institutional conflict were inadequate because they did not explain how actors decided on strategy, and while conceptualizations of the institutional entrepreneur were more successful, they altered the fundamental argument of institutions as taken-for-granted.

Beckert (1999) argued strategic agency was the purposeful attempt to reach a goal but the means to achieve that goal could only be chosen rationally if the actor had a reasonable expectation of the other actors' behavior. Institutions provide structure for

interorganizational relations, which reduce uncertainty and make organizational action more likely. Beckert's argument challenged the view that periods of contestation in organizational fields are the source of strategic action by instead proposing that periods of institutional stability lead to strategic action because they are times when organizations are better able to predict the outcomes of their decisions and therefore risk taking actions that depart from institutional expectations.

The work of DiMaggio (1988), Oliver (1991), and Beckert (1999) facilitated the ability of institutional theorists to analyze agency within institutional structures but still met with criticism for treating agency as a product of institutional structures rather than individual actors. The concept of *institutional work* was proposed to link the previous ideas of agency and shift the focus of analysis to understating how actions affect institutions (Lawrence, Suddaby, and Leca 2009). Institutional work does not discount the previous ideas of agency but expands the analysis of agency in institutional theory by arguing agency and institutions have a recursive relationship: institutions structure action but at the same time actions create, maintain, and disrupt institutions (Lawrence, Suddaby, and Leca 2009).

Institutional work focuses on activity rather than accomplishment, which allows for the analysis of the intentions behind actions as opposed to focusing on the outcomes of the actions. Institutional work proposes agency does not occur because a vacuum of isomorphic pressures drives decision-making but because actors derive distinctive intentions from the institutional structure. Agency, however, is still embedded within an institutional framework because it is the institutional structure that provides the enabling conditions for action (Battilana and D'Aunno 2009). Evaluating agency then requires a

multidimensional viewpoint since changes in the institutional and organizational environments will result in changes to the purpose and intention of an action. Battilana and D'Aunno (2009) developed a typology for evaluating the intersections of the three main forms of institutional work: creating, maintaining, and disrupting, with three dimensions of agency: iterative, practical-evaluative, and projective. Institutional work is an important construct within institutional theory because it reiterates the core argument that institutions are products of collective action and at the same time indicates institutions are neither totalitarian nor permanent. Institutional work explains why institutional pluralism occurs within a field because organizations structure their interactions through the dominant logic order of their primary field and thereby incorporate components of those logics into the shared field. In the pharmaceutical industry, professional medical organizations, third party payers, and financial investors engage in institutional work by bringing different institutional logics into the field for evaluating pharmaceutical development strategies.

2.6.2 Strategic Action Fields

Neil Fligstein and David McAdam (2012) recently proposed a comprehensive theory of fields that builds on the previous work of institutional theorists by incorporating agency in organizational analysis through the framework of *strategic action fields*. The strategic action field concept proposes the act of reproducing an existing social institution is a function of constant negotiation between actors. A strength of this framework is that while collective action underpins the interdependence of field members, the interests and advantages of individual actors are incorporated. Strategic action fields are socially constructed arenas dependent on the definition of the situation and issues at stake

(Fligstein and McAdam 2012); therefore, they retain the flexible demarcation of the organizational field framework. This project applies Fligstein and McAdam's (2012) field theory to argue the pharmaceutical industry in the United States is a distinct strategic action field within the health care system comprised of six main stakeholders: pharmaceutical corporations, medical professionals, patients, the Food and Drug Administration, third party payers, and financial investors.

The framework of strategic action fields is appropriate for my research because all of the stakeholders within the pharmaceutical field do not automatically accept newly developed pharmaceutical products. Pharmaceutical corporations actively manage knowledge of new drugs utilizing a variety of different organizational strategies designed to address the specific interest of each stakeholder. With investors and other financially motivated stakeholders, pharmaceutical corporations discuss drug innovation and disease prevalence rates to support claims a new product has market potential. Pharmaceutical corporations strategically use the concept of science and empirical validity to frame the presentation of clinical data to government regulators and medical professionals as a method of gaining product legitimacy (Abraham 1995, Applbaum 2009, 2010, Matheson 2008). With potential patients, pharmaceutical corporations focus on developing a perception of need for treatment around a disease or condition while framing pharmaceutical use as the solution and pathway toward an improved quality of life (Fox and Ward 2009, Williams et al. 2009).

Strategic action fields can also explain why pharmaceutical corporations within the same organizational field would display a heterogeneous mix of organizational strategies. Each organization possesses the ability to adopt a preferred organizational strategy but

external stakeholders could also influence these preferences. For example, a small startup firm might desire to be research oriented but the need to secure funding from private sources could act as a countervailing force resulting in the organization adopting a market-based strategy. The research of Powell and Sandholtz (2012) showed that these two organizational strategies existed in early biotechnology firms, and while their analysis indicated these differences were associated with an organizations founding, the concept can be applied to analyze established organizations.

2.7 Institutions and Organizational Legitimacy

From its conception, institutional theory has recognized the importance of legitimacy in organizational studies and incorporated the concept into multiple research frameworks (Deephouse and Suchman 2008, DiMaggio and Powell 1983, Meyer and Rowan 1977, Scott 2014). Developing a framework for legitimacy is important for this project because legitimacy underlies the institutional process of pharmaceutical regimes and the organizational actions taken by stakeholders within the pharmaceutical field. Pharmaceutical corporations are unlikely to adopt drug development strategies if other stakeholders perceive them to be illegitimate means. However, if corporations adopt strategies not institutionally legitimized, they may attempt to justify those strategies to a stakeholder as legitimate using an alternate logic order.

Legitimacy research has resulted in a variety of definitions for legitimacy, but the idea that legitimacy is a collective process requiring social consensus is found in a majority of definitions (Deephouse and Suchman 2008, Ridgeway and Berger 1986, Zelditch 2001). To analyze how legitimacy works in relation to the development of new

pharmaceutical products, a distinct process of legitimacy should be adopted which addresses legitimacy issues that may arise in an institutionally plural organizational field.

2.7.1 Organizational Legitimacy and Logic Orders

Organizational legitimacy occurs when there is congruence between the social values and norms of a society and the organizational behavior or activities of a specific organization (DiMaggio and Powell 1983, Dowling and Pfeffer 1975, Scott 2014).

Applying this concept of legitimacy to the pharmaceutical industry allows for the evaluation of specific organizational strategies as legitimate on a variety of dimensions:

“For instance, regulatory approval of a new pharmaceutical not only confers regulatory legitimacy but also (a) enhances the ‘cognitive’ comprehensibility and taken-for-grantedness of the new compound, (b) indicates the that entity is consistent with the ‘moral’ value of good health, and (c) confirms the entity’s demonstrable ‘pragmatic’ benefits.” (Deephouse and Suchman 2008: 68)

At the organizational level, this framework of legitimacy is useful to analyze specific organizations within a field by evaluating the differences between organizational strategy and societal expectations. However, focusing on organizational legitimacy is problematic for analyzing organizational interactions within a complex field because organizations can be embedded in multiple fields each with distinct institutional logics so an interaction between organizations necessitates acknowledging multiple, and sometimes contradictory, institutional expectations. As Deephouse and Suchman (2008:68) argued, “researchers might do well to attend more closely to the workings of various sources of legitimacy.”

The concept of institutional pluralism is necessary to analyze legitimacy in a complex organizational field because stakeholders evaluate an organization's actions as legitimate through the institutional order most in line with that stakeholder's relationship to the organization (Jarzabkoski, Matthiesen, and Van de Len 2009). I argue three logic orders are salient to pharmaceutical corporations: commerce, science, and care. Table 2.1 list the components of these logic orders adapted from the Table 3.1 found in Thornton et al. (2012: 56) and the work of Dunn and Jones (2010) and Powell and Sandholtz (2012).

Table 2.1 Institutional Logic Ideal Types

| <i>Institutional Component</i> | Logic Order | | |
|---------------------------------------|-------------------------|------------------------|---|
| | Commerce | Science | Care |
| <i>Basis of norms</i> | Self-interest | Objective analysis | Patient interest |
| <i>Source of legitimacy</i> | Market position of firm | Verifiable results | Patient outcomes |
| <i>Formal mechanisms of control</i> | Regulations | Research practices | Professional certification |
| <i>Informal mechanism of control</i> | Industry analyst | Peer review | Professional reputation |
| <i>Basis of attention</i> | Profit | Scientific unknowns | Patient health |
| <i>Basis of strategy</i> | Increase profit | Experimentation | Conventional medical treatment routines |
| <i>Sources of authority</i> | Market share | Scholarly publications | Professional associations |
| <i>Cultural-cognitive frame</i> | Free market capitalism | Theoretical paradigms | Professional expertise |

Viewing the pharmaceutical industry as a multi-institutional strategic action field requires more than analyzing organizational legitimacy since stakeholders within the field evaluate their interactions with pharmaceutical corporations using different logic orders

but the actions of all field members still adhere to an institutional level of legitimacy supporting pharmaceutical regimes. Understanding organizational strategy in a field of institutional pluralism requires utilizing a concept of institutional legitimacy. Institutional legitimacy “emphasizes the ways in which sector-wide structural dynamics generate cultural pressures that transcend any single organization’s purposive control” (Suchman (1995: 572).

2.7.2 Institutional Legitimacy and Stakeholder Expectations

Suchman (1995) stratifies legitimacy into three broad categories, pragmatic, moral and cognitive, all of which are applicable to analyze of the pharmaceutical field as a strategic action field. Pragmatic legitimacy is tied to self-interest, and characterized an exchange-based legitimacy. Pragmatic legitimacy is evaluated through the outcome value of the product an organization receives through interaction. Moral legitimacy is a normative evaluation on organizational behaviors as a reflection of their promotion of social welfare. In moral legitimacy, legitimacy occurs through the judgment of organizational accomplishments, the assessment of organizational operations as using socially accepted techniques and procedures, and the perception of worthiness of the social institution. The third process of legitimacy is cognitive legitimacy which is legitimacy based on the comprehensibility of organizational action and a social structure that makes alternative actions unthinkable. Cognitive legitimacy focuses on the culturally constructed nature of legitimacy as a process of collective action.

My argument is that through the development of a new product within the organizational field pharmaceutical organizations strategically engage other field stakeholders using mechanisms designed to address pragmatic, moral, and cognitive

legitimacy concerns at the institutional level by using different logic orders. My research explores the following theoretical propositions related to the organizational pursuit of legitimacy in a situation of institutional pluralism:

P1a: When interacting with investors, trade industry groups, or third party payers, pharmaceutical corporations will strategically frame a new product through measures of potential profitability as a method to secure pragmatic legitimacy in line with the logic order of commerce.

P1b: When interacting with regulative stakeholders, pharmaceutical corporations will strategically frame data on new product efficacy through measures of empirical and scientific validity as a method to secure moral legitimacy in line with the logic order of science.

P1c: When interacting with potential patients and physicians, pharmaceutical corporations will strategically employ narratives to frame the perception of need for a new pharmaceutical product as a method to secure cognitive legitimacy in line with the logic order of care.

These theoretical propositions suggest the actions of pharmaceutical corporations in developing new pharmaceutical products is a strategic interorganizational processes designed to meet the specific institutional expectations of outside stakeholders. Figure 2.1 displays the general model of these propositions. The arrows between stakeholders are double-sided to indicate the interactive structure of a strategic action field. Only relationships between pharmaceutical corporations and other field stakeholder are represented because these relations are the focus of this project.

Investors, industry trade groups, and insurance companies interact with pharmaceutical corporations through the logic order of commerce where the value of a new pharmaceutical product is based on market exchange principles; therefore, the legitimation of a new product by these stakeholders requires the demonstration of profitability, as either an investment or increased cost-effectiveness in a payment

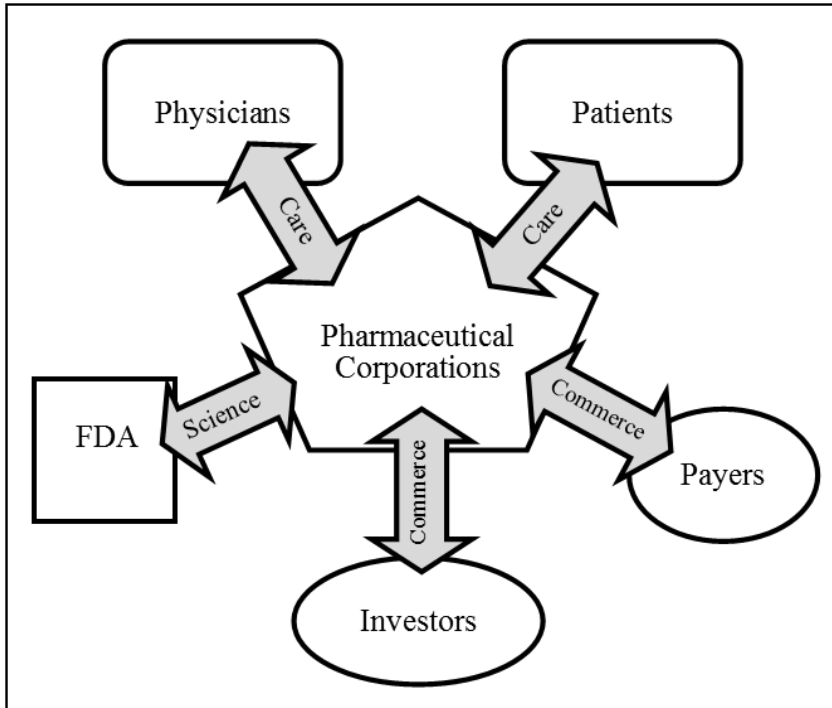


Figure 2.1 Theoretical Model of Pharmaceutical Corporations' Relations to Other Field Stakeholders by Logic Order

scheme. The Food and Drug Administration acts as the regulator and gatekeeper within the pharmaceutical field leading to the evaluation of pharmaceutical products through a framework of scientific validity based on the experimental methodology of clinical trials. To gain legitimacy from the FDA pharmaceutical corporations should adopt concepts of institutionalized science to demonstrate objectively and empirically that a new product demonstrates efficacy and safety. Finally, pharmaceutical corporations need to address the legitimacy of consumers and physicians who evaluate pharmaceutical products

through a framework of how they can improve individual health. To legitimate a new product to potential consumers and physicians pharmaceutical corporations need to operate within the logic order of care, where institutionalized medicine positions the value of a treatment in its ability to address a pathological problem or improve quality of life.

In conclusion, the process of market development places pharmaceutical corporations in a position of institutional pluralism by the requirement that new products meet the interest of each stakeholder for successful institutionalization within the pharmaceutical regime. Navigating these institutional expectations requires that organizations act strategically by applying different mechanism to meet the institutional expectations of legitimacy held by each stakeholder. Drawing from institutional theory, the expectation is these institutional effects will create a field of heterogeneous organizations because pharmaceutical corporations will align their dominant organizational strategy to different logic orders.

2.8 Institutionalization, Medicalization, and Pharmaceutical Regimes

Contemporary drug development proceeds on the logic that consumers have unmet needs that the company can determine and market to (Applbaum 2009, Civan and Maloney 2006, Fisher et al. 2015). Critics contend research programs at large pharmaceutical companies focus not on improving health but on increasing profit. “Pharmaceutical companies continuously emphasize how deeply society depends on their development of innovative products to improve health. But in fact, these companies are mostly developing drugs that are mostly little better than existing products but have the potential to cause widespread adverse reactions even when appropriately prescribed”

(Light et al. 2013: 591). While this critique of industry interest is valid, it obscures the dynamics of the field because it fails to distinguish that the interest of public health and consumer markets derive from different institutional frameworks making commercial interest valid too. A more useful analysis reframes the issue of pharmaceuticals usage as an institutionalized process, which is why I adopt the concept of the pharmaceutical regime. The fact pharmaceutical use is institutionalized in society is not debated even by the most vocal critics of the industry. Neither Marcia Angell (2005), Peter Conrad (2007), Ben Goldacre (2012) or, Ray Moynihan and Alan Cassels (2005) suggest pharmaceutical products cannot actually treat disease or improve patients' lives, rather the idea a chemical compound can be consumed and lead to a cure or improvement in health is a taken-for-granted concept.

Analyzing pharmaceutical development as an institutionalized interorganizational process allows for better understanding on how different perceptions of pharmaceutical use develop. More explicitly, stakeholder perceptions on the purpose of pharmaceutical usage can incorporate aspects of both public health and market economics because if these logic orders coexist in the organizational field. In the United States, pharmaceutical usage can be an aspect of public health when the product is intended to benefit more than the user; an example is vaccines. Likewise, pharmaceutical usage can be part of the market economy when they are purchased in lieu of an alternative treatment option: for example the consumption of antidepressants instead of behavioral therapy. Complications arise at institutional intersections, most clearly demonstrated by the current debates over the high cost of cancer treatments and price increases on patent expired medications with

no generic competition. It is through these contested situations that understanding pharmaceutical usage as an institutional process is most valuable.

By framing pharmaceutical development as institutionalized, this project is in a unique position to engage critically with one of the significant areas of research in medical sociology, the thesis of *medicalization*. Social scientists have studied medicalization for the past forty years (Conrad 2007, Freidson 1970, Zola 1972). Medicalization is a social process that researchers have broadly defined to allow for a wide range of applications in empirical analysis. Conrad (2007:4) defined medicalization as “a process by which nonmedical problems become defined and treated as medical problems, usually in terms of illness and disorders.”

Recent researchers have proposed *pharmaceuticalization* as an elaboration on the general medicalization thesis to address issues related specifically to the use of pharmaceuticals in society and reflect the changes that have occurred in the past two decades within society and the institution of formal medicine (Abraham 2010, Barker 2011, Bell and Figert 2012, Williams et al. 2011). One of the key aspects of the pharmaceuticalization literature that diverges from the general claims of medicalization is the concept pharmaceutical regimes can be developed for conditions not considered pathological, meaning pharmaceuticals are developed and promoted as capable of general lifestyle enhancements not just medical treatments (Bell and Figert 2012).

The majority of the existing sociological research on medicalization and pharmaceuticalization is qualitative which presents the opportunity for new research to add to the literature by analyzing medicalization using quantitative methods. A quantitative analysis would address the criticism of medicalization that the thesis itself is

too abstract; specifically that the existing research has not presented sufficient empirical evidence for the claim of medicalization over an argument that pharmaceutical expansion is actually the result of advancements in medical knowledge. For example, a significant proportion of the medicalization literature focuses on medicalization through the expansion of psychiatric conditions but current research on the drug pipeline shows products targeting mental disorders only account for 4.12% of the drugs currently under development (Fisher et al. 2015).

The medicalization thesis is important to address in this project because it implies a distinct path of strategic action by a pharmaceutical corporation. A pharmaceutical corporation engages in medicalization if it seeks to expand the definition of treatment on specific conditions. The medicalization thesis is neutral in that the motivation for actively seeking expansion can be categorized as components of all three logic orders: commerce, science, and care. At the same time, medicalization could also be the consequence of pharmaceutical research and not a defined organizational strategy. Analyzing pharmaceutical development strategies for latent constructs could reveal if medicalization is a distinct organizational strategy.

Regarding expectations of organizational strategy, industry critics argue medicalization practices align primarily with the commerce logic and pragmatic legitimacy. However, if pharmaceutical corporations operate from a position of institutional pluralism, framing a new product as an advancement in medical knowledge and addressing a health care need is necessary for market success. Product development requires a pharmaceutical corporation to meet the interest of all the stakeholders, obscuring the internal interest of the organization so expansionary practices could also

result from the logics of science and care. I explore the concept of medicalization in the case study analysis through the following theoretical propositions designed to evaluate internal organizational interest within the strategy of expansion, if one is identified in the quantitative analysis.

P2a: If a pharmaceutical corporation's dominant logic aligns with the commerce logic then the primary organizational reaction to a product-harm crisis will be to mitigate internal financial loss.

P2b: If a pharmaceutical corporation's dominant logic aligns with the logic of science then the primary organizational reaction to a product-harm crisis will be to validate the scientific accuracy of clinical trial data.

P2c: If a pharmaceutical corporation's dominant logic aligns with the logic of care then the primary organizational reaction to a product-harm crisis will be to mitigate potential harm to patient health.

These propositions assess the medicalization thesis because if pharmaceutical corporations are not primarily concerned about financial loss it undercuts the claim market interest drive medical expansion. If pharmaceutical corporations are concerned with ensuring the accuracy of clinical trial data then the argument medical expansion is due to genuine scientific advancements cannot be dismissed. If pharmaceutical corporations are primarily concerned with protecting patients from harm then medical expansion is more likely driven by the logic of care.

2.9 Conclusion

Organizations are not isolated entities; they are dynamic phenomena shaped by both external social factors and the interest of internal actors. Institutional theory

provides a conceptual framework for understanding and analyzing organizations in society and is the theoretical foundation of this project. Researchers have demonstrated that the connection between institutions and organizations is an interactive process, but the focus of my analysis is on how institutions effect organizational strategy. Institutional theory contains concepts that can thoroughly explain organizational level actions in a complex system where organizations must meet the competing demands of multiple stakeholders.

I apply the construct of organizational fields as the conduit that mediates strategic choice between institutions and organizations. The field level provides context for organizational behavior by framing strategy as an agentic process bound by the expectations of other stakeholders. A pharmaceutical corporation is unlikely to pursue strategies that are viewed externally as illegitimate even if they maximize the self-interest of the company. Analysis at the field level also allows the indirect influence on organizational behavior by other stakeholders to be observed through the processes of collective negotiation and settlement over the dominant institution of the field.

Of central importance in this project is the concept of institutional logics and their connection to organizational strategy. Institutional logics exist in the background of the organizational environment, shaping both organizational practices and external evaluations of organizational behavior. Drawing from the strategy-as-practice theory literature, institutional logics are expected to influence the drug development process and should be measurable in basic organizational decisions. Analyzing the characteristics of a product submitted to the FDA for approval as representational of organizational decisions that are effected by a logic order can reveal the institutional logics in the field.

The pharmaceutical industry in the United States is complex with corporations following different organizational structures and developing different products, but are these differences the result of unique decisions at the organizational level or are external factors creating commonalities in strategy between organizations? I argue that the presence of multiple institutional logics within an organization field explains diversity in organizational strategy. The impact of institutional pluralism at the field level results in diversity because individual firms address the influence of competing logics by selecting one logic order as the dominant framework for the organization. The caveat though is that the field's other stakeholders must perceive the each logic orders of as legitimate.

Using organizational fields as the site of analysis necessitates that the researcher develop an awareness of the field dynamics. Power shifts between stakeholders and technological advancements are to two mechanisms that result in changing logics so it is important for a researcher to take historical context into account (Fligstein and McAdam 2012). These field level dynamics influence institutional logics by operating as mechanisms of exposure to alternate logics and organizational forms as well as structuring the field by providing paths or constraints on specific organizational behaviors. The next chapter is an analysis of the current dynamics between pharmaceutical corporations and the other stakeholders in the field to assess the general structure of interactions between organizations.

CHAPTER 3
CURRENT STAKEHOLDER DYNAMICS WITHIN THE
PHARMACEUTICAL FIELD

3.1 Introduction

The goal of this study is to understand how multiple institutional frameworks come to populate an organizational field and effect organizational strategy. Theoretically, the structure of interorganizational relationships will affect strategy choice at the firm level through mechanisms such as power differentials or resource dependencies but studying strategy selection within the firm may not reveal institutional influences. In order to reveal institutional level effects on pharmaceutical organizations, it is necessary to evaluate the details of the interorganizational interactions within the field to determine how institutional logics structure these relationships. The purpose of this chapter is to provide empirical evidence to evaluate the proposed model of stakeholder relationships in Figure 2.1, page 53, and demonstrate the complex interdependent structure of pharmaceutical development is appropriate for an institutional theory analysis.

The benefit of analyzing pharmaceutical development through the organizational field framework, instead of an industry perspective, is the field framework incorporates stakeholder dynamics as interactive and reciprocal. This chapter covers the general structure of the relationships between pharmaceutical corporations and the other main stakeholders in the modern pharmaceutical field of the United States and defines them within the frameworks of the three logic orders: commerce, science, and care. While each

relationship is subject to a complex set of dynamics resulting in changes over the past several decades worthy of detailed study, my discussion of these relationships only highlights the major dynamics since an extensive analysis of each relationship is beyond the scope of this project.

One of the most important relationships in the current field is between the FDA and pharmaceutical corporations. The central element shaping the current dynamic was the passage of the Prescription Drug Users Fee Act in 1992. This piece of legislation changed the overall field dynamics by weakening the FDA's position for the benefit of pharmaceutical corporations and possibly at the expense of patients' health. The direct relationship between pharmaceutical corporations and patients is similarly complicated. Pharmaceutical corporations engage patients as consumers in a market system through direct to consumer advertisements and indirectly by providing financial support for patient advocacy organizations. Pharmaceutical corporations present both strategies as awareness campaigns rather than product marketing, obscuring financial motivations and increasing the likelihood of patient buy-in.

Pharmaceutical corporations manage their direct relationship with physicians by treating physicians as liaisons to the consumer. Pharmaceutical corporations use a variety of subtle strategies to influence physician prescription habits, such as managing continuing education programs and enlisting well-respected experts to serve as ghostwriters on professional publications. Pharmaceutical corporations also employ strategies of direct marketing towards physicians through advertisements in medical journals and deploying drug representatives for office visits. The final stakeholder dynamic I discuss is the structure of the retail pharmaceutical supply chain. Recent public

debate has focused on the pricing of prescription pharmaceuticals, but concern over the listed price of drugs obscures how the fragmented supply structure actually creates a market of differential pricing. Figure 3.1, page 87, provides a concise overview of the complex relationships in the pharmaceutical supply chain between health maintenance organizations, pharmacy benefits managers, retail pharmacies, wholesale distributors, and pharmaceutical corporations.

3.2 Pharmaceutical Corporations and the Food and Drug Administration

The regulatory strategy in the pharmaceutical field combines components from the logic of care and science. Historical developments, discussed in chapter 4, resulted in the Food and Drug Administration gaining enough stakeholder power in the late 1960s to shape the pharmaceutical field and determine the processes of drug development from clinical trials to market release. While these actions were beneficial to patients, pharmaceutical corporations found these regulatory statues increasingly burdensome and constraining on corporate goals.

By the late 1970s, the increased regulatory requirements of the FDA had become a major point of contention between the agency and pharmaceutical manufacturers, and companies were complaining loudly of a drug-lag in the United States (Schweitzer 1996), and pharmaceutical corporations began to increasingly engage in strategic collective actions designed to shift the regulatory process towards the logic of commerce. At the same time, there was a shift in disease politics as the National Cancer Institute began pressuring the FDA for quicker approvals on new treatments following recent developments in chemotherapy (Carpenter 2010). The 1980s brought a general rise in the power of corporate America as well as the anti-regulatory administrations of Regan and

Bush, Sr. further setting the stage for major changes in the field dynamics between pharmaceutical corporations and the FDA. Changes in drug regulation were additionally spurred on as other stakeholders began calling for FDA reform; notably AIDs activist organizations started pressuring the FDA in the late 1980s to relax regulatory standards on drug approvals to allow quicker and expanded access to experimental treatments.

3.2.1 The Prescription Drug User Fee Act and Drug Reviews

The external pressures mentioned above all contributed to the legislative events of 1992 that caused a significant shift in the field dynamics between pharmaceutical corporations and government regulators. In 1992, Congress passed the Prescription Drug User Fee Act (PDUFA) that altered the funding stream for drug reviewers at the FDA from being solely dependent on the federal government to include funds from pharmaceutical companies by authorizing the FDA to charge companies application fees for each review submission. However, PDUFA was not a neutral piece of legislation; it was a strategic settlement within the field intended to diminish the power of the FDA by making it more dependent on private industry.

PDUFA was also a solution to the staffing needs within the FDA, which was the result of the chronic underfunding from deregulation during the 1980s and had led to increased drug approval times from an average of 6 months to 30 months (Carpenter 2010, Light et al. 2013). PDUFA provided the FDA with the additional income stream the organization needed to increase drug review staff and reduce approval times. Pharmaceutical corporations benefited directly from the passage of PDUFA by receiving an explicit guarantee from the FDA that priority drug applications would be reviewed within 6 months and regular applications within 12 months. The FDA, however, received

no guarantee from the industry regarding the quality of the data submitted for review and the organizations reliance on industry money has led scholars to charge the Act resulted in regulatory capture and institutional corruption (Light et al. 2013).

One direct outcome of PDUFA was that while drugs were being approved quicker, the rates of adverse drug events (ADRs and commonly referred to as side effects) also increased (Chen and Yang 2013, Light et al. 2013). “An in-depth analysis found that each 10-month reduction in review time — which could take up to 30 months — resulted in an 18.1-percent increase in serious adverse reactions, a 10.9-percent increase in hospitalizations, and a 7.2-percent increase in deaths” (Light et al. 2013:595). “From 2000 through 2010, serious ADRs reported through the FDA Adverse Event Reporting System (AERS) increased 3.1-fold from 153,818 to 471,291 cases, and fatal ADRs rose 4.3-fold from 19,445 to 82,724 reports” (Chen and Yang 2013). These trends remain even after increases in prescription drug usage are controlled for indicating either more drugs of lower quality are being developed or the new shortened regulatory structure is inadequate for detecting and preventing many iatrogenic effects.

Part of the adverse drug event problem is the approval process is a delicate balance of risk: the risk of releasing a drug too soon and causing patient harm through adverse drug reactions versus the risk of keeping a drug under review too long and causing patient harm by denying access to beneficial treatments (Daemmrich and Krücken 2000). However, critics contend PDUFA skews this risk-risk calculation towards increasing the risk of adverse drug events by restructuring the regulatory process around industry interest rather than patient interest (Angell 2004, Chen and Yang 2013, Light et al. 2013).

Increased adverse drug events do not align with the logic order of commerce, but do indicate influence from the order of care has diminished in the regulatory process.

PDUFA altered the power dynamics between field stakeholders by weakening the FDA and solidifying pharmaceutical corporations as the dominant field stakeholder; physicians and the FDA are still gatekeepers, but their ability to fulfill this role has shifted from a proactive regulation and assessment of new products to a reactive position with the ability to apply constraints only after problems arise. The case of Zyprexa is a well-known example that demonstrates how strategic actions on the part of pharmaceutical corporations led to industry control over the process of drug regulation and supports the argument of regulatory capture.

3.2.2 Zyprexa and the Corporate Management of Data

Scholars of the pharmaceutical industry and industry insiders make a distinction between the market competitiveness and scientific aspects of a drug. A competitive pharmaceutical product is a drug that can gain market share while scientific progress is a product offering a therapeutic advancement over existing treatment options. The strategies of market competition and scientific advancement are not mutually exclusive, many drugs are developed intending to achieve both, but a drug can be competitive without offering a therapeutic advantage. The current regulatory approval process encourages the adoption of a strategy for market competition over scientific advancement by only requiring that a new drug demonstrate efficacy in placebo control trials; therefore, a successful marketing campaign can increase the competitiveness of a new product with no novel scientific value.

Kalman Applbaum (2009) stated the marketing of Zyprexa was typical for contemporary pharmaceutical corporations. In 1998, Eli Lilly's patent on Prozac was close to expiration. Seeking to develop a replacement blockbuster, the company formed the New Antidepressant Team, which was headed by a marketing strategy expert and a psychiatrist (Applbaum 2009). It is important to note pharmaceutical companies now rely primarily on blockbuster drugs to generate income (Lexchin 2006, Lybecker 2006, Vogel 2007). Internal company documents reveal the strategic focus for developing Zyprexa was on uncovering patient needs, framed as expanding the market, and meeting them through a competitive product rather than a scientific advancement. This strategy was partially the result of the lesson learned from Prozac that a successful drug needed not only to be effective but also required a campaign to raise public awareness on need.

Zyprexa was an antipsychotic medication approved in 1997 to treat schizophrenia. At the start, the Eli Lilly development team determined "Zyprexa will be the world's number one neuroscience pharmaceutical in history" (Applbaum 2009: 198) and set out to achieve this goal by expanding the approved therapeutic categories for Zyprexa usage. The first success the company had was in getting Zyprexa approved to treat bipolar disorder and Eli Lilly subsequently began marketing the drug to physicians as a new treatment option for this condition. Released internal documents, however, show Lilly sought to deceive physicians both about the adverse drug reactions of Zyprexa and illegally promoted off-label usage for unapproved conditions (Applbaum 2010).

The adverse drug reactions did not go unnoticed outside of the company and articles began appearing in journals linking Zyprexa to various negative side effects. For years, Eli Lilly managed this increasing evidence by producing and sponsoring articles

designed to counter any negative claims that surfaced in the medical literature (Applbaum 2010). Eventually Eli Lilly lost a series class action lawsuits over the company's intentional withholding of information on adverse drug reactions and received a criminal misdemeanor charge for promoting off-label uses. The Zyprexa court case revealed Eli Lilly managed the FDA's regulatory process by strategically providing information to the agency that downplayed the risk of the drug while overstating its benefits (Applbaum 2009, 2010). Lacking the funds or authority to conduct internal clinical trials, the FDA was limited in its ability to sanction the corporation because it was dependent on the data provided by the company. John Abraham's (1995) research indicated the corporate control of scientific information is not unique to the Zyprexa case but is a common industry strategy for managing the regulatory process in the submission company's favor.

In conclusion, the relationship between the FDA and the pharmaceutical industry has changed to one where industry now has countervailing power within the field. New drugs are still subject to regulatory approval by the FDA but companies have been able to gain control of this process by selectively submitting data that leads to their desired outcome. Moreover, once the FDA has approved a drug, it is slow to issue a withdrawal. These shifting dynamics are the result of both broader political and economic changes exogenous to the organizational field, as well as, the rise of patients as a stakeholder within the field who began to view the FDA as an obstacle to treatment and further advocated for reducing the organization's regulatory power. Finally, while the current regulatory process appears to be increasingly aligned with the logic of commerce, the logics of care and science are still evident in the FDA's standards of clinical trial testing and that corporations need to address these concerns during the process of regulatory approval.

3.3 Pharmaceutical Corporations and Patients, or the Potential Consumer

Researchers have argued one of the central changes in the field of health care since the 1980s has been the rise of the patient as an independent health care consumer (Applbaum 2006, Clarke and Adele 2009, Conrad 2007). Although other researchers state this type of patient interaction with the health care system has its roots in an earlier era (Tomes 2001). Regardless of the exact origin, pharmaceutical corporations have actively facilitated this normative shift from passive patient to active consumer with increasing emphasis during the previous three decades (Applbaum 2009). In the United States, pharmaceutical companies engage with patients as consumers primarily through two organizational strategies: direct interaction through marketing campaigns and indirect interaction by supporting patient advocacy organizations. Both of these strategies utilize components from the logic of care to engender the perception that pharmaceutical products offer patients an avenue to wellbeing.

3.3.1 Direct to Consumer Advertisement of Pharmaceuticals

The direct advertisement of prescription drugs to consumers, while not legally prohibited, did not occur much between 1906 and 1980 because of the gentleman's agreement between industry and the American Medical Association (Conrad and Leiter 2008). There was also confusion over the regulatory jurisdiction of pharmaceutical advertisements between the FDA and Federal Trade Commission that was only resolved after the 1962 Drug Amendments Act (Junod 2007). Direct to consumer marketing strategies for prescription pharmaceutical products became a common industry practice during the 1980s following the general deregulation of the Regan administration, the declining power of professional medicine, and the rise of market style models for health

care management. The early advertisements were tenuous as companies sought to establish the boundaries rather than exceed them and risk negative publicity.

Conrad and Leiter (2008) noted that there was a general sense of inappropriateness about direct to consumer marketing in the FDA, the medical profession, and surprisingly the pharmaceutical industry in early years of the 1980s. The primary concerns over direct to consumers advertising (DTCA) were the ability of patients to understand the information, whether it would lead to self-diagnosis, and how this could undermine the physician role in health care delivery. Because the consumption of any prescription medication contains the risk of iatrogenic effects, proponents argued that the advertisement of pharmaceutical products could not present only the benefits of treatment but needed to include risk and side effect information. This argument aligns with the logic of care as patient outcomes outweighed the immediate economic benefits for the corporation. However, the increasing pressures of market competition that accompanied the shift of investors focusing more on financial metrics as performance indicators led corporations to begin testing DTCA.

The FDA reacted to the earliest attempts of DTCAs in 1981 by calling for a moratorium on DTCA at the end of 1982 that was not retracted until 1985. For the rest of the decade and into the 1990s, the FDA applied a policy of ‘fair balance’ on advertisements. This policy required ads to give equal space on potential benefits and possible side effects. This requirement served as an unintentional restriction on DTCA to print media and despite the initial hesitant responses within the industry, DTCA spending quickly grew to \$12 billion annually by 1989 (Conrad and Leiter 2008). In August of 1997, the FDA issued formal guidelines for broadcast advertisements that relaxed the

pervious rules by allowing companies to list a source where consumers could find additional information instead of requiring all the information be included in the advertisement.

The most vocal industry opponents argue direct to consumer advertisements are inherently negative because they present misleading information and are focused on expanding market share rather than improving public health (Angell 2005, Moynihan and Cassels 2005, Goldacre 2012). These critics point out the marketing cycle for products is designed to stimulate demand for brand name prescription drugs only while they are still under patent; after patent protection ends and generics become available companies tend to cease marketing a drug. Some research has even indicated marketing can increase the price of a drug over time as sales, and usage, increase, a contradiction to the expectations of price sensitivity in basic economic theories on supply and demand (Faden et al. 2009).

Industry officials and representatives argue direct to consumer advertisements serve a vital function by educating the public about both the treatment options available as well as the conditions themselves. However, pharmaceutical companies use these marketing tools strategically to expand the market share of specific products. Companies are aware of the connection between direct to consumer marketing and product success. A strong marketing campaign serves to build the brand of a specific drug and increases the chance patients will ask their physician for that drug during an office visit (Applbaum 2009, Lexchin 2006).

Companies are also aware of the importance of marketing plans in the product life cycle. The prescription drug market is a competitive market where consumers frequently encounter several treatment options that may offer no perceivable differences in

outcomes. The financial success of a new product depends on a rapid adoption rate, and with the time of patent protection constantly decreasing, the window for a company to make money on a product is small. Therefore, it is common for corporations to devote a significant amount of marketing resources into advertising a product just prior to its launch on the open market (Applbaum 2009, 2010). This strategy increases the chance consumers will request the product sooner, which results in longer spans of treatment that maximize profits. The other patient targeted marketing strategy pharmaceutical corporations pursue is establishing relationships with patient advocacy organizations to build awareness on both prescription drugs and health conditions.

3.3.2 Patient Advocacy Organizations and Pharmaceutical Corporations

Non-profit patient advocacy organizations (PAO) have been part of the health care field for most of the 20th century. Some of these organizations have evolved into large, well known organizations, for example the March of Dime and the American Cancer Society (Rothman et al. 2011, Starr 1982). The early PAOs were funded by private individuals and were able to become influential and trusted stakeholders within the health care field (Rothman 2011 et al.). However, the structure of these organizations began to change during the 1980s with the rise of HIV and AIDS activist groups. These new groups represented a distinct change in organizational strategy because they focused on making new pharmaceutical treatments, including drugs still in experimental trials, readily available to patients (Rothman et al. 2011). At the same time, pharmaceutical companies began to view these organizations as potential partners for expanding their product markets and started increasing their financial donations to them (Moynihan and Cassels 2005, Rothman et al. 2011).

PAOs are perceived by outsiders to be primarily motivated by the desire to improve health care options for individuals but research has indicated these organizations now increasingly favor new, expensive medical technologies and brand name drugs (Conrad 2007, Rothman et al. 2011). However, evidence on the co-optation of patient advocacy organizations by pharmaceutical corporations is difficult to find because an asymmetry of information exist whereby pharmaceutical corporations are under certain legal obligations to report money given to advocacy organizations but advocacy organizations are not subject to the same disclosure requirements (Jones 2008, Rose 2013, Rothman et al. 2011).

Advocacy for the newest medical treatments does not necessarily indicate industry co-optation of a PAO but several instances support the conclusion that the relationship between the two stakeholders is not neutral. Marcia Angell (2005: 152) discussed the case of hepatitis C coalitions that appeared to be grassroots organizations but were revealed as initiated and sponsored by Schering-Plough, the manufacturer of Rebetron, the primary treatment for hepatitis C at the time. Another well-cited example is the case of the National Alliance for the Mentally Ill (NAMI). While receiving millions of dollars in funding from the pharmaceutical industry, NAMI used its political position to oppose black-box warnings and down play emerging data that linked antidepressant use to increased suicide rates in adolescents (Conrad 2007, Rose 2013). NAMI concealed both the amount of funding it received from the pharmaceutical industry and that it coordinated its lobbying efforts with drug makers; this information was uncovered and disclosed only after a government investigation on conflicts of interest (Rose 2013).

Patient advocacy organizations occupy an interesting stakeholder position within the pharmaceutical field. These organizations have differing interests from pharmaceutical corporations but their actions align with the commerce logic interest in expanding access to prescription drugs. PAOs position as advocates for improving health care provide the organizations with moral legitimacy that allows them to engage directly with policy makers on legislation related to pharmaceutical regulation. Nevertheless, many of these organizations also have direct financial ties with the pharmaceutical industry creating potential conflicts of interest that could negate an organization's moral legitimacy if these relationships were made public. The exact extent of industry ties is complicated by the information asymmetry mentioned earlier but researchers have estimated between 30 and 70 percent of all PAOs receive varying levels of financial support from the industry (Rose 2013). The acceptance of financial support does not automatically mean a PAO advocates for industry interest but the examples above indicate the potential for conflicts of interest and co-optations exist in these relationships.

Despite the potential risk of appearing to mislead the public, pharmaceutical corporations have an interest in continuing to support PAOs because these organizations also facilitate the marketing and branding of disease conditions (Moynihan and Cassels 2005). A good example of brand management utilizing PAOs is the expansion of attention-deficit/ hyperactive disorder from being a childhood problem to a condition also afflicting adults. Moynihan and Cassels (2005: 61-81) discussed in detail how events hosted by the Children and Adults with Attention-Deficit/Hyperactivity Disorder (CHADD) were sponsored by pharmaceutical corporations with the intent of spreading awareness on ADHD in adults while branding the solution with their product. The

significance of these industry tactics for Moynihan and Cassels (2005) was how they were hidden from public view. Company logos and product names appeared at the events but the events themselves were publicized as CHADD events even though a pharmaceutical corporation was covering all the expenses.

The research of Shelia Rothman and her colleagues (2011) provides detailed information about one company's relationships to PAOs. Rothman et al. (2011) analyzed the grant activity of Eli Lilly, one of the first U. S. pharmaceutical corporations to make its charitable donations available to the public. The most significant finding from their study is how the company acted strategically by donating to PAOs that aligned with the therapeutic areas of the company's bestselling products: neuroscience, endocrinology, and oncology. Because the company listed all the PAOs receiving donations, the researchers were able crosscheck the information by looking at the websites and tax filings for the 188 PAOs meeting the study criteria. Of these 188 PAOs, the researchers found complete data on 161 (85.6%) organizations. Of these 161 organizations, only 40 (25%) publically acknowledged receiving financial support from Eli Lilly. Not listing a corporate sponsor does not mean an organization is co-opted, but researchers argue that this lack of transparency is the main problem in accurately understanding the dynamics of the relationship between pharmaceutical companies and patient advocacy organizations (Angell 2005, Jones 2008, Moynihan and Cassels 2005, Rose 2008, Rothman et al. 2011).

This lack of transparency is not limited to the United States. Kathryn Jones' (2008) research addressed the issue of industry influence in patient advocacy groups in the UK. Jones' (2008) study used a similar method of crosschecking publically available

information on corporate donations with publically available PAO disclosure information. Her data also indicated companies made donations strategically by selecting organizations advocating for causes represented by the therapeutic classes of their products. Her general conclusion was that while the industry is not bankrolling or setting the agenda for advocacy groups, the lack of transparency in reporting financial connections constrains the identification of possible conflicts of interest.

In conclusion, pharmaceutical corporations structure their interactions with patients as actions of public awareness on the management of pathological conditions by framing patients as active health care consumers. Direct to customer advertisements rely on disease narratives to engender the salience of a disease state to potential customers and frame pharmaceutical products as a legitimate, if not the optimal, treatment option. Pharmaceutical corporations support patient advocacy organizations because they can generate public awareness on diseases and provide an additional legitimate platform for product advertisement. Moreover, when pharmaceutical corporations donate to advocacy groups, they tend to select charities advocating for diseases represented within their product range, demonstrating this is a strategic activity aligned with the logic order of the market as opposed to the logic order of care.

Within the pharmaceutical field, patients appear to be the stakeholders with the least amount of power to influence field dynamics and shape interactions. I do not propose that patients are passive actors, Patient Advocacy Organizations are initiated and lead by patients, but the relationship between pharmaceutical corporations and patient is dominated by the corporate agenda. Social media has provided some increased power to patients as a platform for public complaints, but this power is limited. While

pharmaceutical corporations may frame drug advertisements within narratives of care, the likelihood patients as a stakeholder group could directly influence dominant organizational strategy seems remote.

3.4 Pharmaceutical Corporations and Physicians

Physicians function as gatekeepers in the organizational field but their ability to perform this function has changed over time due to the actions of pharmaceutical corporations. During the 1980s, the structure of the relationship between pharmaceutical corporations and physicians shifted away from being a partnership in health care treatment towards a market based dynamic of unequal power where physicians are consumers of pharmaceutical products (Angell 2005, Applbaum 2009, Goldacre 2012, Jaakkola and Renko 2007, Jain 2007, Landa and Elliot 2013, Spurling 2010). Elina Jaakkola and Mijia Renko's (2007) study represents the structure of this new market dynamic as they frame physicians as "surrogate adopters" who evaluate new drugs using a different set of criteria than the end-user (patient). "As physicians evaluate the product's acceptability from their patients' viewpoint as well as their own, marketers of new products should communicate the key benefits of an innovation for both parties" (Jaakkola and Renko 2007: 342). Pharmaceutical companies are advised to understand the context in which physicians make decisions shapes physician perceptions about a product so the presentation of information to physicians should be treated as a marketing campaign to increase new product adoption (Cook 2006, Sismondo 2009). Applbaum (2009) succinctly summarized the new dynamic between pharmaceutical companies and physicians by stating, "The strategic goal becomes how to convert them from potential obstacles to compliant facilitators" (187).

3.4.1 Key Opinion Leaders, Ghostwriters, and Clinical Data

One of the main strategies pharmaceutical corporations employ to align physician interest with their own is the utilization of key opinion leaders (KOL). Pharmaceutical companies realized in the early 20th century that physicians were more responsive to product claims when they occurred through a direct physician-to-physician interaction (Fox 1961, Landa and Elliot 2013, Sismondo 2013). Pharmaceutical corporations now utilize KOLs for authorship on journal articles and as speakers at conferences and symposiums. The role of KOLs within the field is so important to the successful management of pharmaceutical products that a separate industry of companies has emerged focusing on locating, recruiting, and managing KOLs (Landa and Elliot 2013, Sismondo 2009, 2013).

The strategic goal for pharmaceutical companies in employing KOLs is to increase the adoption rate of products (Matheson 2008, Sismondo 2009). This is achieved through the careful selection of KOLs on the criteria of professional reputation and professional embeddedness. Another important selection criterion for KOLs is that their research should align with the product, meaning KOLs are generally already working and established in the therapeutic area of a pharmaceutical company's product portfolio.

Nevertheless, key opinion leaders are not industry shills but are reflexive actors within the field (Fox 1961, Goldacre 2012, Matheson 2008). KOLs are medical professionals aware of their ethical obligations towards patients and publically resent implications that they would advocate for inferior, or harmful, products because of their industry relationships. As Sergio Sismondo (2009: 640) found in his research: "Dr. A, for example, cheerfully comments: 'My mother and father are on a lot of the drugs I speak

for. I think they're terrific. So, I am not putting my parents on it because I am speaking for the company — it's the best drug.”” This statement indicates that while KOLs advocate on behalf of pharmaceutical corporations for specific products, they publically maintain a primary alignment with the logic order of care.

Becoming a KOL provides both professional and financial opportunities for a physician. KOLs can receive compensation for travel expenses to conferences and honorariums for giving conference talks. They can also receive honorariums for giving talks to local physicians groups. However, the financial benefits scholars are most critical towards are the available research grants from the companies of the products they advocate. Critics argue the real dynamics of the KOL relationships are not neutral but structured to align the larger presentation of medical knowledge to physicians with the interest of the pharmaceutical industry (Goldacre 2012, Matheson 2008, Sismondo 2009).

Pharmaceutical companies also strategically control the knowledge available on their products and seek to influence physicians by hiring ghostwriters on journal articles. Ghostwriting is the practice whereby a pharmaceutical company, or a company hired by a pharmaceutical company, writes an article on the results of a clinical trial and then solicits a physician to sign on as the primary author. The ability of the physician to make changes to the article varies, as well as, the access the physician is given to review the data. This practice is one of the most contested strategies within the pharmaceutical field because in addition to being seen by many as a subversive form of marketing (Goldacre 2012, Matheson 2008, Sismondo 2009, Spielmans and Parry 2010), it also raises questions on the scientific legitimacy of professional medicine. The extent of ghostwriting is hard to determine because it is an opaque practice but Marcia Angell

(2005), a former editor in chief at the *New England Journal of Medicine*, stated ghostwriting articles for professional journals has become increasingly commonplace.

Ghostwriting occurs because it meets the interests of both individual physicians and pharmaceutical corporations. The practice assists physicians in developing their professional reputations by increasing their publication count. Physicians, especially those with academic careers, are evaluated on their impact within the discipline and publication counts are a prime measure of this (Sismondo 2009). Ghostwriting benefits companies through practices that generate the highest impact and product exposure: strategically targeting KOLs for authorship and submitting to the most prestigious journals. Both of these tactics can improve the cultural capital of a product, regardless of its scientific merit, by engendering the perception in other physicians that the drug provides a greater advancement in treatment because a leading professional in a prestigious journal endorsed it (Applbaum 2009, Sah and Fugh-Berman 2013). Cognitively, this strategy is a way to get around the problem of a reflexive gatekeeper because delivering a questionable message through a trusted source discourages the receiver from questioning the validity of the message.

The medical profession has been reluctant to address the issue of ghostwriting. Many physicians do not think it is a problem because the ghostwriter is able to review and revise the work before the final submission (Goldacre 2012, Sismondo 2009). Journals also benefit from ghostwriting because the requests for reprints of individual articles by pharmaceutical companies, drug representatives use reprints of articles as handouts during office visits, brings in a significant amount of revenue (Spielmans and Parry 2010). Nevertheless, as an institutionalized practice, ghostwriting threatens the

legitimacy of scientific authority within professional medicine because the extent and impact of the practice is currently unmeasurable.

Related to the practice of ghostwriting, the ownership of clinical research data by pharmaceutical corporations also threatens the scientific legitimacy of professional medicine. Ben Goldacre (2012) and others (Abraham 1996, Angel 2005, Moynihan and Cassels 2005, Spielmans and Parry 2010) argue one of the biggest problems in the pharmaceutical field is the misleading use of evidence in professional journal articles. The corporate ownership of data is viewed as problematic because scientific legitimacy claims rest on the idea of objective analysis but when data are treated as proprietary products, their validity cannot be assessed.

Brown (2013) argued that the incentive to manipulate results is tied to the financial logic of the industry and made possible because the system of scientific review at journals relies on routinized practices, like test for statistical significance, which can be gamed, instead of engaging in difficult scientific judgement calls. Based on his extensive fieldwork within the industry on publication management, Sismondo (2009) argued the people and companies producing ghostwritten work understand the importance of scientific standards and the quality of the articles produced is not inferior to non-industry funded work. However, ghostwriting is a top-down managed process where the companies providing the service are financially dependent on pharmaceutical corporations. This interorganizational structure means that despite the importance of maintaining scientific standards, publication management companies know their value in the pharmaceutical field is determined primarily by producing material that successfully markets products and not just good science (Sismondo 2009). The dynamics of KOLs and

ghostwriting indicate the concern of pharmaceutical corporations over scientific validity may only be significant within physician interactions and is not likely to represent the dominant organizational strategy within the field.

3.4.2 Advertising to Physicians

Pharmaceutical corporations also engage in direct marketing to physicians through advertisements in medical journals. Pharmaceutical companies argue that these advertisements serve educational purposes and research has revealed physicians do use advertisements in this way (Othman et al. 2009). This is a lucrative marketing strategy for corporations with research indicating returns of \$2.43 for each dollar spent during the first four years of a products lifecycle and upwards of \$4 after that (Othman et al. 2009). The systematic review of studies on journal advertisements by Noordin Othman and colleagues (2009) found that most advertisements used low quality references and studies examining advertisements for misleading claims consistently find them. While researchers point out these are problems with allowing direct to physician advertisements, journals have been reluctant to address the issue because many rely on the revenue advertising brings in (Goldacre 2012). Furthermore, the journals typically have internal standards and review policies that they argue are sufficient to identify fraudulent claims (Othman et al. 2009).

One of the most well researched areas in the relationship between pharmaceutical corporations and physicians is the practice of using drug representatives to market products through direct interactions with physicians. Research consistently indicates that a cognitive dissonance occurs in the practice whereby physicians do not think accepting small items or the occasional meal from drug representatives influences their prescribing

habits but they think it does influence their peers (Chimonas 2007, Goldacre 2012, Sah and Fugh-Berman 2013). However, the evidence is clear that physician's prescribing habits are influenced by gift practices and that companies, with their sophisticated marketing analysis teams, are aware of this or else they would not be spending money on the practice (Chimonas 2007, Goldacre 2012, Sah and Fugh-Berman 2013).

Research on the interactions between physicians and drug industry representatives indicate that these are complex social situations. Physicians view interactions with drug representatives reflexively and claim that they critically evaluate the material presented rather than accept the message at face value (Chimonas 2007, Goldacre 2012, Jain 2007). Physicians perceive the interactions as educational and informative, but at the same time are aware drug reps are sales personnel trained to present information biased towards their products. Yet the awareness of receiving a biased message does not prevent bias from occurring since researchers consistently show that physician prescription rates increase for specific medications and company products after a drug representative visit (Goldacre 2012, Sah and Fugh-Berman 2013). Susan Chimonas (2007) and her colleagues applied cognitive dissonance to explain how physicians negotiated this contradiction and argued that creating voluntary guidelines to regulate these interactions would not change physician behavior but the practice would have to completely stop in order to address the issue.

The final way pharmaceutical companies manage the information physicians receive is through continuing medical education. Continuing medical education requirements in the United States have been in place since the 1970s and mean that physicians must accumulate a certain amount of education hours annually to maintain

their medical license. The Accreditation Council for Continuing Medical Education (ACCME), formalized by the AMA in 1981, regulates and certifies continuing medical education programs but a range of other organizations actually develop and run the programs. Some of these organizations are almost completely supported by money from pharmaceutical corporations while others, such as the Veterans Administration, are less connected to industry (Brody 2009). The ACCME has strict guidelines on the content of continuing education programs but industry members sit on the boards developing these guidelines, which raises conflict of interest concerns. Pharmaceutical corporations also hire KOLs as presenters and provide them with scripts and slideshows, insuring the message physicians receive by maintaining control over program content (Brody 2009, Sismondo 2013).

In conclusion, pharmaceutical corporations structure their interactions with physicians in the field through practices designed to manage the availability and content on knowledge about pharmaceutical products. The strategies used range from the subtle control of information through key opinion leaders and ghostwriting to overt advertisements for products in medical journals and designing continuing education curriculum. I contend it is not that physicians do not adhere to the logic of care in the interactions with pharmaceutical corporations; rather pharmaceutical corporations have become more skillful in negotiating these interactions around their commercial interest. I think Sergio Sismondo best captured the institutionalized structure behind these field dynamics when he stated:

Pharmaceutical companies not only shape taken-for-granted medical knowledge and opinions, but have also, in many situations, naturalized their

presence and roles: most physicians see the companies as playing legitimate roles when the companies promote products in clinics, when they create and distribute medical research, and when they fund and provide continuing medical education. (Sismondo 2013: 640)

3.5 Pharmaceutical Corporations and the Retail Pharmaceutical Supply Chain

Unlike in other commercial industries, pharmaceutical corporations cannot sell their products directly to the consumer. Instead, products move through a series of intermediary organizations until reaching the patient. Further complicating the supply process is the fact that most consumers do not pay the complete cost of a prescription drug at the time of purchase. Payments move through a different series of intermediary organizations before reaching pharmaceutical corporations. This market structure is best understood as a subfield within the larger pharmaceutical field. Pharmaceutical corporations hold the dominant position in terms of drug pricing but the fragmented market created by different intermediary paths for supply and payment have allowed other stakeholders to gain a significant amount of negotiating power against the interests of pharmaceutical corporations.

3.5.1 Prescription Drug Pricing

Few people in the United States currently pay for prescription drugs out-of-pocket but this was not always the case. In 1970, 82.4% of retail expenditures on prescription drugs were paid for out-of-pocket but by 2013, this figure had been reduced to 16.9% and health insurance was covering 82.1% of expenditures (Centers for Medicare and Medicaid Services 2015). Unlike other consumer goods, there is no single price for a prescription drug in the United States; instead, drug pricing is a market of differential

pricing, known as a Ramsey pricing scheme (Frank 2001, Lybecker 2006, Vogel 2007). Patients' who use cash to purchase prescription drugs pay the highest price while individuals with drug benefits pay less, both in direct out-of-pocket cost and in the amount their insurer reimburses the retailer.

The common criticism of drug prices in the United States follows narratives of corporations engaged in profiteering and cost shifting (Spitz and Wickham 2012). The methods pharmaceutical corporations use to determine drug prices are proprietary knowledge but firms publicly state that price determinations reflect the need to remain profitable and continue engaging in research and development (Freeman 2006). The recent decision by Turing Pharmaceuticals to raise the price of Daraprim from \$13.50 to \$750 a pill is unique only because of the sustained attention it has received which is most likely due to the CEO's brash manner and the presidential election cycle rather than the actual price hike (Ramsey 2015).

Most other industrialized nations employ a national level system of price control on prescription drugs, but in the United States, there is no regulation on drug pricing and private corporations act as intermediaries altering the price between pharmaceutical corporations and the consumer. Scholars argue that this structure of pharmaceutical coverage creates price differentials because prices are determined through negotiations between profit-maximizing firms and price-sensitive buyers (Frank 2001). Framing prices as a process of structural factors counters the ideological argument that pharmaceutical corporations are engaging in excessive rent seeking, or gouging the customer, by charging high prices. Four types of organizations occupy the role of negotiators in the pharmaceutical supply chain between manufacturers and consumers: health maintenance

organizations (HMOs), pharmacy benefits managers (PBMs), wholesale distributors, and retail pharmacies.

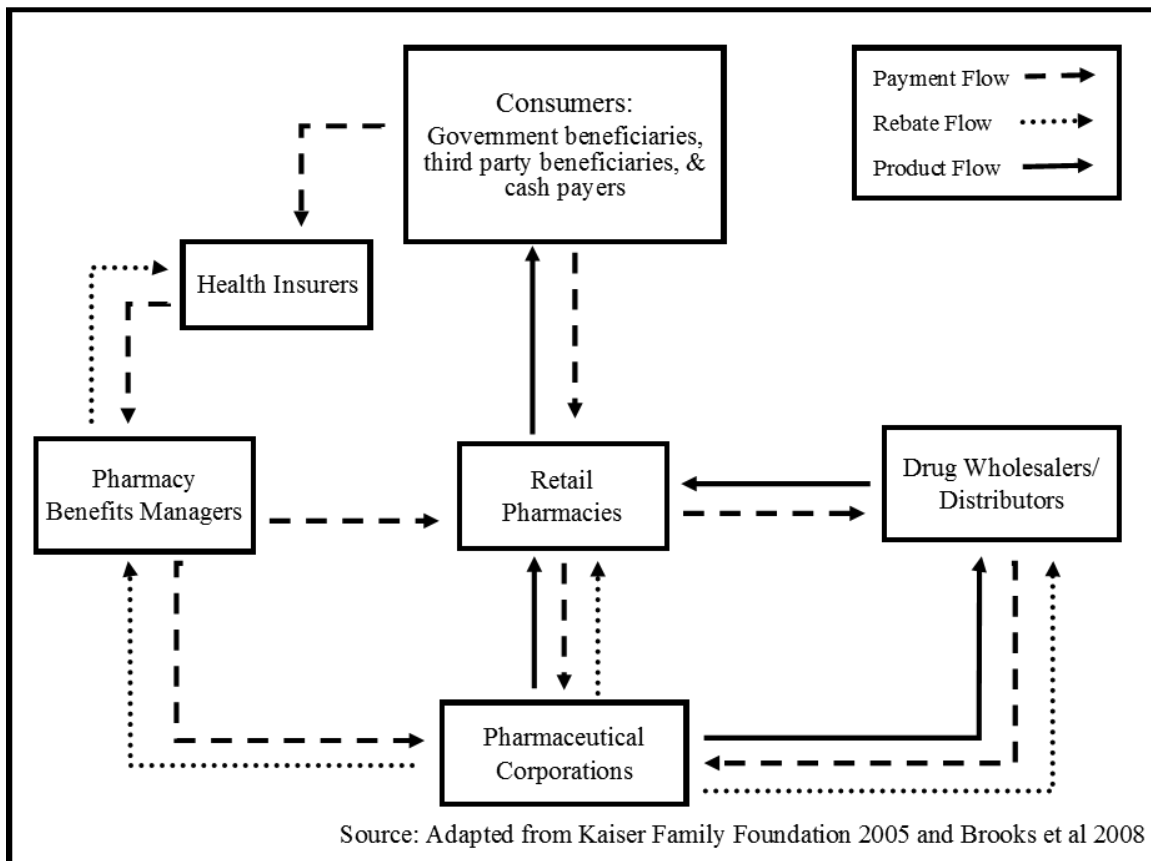


Figure 3.1 Stakeholder Connections in the United States Retail Pharmacy Supply Chain

3.5.2 Structure of the Pharmaceutical Supply Chain

Since the 1980s, HMOs, PBMs, wholesalers, and retail pharmacies have held different levels of influence within the pharmaceutical supply chain, but organizations of all four types continue to operate as negotiators within the pharmaceutical field. One of the key strategies employed by HMOs and PBMs is the use of formularies to restrict consumer drug choice and thereby lower the organizational cost of drug coverage. A drug formulary is a list of drugs for routine use that have been approved for some level of cost coverage (Neumann 2004). There are three categories of formulary lists based on the

guideline's incentive structure: open, preferred, or closed (Simonet 2007). Drug choice is unrestricted in open plans, meaning that any drug that a physician prescribes for the patient are covered. In preferred plans, some unlisted drugs are covered only if the patient receives prior authorization. Finally, in closed plans, unlisted drugs are not covered in any form, meaning that the patient has to pay the total cost out-of-pocket.

Cost-effective analysis is the basis of drug evaluations for formulary inclusion. To avoid conflicts of interests independent pharmacy and therapeutics committees oversee the drug selection process using information from a variety of sources that range from anecdotal physician evidence to clinical trial data from pharmaceutical manufactures (Neumann 2004). Large market PBMs are able to receive clinical data from pharmaceutical corporations that is not publically available because the companies want their products listed in the formulary. This practice demonstrates the strength of formularies as interorganizational negotiation tools.

Critics of the process argue the focus of pharmacy and therapeutics committees is on reducing pharmacy budgets rather than patient health. Furthermore, formularies are proprietary products and even though efforts to standardize them using evidence-based medicine have been made, the decision-making is still black-boxed to a certain extent, suggesting that some differentiation between formulary listings are the result of personal preferences rather than objective medical evidence (Neumann 2004). These facts indicate the interests of pharmacy and therapeutics committees likely align with the logic order of commerce.

Health Maintenance Organizations were the earliest large organizations that acted as intermediaries between pharmaceutical corporations and patients. As Jonathan Weiner

and his colleagues (1991) pointed out the early efforts of HMOs were designed to reduce the cost of pharmaceuticals by discouraging high price drug usage rather than actively negotiating lower prices with pharmaceutical corporations. Weiner et al. (1991) stated this strategy was adopted primarily because prescription drugs accounted for only a small part of health care spending for insurers prior to the 1990s, making interorganizational negotiation a financially ineffective method to reduce overall health care cost. Rather than controlling patients, HMOs sought to control physicians and pharmacists by using formularies and imposing mandatory generic substitution rules. While these practices did lower the cost of drug usage on individual prescriptions, Weiner et al. (1991) found that having drug coverage through an HMO actually increased overall drug usage in patients and negated the overall cost reductions for the organization. This outcome is not unexpected and is referred to as the moral hazard of health care coverage (Arrow 1963, Hoffman 2006). By the end of the 1980s, HMOs and other traditional fee-for-service health insurers were increasingly turning to pharmacy benefits managers as a more efficient strategy for managing customer drug benefits and reducing drug cost.

Pharmacy benefit managers (PBMs) are third party organizations that negotiate rebates and discounts between pharmaceutical manufacturers on behalf of their clients: HMOs, traditional health insurers, retail pharmacies, the Federal Government, hospitals, and other organizations that provide prescription drug access (Simonet 2007, Sroka et al. 2000). Drug formularies are the primary strategy that PBMs employ as leverage to negotiate with pharmaceutical manufacturers. Since not all drugs are included in a formulary, formularies act to either provide access to or exclude specific pharmaceutical products from the market segments covered by a PBM's clients. Pharmaceutical

corporations want their products to be included in formularies and are willing to negotiate rebates directly with PBMs based on the size of the potential market.

In addition to managing drug billing for their clients, PBMs also collect data on patient pharmaceutical usage and physician prescription records. The collection of patient data is valuable for managing individual health by spotting potential drug interactions or duplications. Physician prescribing data is useful for payers to assess the success of their control mechanisms. The PBM industry is highly concentrated with a few corporations controlling large market segments and occupying dominant positions (Simonet 2007). The structure of the industry, as well as the value of the data collected by PBMs, led three of the largest pharmaceutical corporations to acquire PBMs during the 1990s as a strategy of vertical integration; however, almost all of these acquisitions ended as costly failures (Simonet 2007).

Daniel Simonet (2007) argued while the pharmaceutical corporations that acquired PBMs during the 1990s publically presented the actions as intended to improve patient quality and safety, the reality was these corporations pursued the acquisitions as a strategy to obtain market control. “PBM ownership was a mean to obtain information on patients and prescribers, to increase control on drug prescription, to secure an access to markets and build entry barriers” (Simonet 2007: 19). The three major pharmaceutical corporations that acquired PBMs were Merck, SmithKline Beecham, and Eli Lilly; each firm acquired a large PBM with coverage ranging from 14 million patients to 56 million patients and at costs between \$2.3 billion and \$6.6 billion. The pharmaceutical corporations argued post-acquisition that these PBMs would operate autonomously from the parent corporation in terms of formulary decision-making but in each case, there were

formulary changes after the acquisition that benefited the parent firm at the expense of other pharmaceutical corporations (Simonet 2007).

This strategy of vertical integration, however, resulted in long-term failures in all cases because of countervailing actions taken by other stakeholders in the pharmaceutical field and unexpected internal complications from the mergers. The first external pressure came from government regulators. The Federal Trade Commission intervened in the Merck-Medco and Eli Lilly-PCS acquisitions to limit the ability of the parent company to alter the PBMs formulary independently. The FTC did not place limits on the SmithKline Beecham-Diversified agreement. Physicians also expressed hostility to these acquisitions for several reasons: formulary usage denies individual practitioner experience, drug pricing is not transparent which complicates formulary compliance, and the asymmetry between PBMs and practitioners creates a situation where if practitioners ignore the financial arrangements created by the PBM and parent company physicians would no longer be the best patient advocates (Simonet 2007). In addition to these external factors, PBMs proved difficult to integrate within the structure of the parent company because of the firewalls required by the FTC.

Financially, these acquisitions did not produce the expected market gains, and by 2003, all three pharmaceutical companies had spun-off or sold the PBMs they acquired (Simonet 2007). While the vertical integration of PBMs did not work for pharmaceutical corporations, since Merck's sale of Medco several major retail pharmacy chains have pursued the strategy (Simonet 2007). The most notable examples are the 2007 acquisition of Caremark by CVS, the second largest PBM at the time, and the recent announcement by Rite Aid that it will complete an acquisition of EnvisionRx by 2017.

Retail pharmacies are another key stakeholder in the pharmaceutical supply chain because they are the delivery point to the consumer. In 2014, standalone chain and independent pharmacies accounted for 55.5% of the total number of prescriptions filled in the U.S. (Drug Channels Institute 2015). Pharmacy outlets in mass merchant or supermarkets accounted for another 23.4% of prescriptions filled. Retail pharmacies occupy an intersecting position in the supply chain because they negotiate financial arrangements with PBMs and insurers for the right to be providers to their clients and they negotiate supply orders with wholesalers and pharmaceutical manufactures.

The cost of a drug at a retail pharmacy is a component of two factors. First, the size of the pharmacy, chain or independent, determines its bargaining power with PBMs and insurers (Brooks et al. 2008). Because PBMs gain negotiation power through the coverage size of their market, chain pharmacies get better deals than local or independent operators. The second factor is the customer type. There are three main categories of retail customers: government beneficiaries, private third party covered beneficiaries, and cash-paying patients (Brooks et al. 2008). The price a customer pays is based on the negotiation between the pharmacy and the PBM with cash customers paying the most; therefore, the same drug has different prices within the same pharmacy. The profitability of a pharmacy is determined by its ability to negotiate a low payment rate with the PBMs and high rebate rates with wholesalers and manufacturers. Brooks et al. (2008) stated that approximately 70% of pharmacy stock comes from wholesalers and the remaining 30% from manufactures. The fact the majority of retail drugs arrive at pharmacies through wholesale distributors is another element distorting the publically listed price for a drug and the actual price patient's pay.

3.5.3 The Federal Government as a Powerless Buyer

Fligstein and McAdam (2012) explicitly discussed the importance of considering the role of government within a strategic action field. Unlike other fields, the Federal government occupies two separate roles in the pharmaceutical field. The first role, discussed earlier in the chapter, is the regulatory role in determining what products are allowed on the market. The second role is as a purchaser of pharmaceutical products through different government sponsored health care programs and health care benefits provided to government employees. This makes the Federal government the largest single purchaser of prescription drugs in the United States, but when congress expanded Medicare coverage to include prescription drugs, the Federal government was explicitly denied the ability to negotiate prices directly with pharmaceutical corporations (Newhouse 2004).

This legislative restriction has resulted in the United States having higher average drug prices on almost all major brand name pharmaceuticals because drug manufacturers use Medicare prices as the starting point for negotiations with purchasers. By prohibiting the largest purchaser to negotiate on prices, the Federal government is forced into the role of a price-taker when economic theory on market structure predicts the Federal government should be the price-maker (Vogel 2007). Many industry critics contend patients in the United States are in essence subsidizing drugs for the rest of the world (Goldacre 2012, Lexchin 2006).

Medicare Part D, the prescription drug component of Medicare currently enrolls 72 percent of eligible Medicare beneficiaries (Hoadley et al. 2015). However, despite the high enrollment, there is considerable variation in services because the program actually

offers beneficiaries options of plans sponsored by private companies. This further undercuts the ability of Medicare to receive favorable prices since program recipients are spread across multiple private markets instead of being consolidated into a single Medicare market. The other oddity of Medicare Part D is the much maligned “donut hole” (Newhouse 2004). The drug plans offered through Medicare Part D provide varying levels of coverage up to a certain limit; the average plan’s limit is \$3,310 in 2016 (Kaiser Family Foundation 2015). After the limit is reached, the enrollee is responsible for the majority of their drug cost until they reach a total of \$4,850 (an out-of-pocket cost of \$1,540), after which Medicare and the patients’ drug coverage provider again cover most of the patients’ drug cost.

In addition to Medicare Part D being a complicated system for patients to navigate, the program further reveals how pharmaceutical corporations occupy the dominant role in the field. In a 2006 letter to the *New England Journal of Medicine*, Congresswoman Louise Slaughter discussed the legislative processes that occurred during the final legislative period on Medicare Part D. According to Slaughter (2006), the final bill was altered 24 hours before the vote during closed door meetings between congressional leaders and industry representatives. Congresswoman Slaughter’s assessment makes it clear her colleagues made sure the pharmaceutical industry’s interests, in terms of drug pricing and preventing drug reimportation, were represented in the bill at the expense of providing patients access to cheaper drugs.

In conclusion, the pharmaceutical supply chain in the United States is a complex network of several different organizational players. Through various different mechanisms, the stakeholders are able to negotiate favorable outcomes with

pharmaceutical manufactures. Size is a key organizational feature that provides increased bargaining power because size corresponds to the potential market segment a pharmaceutical corporation can gain access too. Several large mergers and acquisitions occurring within the past two decades have also influenced the pharmaceutical supply chain by creating a more concentrated market. The three largest PBMs in 2003, controlling 52% of the market, are now two larger organizations with the acquisition of Caremark by CVS and the 2012 merger of Express Scripts and Medco Solutions.

The organizational strategies of the majority of stakeholders in the pharmaceutical supply chain appear to align with the logic of commerce. Suppliers in the field, pharmaceutical corporations, retail pharmacies, and wholesalers, act to keep prices high in order to maximize profits. Purchasers in the field, pharmacy benefit managers and health insurers, negotiate with supplies to reduce their cost but not necessarily the cost to patients. The end consumer, patients, are insulated from these negotiations, which results in most patients being unaware of the total costs of prescription drugs. The fact complaints about high drug costs are made through public media indicates patients as stakeholders occupy a marginalized role in the pharmaceutical supply chain. That this marginalization of patients affects the organizational strategy of pharmaceutical corporations is indicated by the common practice of raising drug prices on acquired products.

3.6 Conclusion

This analysis shows the multitude of stakeholders within the pharmaceutical field creates a dynamic system with pharmaceutical organizations at the center. The structure of the field is fragmented such that pharmaceutical corporations, while occupying the dominant field position, are subject to a variety of constraints that result in

pharmaceutical corporations in general pursuing distinct strategy sets at each site of stakeholder interaction. As the previous literature indicates, these strategies are not isolated but align with the three logic orders of commerce, care, and science, which create differing expectations and power relations.

Pharmaceutical corporations interact with the Food and Drug Administration through the logic of science. While the FDA represents a potential countervailing actor within the field, legislative action has created a situation where the agency is financially dependent on pharmaceutical corporations, making anti-industry decisions uncommon. Furthermore, the regulation of pharmaceutical products is limited to safety and efficacy demonstrated through clinical data gathered primarily from randomized control trials, not comparative experiments, preventing the organization from developing best practice options for medical professionals. Finally, FDA is dependent on applicants to submit data, allowing corporations to manage the review process further by strategically selecting the information provided for evaluation.

Pharmaceutical corporations interact with patients through the logic of care in two capacities. Patients are primarily consumers, and in the United States, pharmaceutical corporations are able to market products directly to patients. This allows pharmaceutical companies to increase demand for a product directly through advertisements and indirectly by raising awareness on an issue as a potential health concern. The second component of interaction between pharmaceutical corporations and patients is mediated through partnerships with patient advocacy organizations that provide legitimacy for awareness campaigns by framing them as educational and public health concerns.

Pharmaceutical corporations interact with physicians through the logic of care. This assertion may sound contradictory because the methods of communication between these stakeholders groups are scientific, but the underlying message of the content is on improving patient outcomes. The point of medical journal articles from the pharmaceutical industry perspective is not to present data for physicians to independently evaluate but to use data to support the adoption of a specific treatment. The use of key opinion leaders highlights how the delivery of the message is dominant in the interaction over the actual scientific value of the results.

Finally, pharmaceutical corporations interact with payers and purchasers in the pharmaceutical supply chain through the logic of commerce. Pharmaceutical corporations dominate these interactions by serving as the price makers in the market. However, the complex and fragmented structure of the general U.S. health care system weakens this role because large purchaser organizations are able to capitalize on their position as gatekeepers to the market and negotiate favorable prices.

While the Food and Drug Administration and physicians both act in a regulatory capacity between pharmaceutical corporations and the end consumer, patients, their overall power in the field has diminished from previous periods. Conversely, patients gained power within the field in response to the larger shift in health care management towards the logic of commerce but are unable to leverage their stakeholder position to negotiate on drug prices. Understanding these current trends and why these stakeholders are important within the field requires additional historical context on the formation of the field. The next chapter is a historical analysis of the pharmaceutical field in the United States and traces the development and changing dynamics within the field.

CHAPTER 4

DEVELOPMENT OF THE UNITED STATES PHARMACEUTICAL FIELD

4.1 Introduction

The purpose of this chapter is to provide historical evidence on the development and changes in the United States pharmaceutical field that led to the current dynamics discussed in the previous chapter. Historical analysis provides the context institutional theorists argue is critical for understanding how organizational behavior is institutionalized; specifically historical analysis reveals how changes in stakeholder interests and power relationships within a strategic action field act as external effects on organizational strategy. Fligstein and McAdam (2012) argue that a historical analysis is a critical part of the process for studying strategic actions fields because it identifies collective actions, distributions of stakeholder power, and processes of settlement negotiation.

Power relations in the field, determined by which stakeholder constructs the “rules of the game” (North 1990), are revealed by analyzing how settlements are reached through negotiations during periods of contention. Changing power dynamics is one mechanism that incorporates new institutional frameworks into an established organizational field. For example, Scott et al. (2000) demonstrated how changing power relations in the national health care field resulted in the organizational strategy of Bay Area hospitals shifting to align with the institutional logic of the dominate stakeholder. The goal of this historical analysis is to illustrate how the historical context of the United

States pharmaceutical field has led to the current field structure of pharmaceutical corporations as dominant stakeholders over Federal regulators, physicians, and patients and created a field of institutional pluralism between the logics of science, care, and commerce.

Historical analysis also highlights the value of organizational embeddedness advocated by institutional theorists. The strategic adjustments organizations make in reaction to environmental changes are more apparent through the history of an organizational field. Understanding institutional effects requires evaluating how organizations in the same industry respond to the same external mechanisms. Institutionalized responses are indicated by strategic patterns between organizations. In a field of institutional pluralism, historical patterns in organizational strategy should reveal if the dominant logic order within a field changes over time and the relative influence between logics.

Dominant logic orders are stronger indicators of legitimate strategy; therefore, overtime the majority of organizations are predicted to change strategies primarily when the dominant logic of the field shifts. Organizations are predicted to adopt alternative strategies for organizationally specific reasons. Additionally, organizational strategy can be dependent on the historical context of the organization. For example, Powell and Sandholtz (2012) showed the professional background of a biotech startup's founder, academic, corporate, or financial industry, had a significant impact on the organizational strategy of the firm. As Chandler (1977) and Fligstein (1985) demonstrated, organizational strategy within an industry is susceptible to historical changes in management ideology as the background of executives within a firm changes. This

historical analysis contributes to the project goals by charting the development and changes within the pharmaceutical field that allow contemporary organizations legitimate options in selecting organizational strategies.

4.2 Emergence of the Organizational Field, Late 19th Century to 1910s

The use of herbs and compounds for medicinal purposes traces back to ancient times but the defined organizational field for the pharmaceutical industry in the United States developed around the turn of the 20th century. The pharmaceutical trade originated in the United States during the Colonial period primarily through importation businesses. After the Revolutionary War, the pharmaceutical trade shifted from an importation based industry into homegrown manufacturing. While some of these early manufacturers reached the level of national distribution, there was little collective action between companies. It was only after the Federal government began to propose industry wide regulations in the late-19th century that the collective action necessary for a strategic action field began to emerge. During this time, pharmaceutical organizations as a group acted mainly through reactionary positions to deal with the mobilization of external actors on their businesses. This lack of strategic action resulted in the medical profession and Federal government becoming the dominant stakeholders when the pharmaceutical field emerged at the beginning of the 20th century.

4.2.1 The Colonial Period and 19th Century

Colonists purchased brand name drugs imported from European manufacturers, and aside from a few local entrepreneurs capitalizing on Native American “cures,” the production of indigenous pharmaceuticals in the colonies was non-existent (Young 1961). High import cost led to a lively business of pharmaceutical fraud whereby druggist

would purchase or acquire the empty bottles of brand name European products and refill them with homemade mixtures. Colonial independence did not immediately change these practices, as industrious new American producers packaged their products in containers resembling the imported goods to capitalize on customer loyalty (Young 1961). The increasing consumption caused by an expanding middle class and loose, or non-existent, regulations lead to an explosion of novel drug products on the American market during the 19th century.

Drug manufacturing during the 19th century was not unified by the collective behavior that defines strategic action fields but instead was divided between medical practitioners who produced their own products or had pharmacists mix compounds by prescription, small manufactures who produced known compounds for pharmacies to distribute, and patent medicine companies which marketed and sold secret formula products directly to the public (Starr 1982). Patent medicine companies did not actually sell patented products as they are defined by current patent law, which requires patent seekers to submit the chemical details of a product to the government, but sold proprietary products, allowing them to keep the formulas secret. These companies varied in scale from small firms with local distribution operations to larger firms with regional and national distributions (Young 1961).

Patent medicine companies were direct competitors to physicians in the 19th century by not only manufacturing drugs for curative purposes, but also publishing guides to achieve good health and inviting people to write in to them for personal health advice. Patent medicine companies threatened the organization of professional medicine around the logic of science because formulas for the compounds were propriety secrets

and companies were not required to demonstrate their efficacy or provide more than anecdotal evidence in support of their curative claims. Patent medicine companies employed strategies that framed their products as resulting from scientific discoveries when in fact they rarely conducted any scientific evaluations on the products.

Starr's (1982: 128) example of William Radam's Microbe Killer is an example of how patent medicine companies gained legitimacy for their products through association with the medical community's science based professional project during the 19th century (Abbott 1988). Radam's Microbe Killer was a homemade tonic consisting of water, red wine, hydrochloric and sulphuric acid. The product's success is attributed not to its efficacy, but to William Radam's skillful advertising by capitalizing on the discovery of microbes (Young 1961, Starr 1982). The American Medical Association adopted a classification system in the late-19th century to distinguish between drug products and assert jurisdictional control over pharmaceutical treatment. The classification system divided pharmaceuticals into two categories: "ethical" preparations with known compositions advertised directly to medical professionals and available to patients only by prescription and "patent medicines" with secret formulas marketed directly to the public and available without physician oversight (Starr 1982). This categorization was an attempt to prevent patent medicines from being viewed as legitimate medical treatments by the public.

4.2.2 Patent Medicine Companies

Lydia Pinkham and her Vegetable Compound is a classic example of the products produced by the patent medicine industry and the organizational strategies pursued by these companies. Mrs. Pinkham was not a medical professional, she was a former

schoolteacher who took an herbal formula that her husband had received through a debt settlement and, with a few alterations, began selling it as a cure-all tonic (Conrad and Leiter 2008). Originally, Pinkham made her nostrum in the basement of her home in Lynn, Massachusetts and sold it locally but she expanded her business through the strategic use of newspaper advertisements. First advertised in the *Boston Herald* in 1876, Lydia E. Pinkham's Vegetable Compound, was touted as a treatment for "Female Weaknesses", which included menstrual cramps, diseases of the kidneys, and other issues related to female anatomy (Conrad and Leiter 2008, Starr 1982).

Pinkham marketed her product directly to consumers and advertised her product not only as a cure for specific illnesses but also as a substitute for treatments offered by medical professionals. Starr (1982) recounts one instance of a woman who wrote Pinkham to inquire if Pinkham's compound would cure her prolapsed uterus because she wanted to avoid the operation her physician said was necessary. Pinkham's reply was, "By all means avoid instrumental treatment for your trouble. Use the Compound as you have been using it – faithfully and patiently – and it will eventually work a cure" (Starr 1982: 128). This example illustrates the dominant organizational strategy of patent medicine companies at the time: marketing is what matters. James Young (1961) argued the patent medical industry was pivotal in creating modern mass advertising. One of the more extreme marketing tactics used by patent medical companies that led to public outcry and eventual regulations on advertising methods was painting cliff sides along railroad routes (Young 1961). With no formal or legal federal regulation of drug production, companies had considerable leeway to make health claims about their products with risk confined mostly to public backlash when the products failed to deliver.

Direct to consumer advertisements and the personal touch of advice letters proved successful for Pinkham's company. In fact, the company continued to advise women to write Mrs. Pinkham for almost 20 years after her death. The success of Lydia E. Pinkham's Vegetable Compound is attributed to the company's marketing strategy rather than any curative properties of the tonic (Conrad and Leiter 2008). Starr (1982) argued it was reliance on direct marketing over substantive evidence, specifically the positioning of nostrums and tonics as alternatives to professional treatment, that led to the eventual decline of the patent medicine companies in the early 20th century. Young's (1961) detailed analysis of specific patent medicines supports this conclusion as well and illustrates how flamboyant owners made some of the biggest patent medicine fortunes through showmanship rather than clinical efficacy.

4.2.3 External Pressure and Collective Action

Patent medicine companies established the Proprietary Medicine Manufacturers and Dealers Association in 1881 as a lobbying organization to repeal the taxes on proprietary drugs enacted during the Civil War (Young 1961). The Proprietary Medicine Manufacturers and Dealers Association actions focused on the business structure of the industry, advocating mainly for lower tax rates and the freedom to make health claims in marketing. Their competitors, physicians and other medical professionals, created professional associations that focused on developing a cohesive institutional logic of professionalism for their practices based on science. The result was the emergence of the organizational field of pharmaceutical development with only one stakeholder possessing the power of collective behavior and able to exert influence shaping the logics of the field.

The American Medical Association initially rejected the use of patent drugs as valid treatment options by physicians on the grounds that medical knowledge and techniques should belong to the profession but the organization did not have enough political power to enforce this rule nor influence public policy regarding drugs until the beginning of the 20th century (Starr 1982). Starr (1982) argued three changes occurred between 1900 and 1910 that allowed professional medicine to gain dominance over the patent drug manufacturers: muckraking journalists and other progressives joining the cause against these products, a growing membership finally giving the AMA the necessary financial resources to launch successful lobbying and public awareness campaigns, and ethical drug makers beginning to recognize their dependence on physicians as gatekeepers.

Throughout the 19th century patent medicine makers were constantly subjected to negative publicity; however, with the large diversity of newspapers, the most successful manufactures were able to maintain their market share by purchasing favorable editorials from competing publishers or even disturbing their own publications (Young 1961). The ability of patent medicine manufactures to purchase or present favorable counter opinions started to change around the turn of the 20th century corresponding to rise of professional journalism. Muckraking journalists began to increasingly target patent medicine companies through exposés that revealed fraudulent products and practices. Starr (1982) detailed the work of Samuel Hopkins Adams at *Collier's Weekly* noting how his series of articles targeted a wide range of companies and used tactics such as printing the headstones of individuals who died of diseases shortly after taking the supposed cures. Journalist like Adams contributed to structuring the organizational field of the

pharmaceutical industry by furthering the jurisdictional claims of professional medicine as the only legitimate source for evaluating drugs in the minds of the public. “The message underlying the exposés was that commercial interests were dangerous to health and that physicians had to be trusted” (Starr 1982: 130).

Financially both the popular press and medical journals remained dependent on the patent medicine industry for the substantial amount of income brought in by their advertisements. This relationship was altered with the American Medical Association 1906 publication *New and Nonofficial Remedies* (Conrad and Leiter 2008, Starr 1982). This publication was tied to the passage of the 1906 Pure Food and Drug Act that created the Bureau of Chemistry to test products for adulteration and contamination following the widespread revelations of the practices in the food processing industry popularized in Upton Sinclair’s 1906 novel *The Jungle*. The AMA also established its own lab to test drugs and a Council on Pharmacy and Chemistry to set acceptable standards for the compounds listed as ethical drugs that physicians used to prescribe from (Starr 1982). It is interesting to note here that neither AMA nor federal approval guaranteed a drug was safe or effective but only meant “that the drug companies would be honest about the contents of their wares, would not knowingly make fraudulent claims about their efficacy, and would not bypass physicians’ authority” (Conrad and Leiter 2008: 828).

While not a formal legal agreement between physicians and drug companies, Conrad and Leiter (2008) use the term gentlemen’s agreement, these actions further structured the field because the AMA took an exclusionary stance. Drug manufacturers could submit to testing and be allowed to continue advertising directly to physicians in medical journals or not submit to testing and be denied access to medical journals but

could continue advertising and selling directly to the public. In essence, the AMA established itself not only as a gatekeeper between drug companies and potential patients but also acted as an internal governance unit² within the field by signaling the legitimacy of the approved drugs to physicians and patients. The AMA's success in legitimizing its claims can be judged by the actions of newspapers which began cutting back on advertisements for patent drugs listed as fraudulent by the AMA despite the fact that this meant a reduction in revenue.

Patent medicines did not disappear from American life quickly. The initial federal regulatory laws of 1906 proved weak and allowed manufactures of over-the-counter drugs and other goods to continue asserting unfounded health claims about their products and positioning them as alternatives to expensive physician visits and treatments (Tomes 2001, Young 1961). Moreover, as Nancy Tomes (2001) pointed out, the high cost of care during the "Golden Age" of medicine, between the 1920s and 1960s, resulted in many people being priced out of the brand name prescription drug market and continuing to rely on patent medicine products as a source of care. However, the strengthening of federal regulation around the middle of the 20th century combined with the scientific advancements made in pharmaceutical development successfully removed patent drugs from the organizational field of the pharmaceutical industry.

In summation, the organizational field of pharmaceuticals in the United States emerged at the beginning of the 20th century largely as the result of professional medicine's attempt to gain social legitimacy by expanding its jurisdiction over all aspects

² Fligstein and McAdam (2012) define internal governance units as organizations "charged with overseeing compliance with field rules, and in general, facilitating the overall smooth functioning and reproduction of the system." (13)

of health care. The structure of the field at this time was one dominated by a single stakeholder, medical professionals. With the passage of the 1906 Pure Food and Drug Act, the Federal government also emerged as a stakeholder in the field. Ethical drug producers became dependent on medical professionals for access to the market because physicians, with the assistance of the American Medical Association and federal laws, had become the gatekeepers to patients.

Patent medicine companies were a diverse group of organizations with only a few tenuous connections between the largest and most profitable firms. Patent medicine companies pursued profit maximizing strategies; however, like other commercial organizations at the time, these strategies were highly variable due to the fragmented legal and market system of the country. Ethical drug manufactures of the time also lacked a structure for engaging in collective action, but these organizations did have more uniform organizational strategies that aligned with the goals and expectations established by the AMA. The structure of the field was shaped further during the early decades of the 20th century by several diverse mechanisms: the development of in-house research labs at pharmaceutical corporations, a rise in academic-corporate research connections, highly public drug disasters leading to calls for enhanced government regulation, changes in patent laws regarding research conducted using government grants, and scientific advancements in biochemistry and pharmacology.

4.3 Laboratory Development and Industry-Academic Collaboration, 1920-1940

The primary dynamic altering the pharmaceutical field during the interwar period, 1920-1940, was changes in organizational strategy as pharmaceutical companies in the United States began creating in-house research departments and forming collaborative

research relationships with universities. Prior to World War I, most large pharmaceutical manufactures in the United States had no interest in developing new drugs and were concerned primarily with the profitable production of known chemical compounds discovered by European chemists (Swann 1990). This led to a negative relationship between industry and research universities highlighted by the American Society for Pharmacology and Experimental Therapeutics' ban on membership for individuals employed by industry that lasted from the association's founding in 1908 until 1941. One reason American firms had little interest beyond reproduction based manufacturing was that the German and British pharmaceutical industries dominated drug development and production, but when World War I cut off the supply of European medicines, American pharmaceutical corporations realized that increasing production capacity could be economically beneficial (MacGarvie and Furman 2005). The strengthened patent and intellectual property laws combined with the auctioning off of German intellectual property at the end of the First World War served as additional factors influencing the creation of in-house research laboratories within America pharmaceutical corporations.

4.3.1 In-House Research Laboratories

Swann (1990: 79) wrote, "If American firms learned anything from their German counterparts after the war, they learned that to remain at the cutting edge of practical therapeutics research was essential." Pharmaceutical companies after the war began strategically investing internally by building in-house laboratories and hiring trained scientific staff to conduct research on new products. By the early 1930s, the annual investment in research and development at the largest firms in the country was regularly over \$100,000 (Swann 1990). Initiating successful strategies for developing research labs

proved challenging since many of the executives at large firms had business backgrounds, as opposed to scientific backgrounds, which meant that they understood little about the research process. To overcome this lack of knowledge, industry leaders adopted two strategies: recruiting heavy from the already developed research programs in the university system and developing collaborative research relationships with universities.

Jeffrey L. Furman and Megan MacGarvie's (2005, 2008, and 2009) detailed analysis of industry-university relationships during this time revealed several key mechanism shaped the strategies of these collaborations. Furman and MacGarvie (2009) noted geographic proximity influenced these relationships through:

“a pattern in which firms with limited (or no) R&D capabilities are generally constrained to work with local partners while firms with greater internal R&D capabilities seek primarily local partners for smaller-scale projects and projects for which general skills are appropriate and distant partners for larger-scale projects an extraordinary projects.” (p. 937)

At the same time, the rise of in-house research labs also benefited local universities by providing jobs for graduates. This labor market connection between universities and industry served to strengthen the scientific legitimacy of industrial research and development as evidenced by membership movements within the American Society for Pharmacology and Experimental Therapeutics during the 1920s to end the ban on industry employees (Parascandola 1990).

The developing relationship between industry and academics was reciprocal. Industry shaped academic strategies directly by funding research at universities through

faculty fellowships, grants, and renting laboratory space (MacGarvie and Furman 2005). Not all corporate financial donations were unrestricted; companies acted strategically in some cases by dictating the research agenda to grant recipients as a method for supplementing or substituting for in-house research and by constructing grant agreements that established the company's legal claim over discoveries (Swann 1990). Despite the fact such tactics reinforced the negative image of the industry researcher in academic circles, a sentiment famously portrayed in Sinclair Lewis's 1925 novel *Arrowsmith*, universities welcomed the money to expand their research programs. In the other direction, hiring trained academics led to changes in organizational strategy within pharmaceutical companies as these new employees brought scientific ideology into commercial research and development. At some companies, former academics had considerable leeway in setting up the laboratory and determining the research agenda (MacGarvie and Furman 2005).

4.3.2 Increasing Federal Regulation

A highly publicized incident of product adulteration marked the end of this period. The deaths of over 100 individuals by a contaminated patent medicine facilitated to the passage of the 1938 Food and Drug Administration Reform Act, which significantly restructured the field by strengthening the federal government's role as a regulator. Sulfanilamide product use, established by the late 1930s for the treatment of common colds, pneumonia, and venereal diseases, was common throughout Europe and the United States. Dr. Massengill's Elixir Sulfanilamide was a patent medicine produced in Bristol, Tennessee and distributed across the country, with higher usage among blacks in the Tennessee and Midwest plains region (Carpenter 2010). Even though the S.E.

Massengill Company was a patent medicine company, the Elixir Sulfanilamide was distributed to patients by prescription.

During the summer of 1937, the S.E. Massengill Company began producing and distributing a liquid form of Elixir Sulfanilamide that contained diethylene glycol, an anti-freeze component, to improve the taste. In the following months over 100 people died from using the product. The media coverage and public outcry that followed this incidence focused on how no product safety evaluation was required prior to sale so the only law the S.E. Massengill Company violated was fraudulently mislabeling the elixir as containing alcohol.

This incident illustrates the larger dynamics between stakeholders in the field at the time, because physicians made the first reports of illness and death directly to the AMA, not the FDA (Carpenter 2010), underscoring the dominant role of the AMA in drug regulation. The AMA immediately sent a request to the company for product samples and tested them at the AMA Chemical Laboratory, which concluded the diethylene glycol additive was the cause of the death. The FDA started its own investigation three days after the AMA received the first death notification, and the agency's analysis of the elixir reached the same conclusion.

Coincidentally, debate on a bill reforming the 1906 Pure Food and Drug Act had begun in early 1937 but had failed to lead to any legislative changes. The coverage of the sulfanilamide incidence generated publicity that the FDA capitalized on to lobby for stronger provisions than those contained in the initial revision proposals. While Carpenter (2010) cautioned against assigning too much credit to this sulfanilamide incidence for influencing congress, the passage of the 1938 Food, Drug, and Cosmetic Act expanded

the FDA's power by giving the agency the authority to formally regulate drugs through pre-market review. Nonetheless, industry lobbying efforts were successful in limiting this provision to the evaluation of product safety only, leaving the evaluation of efficacy solely to the AMA (Carpenter 2010, Greene & Podolsky 2009).

In summation, during the interwar years the dominant strategy of American pharmaceutical companies shifted from manufacturing known chemical compounds to researching new products. This change was made possible in part because of the prior investments by universities in building research programs which provided the industry with access to the skilled scientist necessary to construct and run in-house research departments. This new strategy provided the possibility for logics of science to be incorporated within a pharmaceutical corporation. The differing capabilities of pharmaceutical companies to invest in scientific research also led to the emergence of a strategic division within the industry between research organizations and compound manufactures (Chandler 2005). The coexistence of different organizational strategies within the same organizational type is an indicator institutional pluralism within the field.

Despite the creation of the FDA in 1906 through the Pure Food and Drug Act, the organization lacked the authority to directly influence field development and occupied a mostly reactionary role during this period. The passage of the 1938 Food, Drug, and Cosmetics Act laid the foundation for the FDA to gain authority and direct influence in the field. The stakeholder interests of the FDA and professional medicine aligned during this period with both advocating for stronger scientific evaluations on pharmaceutical products against industry arguments based around the logic of commerce. Public concern over the safety of pharmaceutical products also indicates a source for legitimizing

organizational strategies based on the logic of care. The developing power of the FDA was an important mechanism that shaped the field during the next few decades, but significant scientific advancements also heavily influenced the next period of field restructuring.

4.4 Scientific Advancement and the Rise of the FDA, 1945-1962

The field dynamics in the years following the Second World War were characterized by scientific advancements that led to an increase in novel drugs on the market, the increased adoption of market based competitive practices by pharmaceutical corporations, the FDA assuming the dominant stakeholder position as a regulator, and the declining influence of medical professionals. The adoption of penicillin use early in World War II demonstrated the commercial viability of antibiotics, and drug innovations in general, spurring extensive research into antibiotics during the war and resulting in multiple new antibiotic products coming on the market after the war. By 1949, antibiotics were the largest prescription sales category and accounted for 10.8% of new prescriptions sold that year (Lee 2003). The successes of antibiotics lead to an increased focus on drug innovation by pharmaceutical corporations, and by the 1950s research and development competition had produced such a large number of marketable new drugs it is now considered the heyday of drug discovery (Lee 2003).

4.4.1 Organizational Changes in Pharmaceutical Corporations

The focus on research and development, however, was not spread evenly between organizations within the industry. Differences in research capabilities led to increased field heterogeneity as drug manufacturers segmented further between firms developing innovative, novel drugs and firms manufacturing generic and over-the-counter medicine

(Chandler 2005, Lee 2003, Mazzoleni 2013). Jeho Lee's (2003) research identified several key factors that led to this market segmentation. During the interwar period, there was not much differentiation between innovator and imitator pharmaceutical firms other than firm size. Innovator firms would develop new products but the simplicity of the chemical molecules allowed imitator firms to develop similar compounds. World War II resulted in innovator firms making strategic decisions to commit more resources to research; specifically Lee (2003) showed that innovator firms hired more biologists and scientists to expand their in-house research departments while imitator firms maintained roughly the same percentage of research staff.

The development of multiple new drugs within the same therapeutic class led to more market based competition between firms because of the lack of clear differences in outcomes between treatments. The 1938 Food, Drug, and Cosmetics Act increased restrictions on what drugs could be sold directly to the public and states began passing no-substitution³ laws for filling prescriptions in the 1950s, four states in 1953 and 44 by 1959 (Mazzoleni 2013). As a result, physicians became more important to the industry in their role as gatekeepers to the customer. These factors led pharmaceutical companies to develop strategies for influencing physicians directly, and "Over the course of the 1950s, pharmaceutical companies developed sophisticated promotional structures for their products, linking advertising, salesmanship, and direct mail with public relations, journal publications, conference presence, and even the research process itself" (Greene & Podolsky 2009:338).

³ No-substitution, or anti-substitution, laws were an attempt by pharmaceutical corporations to protect the market of their brand name products by making it illegal for pharmacists to substitute a physician's brand name prescription with a generic product. The laws were eventual repealed during the 1970s (see Facchinetti and Dickson (1982) for a concise discussion on establishment and repeal no-substitution laws).

Jeremey Greene and Scott Podolsky (2009) analyzed this changing dynamic between pharmaceutical companies and physicians in detail. One of the factors influencing the restructuring of the relationship was that the sheer volume of new drugs coming on the market made it impossible for the average practicing physician to keep up with the research. Aware of this fact, pharmaceutical companies began expanding their sales forces, known at time as detail men, who would go to physicians' offices and "educate" them about new products. One example Greene and Podolsky (2009) cited to support this change in organizational strategy was Pfizer increasing its number of detail men from eight in 1950 to 2,000 by 1958.

The use of detail men (at this time they were all men) was a contested issue within professional medicine. One group of medical professionals argued that these men purposely misled physicians by presenting only the benefits of the products that they represented. Other medical professionals countered that it was the physician's job to verify the information presented and since the FDA reviewed marketed drugs for safety there was minimal risk to patients in choosing one product over another. Sociological research at the time revealed that while most physicians were conscious of the sales dynamic behind their interactions with detail men, they primarily found them a valuable way for learning about new products (Fox 1961, Greene and Podolsky 2009). At the field level, pharmaceutical companies were using detail men to shift the role of physicians as stakeholders within the field from self-reliant gatekeepers to consumer gatekeepers.

Another factor contributing to the high output of pharmaceutical development was the increased financial support for academic research from federal grants. Funding for the National Institute of Health climbed from less than one million dollars in 1940 to 52

million by 1950 and reached 400 million in 1960 (Mazzoleni 2011). This increased federal funding changed the field dynamics of the previous period where industry money dominated the sponsorship of academic research to one where industry money was eventually dwarfed by federal expenditures. This change threatened to disrupt the collaborative structure of the industry-academic relationship as academics were no longer dependent on industry money to fund their labs and the ownership of work resulting from public funding became contested (Berman 2008).

4.4.2 The Rise of the FDA

Like the interwar period, this period in field restructuring also ended with a highly publicized drug accident followed by new federal legislation redefining the authority and responsibility of field stakeholders. Thalidomide, used as a sedative and anti-nausea medication and commonly given to pregnant women to treat morning sickness, was released in the European market starting in 1957 but was rejected for the U.S. market by the FDA. Millions of European women used the drug and by end of 1961, Thalidomide use had become linked to a dramatic increase in birth defects. While the drug was never available in the U.S., a front-page *Washington Post* article on July 15, 1962 by Morton Mintz brought the issue national attention and made Frances Kelsey, the FDA staff member who rejected the application, a household name. President Kennedy would eventually honor Ms. Kelsey for her role at the FDA in preventing thalidomide tragedies in the United States, crystallizing a new public image of the FDA as the guardian of public health (Carpenter 2010).

Prior to Mintz's article there was very little press coverage on the Thalidomide births despite how widespread the tragedy was in Europe. Nonetheless, the *Post* article

was not the result of a concerned journalist's investigation, it was a strategic ploy by Senator Estes Kefauver, whose antitrust subcommittee provided Mintz with the details and Kelsey's name (Carpenter 2010). Senator Estes Kefauver had started a series of hearings on the practices of the pharmaceutical industry in 1959. Originally focused on the pricing of prescription drugs, which had skyrocketed in the increasingly competitive post-World War II market, the hearings became a platform for Senator Kefauver to argue that broader reforms of the industry were needed. Senator Kefauver's proposed amendments would strengthen the FDA regulatory statutes in the 1938 Food, Drug, and Cosmetics Act but industry opposition to Kefauver's provisions on restricting patent protections and AMA opposition over allowing a government agency to determine efficacy had stalled legislation until the 1962 coverage on the thalidomide incident began (Carpenter 2010). Newspaper articles calling for drug reforms escalated after the FDA further revealed on July 28, 1962 that while thalidomide had never been commercially available in the U.S. it had been widely distributed to American patients on an experimental basis.

The strong public outcry that followed provided the advantage Senator Kefauver and the FDA needed to move a new reform bill through congress. President Kennedy signed the Drug Amendment of 1962, also called the Kefauver-Hatch Act, on October 10, 1962. This marked a significant shift in the dynamics of the organizational field as the bill expanded the role of the FDA by granting it the authority to conduct pre-market test on drug efficacy in addition to safety. The burden of proof was placed on the drug application's sponsor to provide the FDA with the data necessary for evaluation. The result of these provisions allowed the FDA to establish extensive rules and guidelines for

clinical trials. It is the Kefauver-Hatch Act that led to randomized control trials (RCT) becoming the gold standard for drug evaluation in the United States.

The Kefauver-Hatch Act had several key effects on the process of drug development in the United States. The most notable effect of the 1962 legislation was the increased burden of testing required by the FDA that further fragmented the field of drug companies between innovators and imitators. The increased cost in developing innovative drugs reduced the competitive prospects of small and medium sized firms to be innovators allowing large, integrated corporations to dominate the novel drug market (Mazzoleni 2011). At the same time, the increased regulatory process lengthened the time it took for a drug to enter the market, conversely reducing the patent protection period of new drugs and thereby their profitability.

In conclusion, the period between the Second World War and 1962 brought scientific advancements and increased regulatory measures to the pharmaceutical field. Scientific advancement created progress in the treatment of disease but also furthered the division of organizational strategy between research and development firms and basic manufactures. While this fragmentation between organizational strategies might be expected to decrease the authority of pharmaceutical corporations as stakeholders in the field, the large corporations that were created managed to gain more power within the field over the following decades. Industry opposition to the Kefauver-Hatch Act indicates that while logic of care had been incorporated into the field it was not the dominant strategy of pharmaceutical corporations.

The Kefauver-Hatch Act gave the FDA increased regulatory authority and dominance within the field. The FDA's new authority allowed the organization to function

as a gatekeeper to both physicians and patients. The public perception of the FDA's role further supported the organizations increased authority and legitimized Federal regulation under the logic of care, in addition to the existing logic of science. However, tensions between pharmaceutical corporations and FDA would result in the regulatory dominance of the field being short.

4.5 The Biotechnology Revolution and Organizational Change, 1970s – 1990s

The biotechnology revolution during the 1970s had a major impact on pharmaceuticals not only through scientific advancements in disease treatment but also by reshaping the structure of the industry. Biotechnology resulted in the emergence of a distinct subfield of new organizations and organizational forms, as well as, new relationships between pharmaceutical corporations and financial firms (Cockburn 2004, Henderson et al. 1999, Powell and Owen-Smith 2012, Powell and Sandholtz 2012). The biotechnology revolution provides the strongest historical evidence that multiple organizational strategies are legitimate within the pharmaceutical field.

By the early 1990s, established pharmaceutical corporations also faced mounting drug development cost stemming from the increased regulatory requirements, increased financial burdens from following the general trend of American corporations to become multi-divisional conglomerates, and mounting revenue pressure from firms' increasing reliance on blockbuster drugs to generate income (Aitken et al. 2009, Chandler 2005, Kaplan 2006, Scherer 2001, Vogel 2007). The combination of these endogenous and external factors changed the dynamics within the field, specifically resulting in changes to the organizational structure and strategy of the major pharmaceutical corporations.

4.5.1 *Scientific Advancements and Biotechnology*

Prior to the 1970s drug development followed a process called *random screening* where natural and chemical compounds were tested randomly in laboratories for their possible therapeutic qualities (Chandler 2005, Cockburn 2004, Henderson et al 1999). This process of research relied primarily on basic science and allowed pharmaceutical corporations to build cost efficient in-house laboratories capable of the large scale testing that was necessary to find a few successful candidates for development from thousands of possibilities.

Following World War II this process proved highly profitable for pharmaceutical corporations in the United States who were able to produce a steady output of new drugs and become major players in the global pharmaceutical market (Chandler 2005). Some scholars refer to this time as the golden age of the pharmaceutical industry because of the sheer number of new products that emerged. However, other researchers are careful to point out the expansion of productivity between 1950-1990 benefited from the exogenous structural effects of research opportunities combined with unmet consumer need, as much as, internal management strategy (Henderson et al. 1999). Random screening was profitable only as long as large pharmaceutical corporations benefited from scale and scope: scale benefits occurred from having the resources to test thousands of chemical compounds to find a handful of therapeutically viable ones and scope benefits occurred from conducting research in a field with many potential discoveries. Stated less technically, the golden age of pharmaceuticals was really a period when companies were able to pick many low hanging fruits and this mitigated the differences in organizational strategy.

In the late 1960s, pharmaceutical corporations began to benefit from scientific advancements in microbiology and enzymology resulting from the increased public funding of university research following WWII (Chandler 2005, Henderson et al. 1999). This new biochemical knowledge allowed pharmaceutical researchers to shift from random screening towards *guided discovery* or *discovery by design* research processes. Under random screening process, researchers could not effectively hit therapeutic targets and regularly discovered treatments for diseases that they were not actively searching for. The discovery by design process allowed researchers to test molecular compounds for specific therapeutic effects within the laboratory. This knowledge affected the field by reducing the benefits of scale gained by large firms and increased the benefits of strategic management within research programs.

The development of discovery by design research technology opened up the possibility that small firms could develop a marketable new product by strategically investing their limited research resources. However, adoption of this process for drug development was not evenly distributed throughout the industry (Chandler 2005). Incumbent firms with profitable portfolios were able to incorporate discovery by design techniques sooner because of the increased cost requirements for updating facilities and hiring new scientific personnel.

By 1993, the American companies of Merck, Pfizer, Abbot Laboratories, Eli Lilly, and Bristol-Myers Squibb were global leaders in the pharmaceutical field through the adoption of research by design strategies and each brought in over five billion dollars a year in revenue (Chandler 2005). Large corporations like these are now collectively referred to as Big Pharma. Combined with the increasing cost of regulatory approval, the

other field level effect from the adoption of discovery by design was a consolidation of large pharmaceutical companies producing new molecular entities (Munos 2010).

However, the biotechnology revolution of the early 1970s also resulted in the emergence of many small firms and a new organizational form that had an even greater impact on the structure of the field and the established corporations.

The biotechnology revolution began with academic discoveries in molecular biology, specifically recombinant DNA (rDNA) technology, and created advancements in pharmaceutical research by allowing for mass production of large molecule proteins with known therapeutic qualities and by providing tools to increase development efficiency for small molecule chemical drugs (Henderson et al. 1999). Unlike the scientific advances in biochemistry, established pharmaceutical corporations did not readily adopt molecular biology research in part because the successful development of these new products required significant investments in both new knowledge and changes to the manufacturing process. Large firms were also hesitant early adopters because the surrounding scientific uncertainty over whether these molecules would be profitable to manufacture on a commercial scale and the public concern over the perception of biomolecular research as genetic engineering (Henderson et al. 1999, Whittaker and Bower 1994). What occurred in the pharmaceutical field during the late 1970s was a rare event in an established industry: the emergence of a new organizational form.

Walter Powell and Kurt Sandholtz's (2012) work details the institutional forces leading to the emergence of what they refer to as the Dedicated Biotechnology Firm (DBF). One of the unique factors creating these firms was the tightness between academic research centers and corporate organizations. The academic researchers who

were making the discoveries within the fields of microbiology founded many of the new DBFs. Genentech, the first DBF to go public, was founded in 1976 by venture capitalist Robert Sawson and Herbert Boyer, a faculty member at the University of California San Francisco and one of the discoverers of the rDNA replication technique. Other early firms with academic founders who maintained their university connections were Cetus 1971, Biogen 1978, Hybritech 1978, Centocor 1979, and Chiron 1981 (Powell and Sandholtz 2012).

Powell and Sandholtz (2012) argued these early DBFs were divided into two models of operational strategy: those with scientific orientations and those with commerce orientations. DBFs with scientific orientations were distinct within the pharmaceutical field not only because of the ties that they maintained with academic research centers but also because they emphasized the publication of their findings in peer reviewed journals. Commerce oriented DBFs were defined by having serial entrepreneur founders and poaching senior executives from established health care or traditional pharmaceutical corporations in the early stages of their development. Dedicated biotechnology firms had a huge impact on the structure of the pharmaceutical field itself through the relationship structure of their tie formation with large established pharmaceutical corporations.

As stated earlier, large pharmaceutical corporations did not take initiative at the start of the biotechnology revolution to build their own molecular biology programs but neither did these firms ignore this scientific breakthrough. Large pharmaceutical companies played a pivotal role in the down-stream process of developing marketable biotechnology products (Chandler 2005, Cockburn 2004, Galambos and Sturchio 1998).

As small firms, DBFs were able to secure the money needed for basic research through public funding and venture capital investments but these sources were not able or willing to provide the necessary capital to build the manufacturing capacity required for commercialization. This allowed established pharmaceutical firms to form collaborative alliances with DBFs that provided Big Pharma firms with exposure to the new research technologies and DBFs with a pathway to the market. Collaborative relationships between DBFs and Big Pharma ranged from joint venture research and development projects to in-licensing⁴ products depending on the needs of the organizations involved (Chandler 2005, Cockburn 2004, Galambos and Sturchio 1998, Henderson et al. 1999, Powell and Sandholtz 2012).

Powell and Jason Owen-Smith (2012) analyzed the effects of the network structure of DBFs and determined not only did the type of tie formation indicate three distinct periods of field development between 1988 and 2004, but that the overall network became increasingly consolidated around a few key DBFs with new tie formation peaking in 1997. This work corresponds to the findings from other researchers (Chandler 2005, Powell and Sandholtz 2012, Sowlay and Lloyd 2010) who noted many of the early DBFs failed or were acquired by their Big Pharma collaborators. Of the 11 prominent early biotech firms identified by Powell and Sandholtz (2012) only one, Amgen currently the world's largest independent biotechnology corporation, is still an independent company, the remaining 10 firms have all been acquired. Chandler's (2005) list of top eight biotechnology corporations in 1994 has considerable overlap with Powell

⁴ In-licensing is when one company carries out the research and development but another company is responsible for the manufacturing and marketing of a product, or when a company acquires the intellectual property rights to manufacture and sell a product developed by another company.

and Sandholtz's (2012) list but shows the same results. Of Chandler's (2005) top eight biotechnology companies posting over \$100 million in revenue in 1994, only Amgen is still an independent corporation.

Another important factor about the biotechnology revolution was its highly localized structure, not only globally but also nationally. Henderson et al. (1999) argued there were four key institutional factors that resulted in the U.S. emergence and domination in biotechnology: public support of health related research, strong intellectual property protection, regulatory procedure for product approval, and a lucrative system of health care reimbursement. The global effect of American domination in biotechnology is seen through the rate of alliances between American DBFs and foreign Big Pharma (Chandler 2005, Rasmussen 2002, Whittaker and Bowen 1994). The biotechnology revolution was also highly localized within the United States. Powell et al. (2012) and Cooke (2004) discussed how difference in local resources lead to the emergence of high-tech clusters or bioscience mega centers in Boston, San Francisco, and San Diego while hindering their development in other areas.

The scientific advancements of the 1970s had profound effects on the dynamics between pharmaceutical organizations within the field. Large corporations successful in adopting the new processes of research and development for chemical compounds raised the barriers of entry for other manufactures seeking to develop innovative products. Rather than disrupting the field, the biotechnology revolution resulted in the emergence of a new sub-field of dedicated biotechnology firms. The high cost of mass production acted as a barrier to entry for these firms to challenge the incumbent pharmaceutical corporations; instead, the use of a variety of collaborative arrangements created a

network between firms. The strategy of acquisition of DBFs pursued by Big Pharma presents a possible avenue for the change of dominant logics within an established corporation. Depending on company sizes and how many personnel are retained, merges can alter established organizational culture. This indicates pharmaceutical corporations that engage in more merger and acquisitions are at an increased risk of change in organizational strategy compared to companies that rarely, or never, engage in these practices. During the 1980s, several key legislative acts, like the Orphan Drug Act, further reshaped the field dynamics.

4.5.2 Legislation Indicating Shifting Power in the Field

Fligstein and McAdam (2012) stated that “it is impossible to evaluate any form of strategic action field without considering the history of state intervention in that particular field” (174). As noted in the previous chapter, the state holds two stakeholder positions within the pharmaceutical field: one as a regulator through the FDA and the other as a consumer through government sponsored health care plans, but the questions arises does the state also hold a third stakeholder position through Congress. This is a complicated question to answer because as Fligstein and McAdam (2012) pointed out the state is a strategic action field of its own, meaning that legislation is the results of actions by stakeholders within the field of state with their own interest. Unlike the stakeholders discussed in Chapter 3, I argue that Congress is not a direct stakeholder within the pharmaceutical field. While Congress has taken action to shape the field, the legislation process is a mediated response between other stakeholders in the field. For example, the 1906 Pure Food and Drug Act is representative of professional medicine’s interests over patent medicine companies. Likewise, while the Kefauver-Hatch Act originated with

Senator Kefauver's hearings, its passage was due more to legislators appealing to the public's interest rather than drug safety. While Congress is not a stakeholder in the field, legislative acts are a good indication of the shifting power dynamics within the field (Fligstein and McAdam 2012). For this reason, I discuss three pieces of legislation from the 1980s that indicate how the interest of pharmaceutical research organizations and the logic of commerce became dominant within the field.

In the early 1980s, the Bayh-Dole Act, the Orphan Drug Act, and the Hatch-Waxman Act changed the dynamics within the pharmaceutical field. These legislative acts were passed during the period of deregulation in the Regan administration. While these Acts did not directly undercut the authority of the FDA as the regulatory body within the field, the history of each act reveals that the logic order of commerce was gaining dominance over the logics of care and science. All three Acts were designed to change the research strategies of pharmaceutical corporations through external inducements. Each Act was designed to motivate pharmaceutical development in a direction beneficial to patients but proponents of the Acts contend the practices used to stimulate research indicate corporate interests were really the legislators' primary concern.

The Bayh-Dole Act of 1980 allowed nonprofit organizations to receive patents and property licenses on research conducted with federal funds. Prior to the Bayh-Dole Act, universities were patenting results from research funded through federal money; however, without a uniform process, universities, and other nonprofit organizations seeking patents, had to deal with a variety of agencies with different requirements and rules depending on the funding source (Berman 2008, Mazzoleni 2011). The Bayh-Dole

Act streamlined the process for patenting discoveries made with federal money and resulted in a dramatic increase of university patents. In the 12 years leading up to Bayh-Dole, 1968-1980, university patents rose from 100 a year to about 350, but the number of universities patents per year was around 3300 14 years after Bayh-Dole (Berman 2008).

Elizabeth Berman (2008) applied institutional theory to study university patenting in the United States from World War II to the passage of the Bayh-Dole Act and argued that the Bayh-Dole Act was not as much a turning point as other scholars contend but was the outcome of institutionalization started in the 1950s. The Bayh-Dole Act was brought about by skilled actors and a professional project, the development of university patent administrators, who argued government licensing of research conducted with federal money was necessary for innovation because if the government retained the title over scientific discoveries they would go unused (Berman 2008).

Support for the argument that government retained ownership would discourage innovation came from two independent studies published 1968 on the outcomes of chemical discoveries. These studies concluded, “because HEW [Health, Education, and Welfare Department] patent policy did not allow for exclusive licenses, however, no pharmaceutical companies were willing to participate in the screening of these compounds with an eye toward their eventual development.” (Berman 2008: 846). Creating organizational motivation to apply research was the framework proponents for Bayh-Dole adopted; university patenting would make findings available to private corporations who would use that research to develop profitable and innovative outcomes (Berman 2008, Rai and Eisenberg 2003). While the Bayh-Dole Act is not responsible for

starting university patenting, it increased the trend by legitimating the practice through institutionalization.

The Orphan Drug Act, passed in 1983, was designed to create incentives for pharmaceutical companies to research new drugs for rare illnesses. This act was seen as necessary because the rising cost of drug development meant that companies were unlikely to invest in small product markets where they would be unable to recoup development cost. Orphan diseases are officially defined as a condition or illness with a patient prevalence rate of 200,000 or less within the United States (Grabowski 2005, Wellman-Labadie and Zhou 2010). The FDA designates orphan drug status and has approved over 400 drugs since 1983 compared to an approval rate of only 10 for similar drugs between 1973 and 1983 (Food and Drug Administration 2015). Grabowski (2005) stated that the success of the act was due to its combination of “push” and “pull” economic incentives: the push program components include tax incentives, research grants, and accelerated approval times; the pull program component is seven years of market exclusivity. The period of market exclusivity is seen as one of the strongest and desirable components of the law (Grabowski 2005, Wellman-Labadie, and Zhou 2010).

In general, the Orphan Drug Act is considered a successful piece of legislation. Grabowski (2005) compared the outcomes in orphan drug development between the U.S., Japan, and European Union, regions that all passed similar legislation, and found the pharmaceutical companies in United States had produced more orphan drugs. There is evidence that the Orphan Drug Act also effected organizational strategy more directly. Chandler (2005) attributed the success of the DBF Genzyme to its initial research strategy in pursuing orphan drugs. Despite the majority of scholars concluding the Act as

primarily positive on drug research and development, recent work by Olivier Wellman-Labadie and Youwen Zhou (2010) raised the question of whether the Act needs to be reformed.

Wellman-Labadie and Zhou (2010) noted that the paradox of the exclusivity clause, once an orphan drug is approved no other drug can be approved for that disease during the seven year period but orphan drug approval does not mean the same drug cannot be approved for other treatments during that time period, has resulted in multiple drugs gaining orphan approval despite the fact that the drugs total treatment population is over 200,000 U.S. patients. This raises the question of whether companies are undermining the intent of the Act by taking successful drugs and expanding their profitability using orphan drug approvals. Instead of developing a new drug, a company takes an existing drug and applies for Orphan status. This practice gives the company market exclusivity on the treatment of a condition without requiring much additional research and development cost and does not result in new drugs coming to the market.

Financial expectations also appear to be shaping orphan drug research strategy. Wellman-Labadie and Zhou's (2010) findings show oncology was the top therapeutic category with 650 drugs receiving an Orphan designation between 1983 and 2009; the second highest therapeutic category was infections drugs with only 212 designations. Wellman-Labadie and Zhou (2010) argued that the focus on oncology drugs is because they are more profitable than other categories not because there are more orphan diseases in this therapeutic class. Given the funding and tax incentives of the Orphan Drug Act, the high prices for the oncology drugs that are developed suggest patients are paying twice for the same product.

Despite these criticisms, the Orphan Drug Act does address one issue raised often by critics of the global pharmaceutical structure, the focus of pharmaceutical companies on developing drugs for industrial nations while ignoring problems common in the developing world. Because the official definition of an orphan condition only applies to its prevalence rate in the United States, pharmaceutical corporations can receive the financial benefits of the act by developing a drug for a condition with higher prevalence rates in other parts of the world. However, the low profitability of developing markets appears to be a greater deterrence than the incentives of the Orphan Drug Act can overcome (Civan and Maloney 2006). Similar to the Bayh-Dole Act and Orphan Drug Act, the Hatch-Waxman Act was also designed to encourage pharmaceutical development.

The Hatch-Waxman Act, passed by congress in 1984, was intended to speed the entry of generic drugs into the market, thereby lowering overall drug prices, and to strengthen the intellectual property rights of pharmaceutical corporations as an incentive for innovation (Grabowski and Kyle 2007, Young and Andrus 2004). The act established the Abbreviated New Drug Application (ANDA) process at the FDA that requires manufacturers of generic medications only need to demonstrate bioequivalence between a new product and an existing marketed drug. The ANDA process reduced the amount of time and money necessary to introduce a generic drug by eliminating the requirement of lengthy clinical trials to demonstrate safety and efficacy. The act also shortened the time between patent expiration and generic entry by allowing companies to begin product development prior to patent expiration, meaning companies could file ANDA claims when a patent expires.

The Hatch-Waxman Act contained two market exclusivity provisions to gain industry support for the legislation. The first provision gives the expiring patent holder 45 days to file an infringement suit against the ANDA filer. If this occurs, the FDA grants a one time 30-month extension to the original patent holder during the course of the litigation. The second provision was designed to encourage ADNA filers by granting the first filer a six-month period of market exclusivity from other generic competitors. A large portion of criticisms against the Hatch-Waxman Act has centered on the misapplication of these two provisions as barriers to entry. Researchers have argued that the automatic 30-month exclusivity period discourages ANDA filers (Young and Andrus 2004). Since the six-month market exclusivity period is triggered only when litigation ends or the generic manufacturer begins marketing the product, there have been instances where a brand name manufacturer paid a generic manufacturer to not bring their product to market, effectively preventing any other generic manufacturer from entering the market (Young and Andrus 2004).

Despite these problems, the Hatch-Waxman Act has created more competition in the market. Henry Grabowski and Margaret Kyle's (2007) analysis of generic entry between 1995 and 2005 indicated that the market exclusivity period for brand name drugs has steadily declined since the early 1980s due to the rise of generic drugs. Their research also revealed generic manufacturers strategically target the most profitable brand name drugs. Comparing generic entry one year after patent expiration of new molecular entities by market size, measured as revenue per year, they found drugs in the smallest market, less than \$50 million, faced generic entry from only 1.7 products while drugs in the largest market, over \$500 million, faced an average of 7.2 generic competitors.

Grabowski and Kyle (2007) attributed part of this difference to the Hatch-Waxman Act allowing generic manufactures to engage in a ‘prospecting’ approach by challenging patented drugs early in their product life cycle.

The three legislative acts discussed above collectively encouraged pharmaceutical innovation by protecting the intellectual property rights of pharmaceutical corporations through various provisions. Proponents of the pharmaceutical industry argue patents are necessary for continued innovation because of high research and development cost. Critics argue the current patent laws allow pharmaceuticals to engage in profiteering that result in higher prices for consumers while creating barriers to entry for generic manufactures. Regardless of these arguments, the evidence is clear that the United States patent law has created dynamics within the pharmaceutical field leading to novel drug developments at higher rates than in countries with less secure intellectual property rights (Henderson et al. 1999, Grabowski and Kyle 2007, Mazzoleni 2011). At the same time, strong patent laws have also shaped the organizations in the field by leading to huge profits for a small group of products and the rise of Big Pharma.

4.6 The Organizational Strategies of Big Pharma

By the late 1970s, the barriers to entry in the pharmaceutical field resulted in a division between firms developing prescription drugs and those focused on over-the-counter products (Chandler 2005). Organizations developing prescription drugs could be further divided between firms researching novel products from generic manufacturers. Big Pharma, large, vertically integrated research corporations, dominated the pharmaceutical field (Chandler 2005, Cockburn 2004). These firms were multidivisional with in-house research laboratories, manufacturing facilities, and marketing departments

focused on the down-stream (consumer market) development of pharmaceutical products. At the same time Big Pharma companies were pursuing strategies of vertical integration, they were also becoming conglomerates through the acquisitions of a variety of non-pharmaceutical entities.

By the 1980s, this corporate strategy had become increasingly cumbersome and many Big Pharma companies began to engage in strategic divestments to both increase the efficiency of their primary function as pharmaceutical firms and avoid the corporate raiders of Wall Street. Chandler's (2005) history of the industry provides excellent details on the activities of some of the largest pharmaceutical companies during this time. For example the path of American Home Products, renamed Wyeth Corporation in 2002, at its conglomerate height sold products ranging from canned and packaged foods to furniture polish before undergoing massive divestitures to refocus on its pharmaceutical roots only to then be acquired by Pfizer in 2009.

4.6.1 Strategic Alliances, Mergers, and Acquisitions

The organizational structure of Big Pharma firms partially explains the rise of the DBF as an innovative organizational form and the strategy of Big Pharma firms to develop collaborative alliances with DBFs. Up-stream research, which consists of basic scientific exploration and discovery, was mostly confined to academic centers and non-profit organizations but integration and spillover into industry did occur indicating interorganizational ties created porous organizational boundaries within the field (Cockburn 2004, Powell and Owen-Smith 2012).

In order to remain innovative, Big Pharma needed to gain access to the scientific advancements of biotechnology previously discussed or risk declining profitability or

failure. Hess and Rothaermel (2011) discussed two strategies pharmaceutical corporations used to access up-stream knowledge: strategic alliances and star scientists. Their findings indicated that within the pharmaceutical industry these strategies are substitutive and subject to contingency effects. Specifically “any performance effects of star scientists on firm innovation are contingent upon the stars’ connections to other firm-specific resources” (Hess and Rothaermel 2011: 906). Many Big Pharma corporations pursued alliances with DBFs as a method of accessing new knowledge (Chandler 2005, Powell and Owen-Smith 2012, Powell and Sandholtz 2012).

Nadine Roijakkers and John Hagedoorn (2007) stated there were two primary types of collaborations in the pharmaceutical field, joint ventures and contractual partnerships. Joint ventures raise interdependence between organizations whereas contractual partnerships are flexible. The majority of alliances between pharmaceutical corporations and biotechnology companies were contractual partnerships, indicating that one firm was performing a service for the other. However, the rise of joint ventures during the late 1980s indicated that rather than continuing to rely on biotechnology companies to conduct research, established pharmaceutical corporations were also developing internal biotechnology research and development capabilities (Roijakkers and Hagedoorn 2007). Through network analysis, Roijakkers and Hagedoorn (2007) concluded the new biotechnology firms acted as innovators within the field while established pharmaceutical corporations occupied the dominant position in traditional pharmaceutical sub-sectors by guiding products through the regulatory and marketing process.

Research by Erica Whittaker and Jane Bower (1994) and Bruce Rasmussen (2002) offers further explanations on why roles in pharmaceutical alliances varied by organizational type. The fact established pharmaceutical corporations were engaged in multiple biotechnology alliances while also building internal research programs suggests these companies saw two strategic benefits to alliances (Whittaker and Bower 1994). First, alliances provided access to young scientists attracted to working at new biotechnology companies for the science based organizational culture and financial opportunities provided through stock options. Second, alliances allowed established firms to externalize the risk of conducting research. Rasmussen's (2002) data supports the strategy of risk shifting by noting that the dominant contractual form of alliances was between established pharmaceutical corporations in-licensing the products developed by biotechnology firms. Alliances are not the only organizational strategy pharmaceutical corporations employed to gain access to innovation technology or new products; mergers and acquisitions are also common practices in the field.

Mohan Sowlay and Scott Lloyd's (2010) research indicated that mergers and acquisitions between biotechnology firms and Big Pharma firms can be the result of strategic planning on the part of either corporation involved rather than a desperate move by a failing firm. Biotechnology companies benefit in a merger or acquisition with a Big Pharma firm as a method of cashing out that avoids the expense and organizational requirements of an initial public offering. This is an attractive strategy particularly for small firms without the capital to bring a product to market (Sowlay and Lloyd 2010). Fabio Pammolli and Massimo Riccaboni (2004) further highlight how a merger can be a strategic exit strategy for DBFs because innovation is path dependent, meaning it is

difficult for small, specialized research firms to take the knowledge gained in one therapeutic area and transfer it successfully into the development of another product.

Big Pharma firms also benefit in acquiring biotechnology firms to gain products. Because the Hatch-Waxman Act does not cover biological products and the difficulty in creating therapeutically equivalent biologics⁵, there is limited competition in this market segment making biotech acquisitions a strategic method that Big Pharma firms can use to expand their product portfolios (Sowlay and Lloyd 2010). Biologics are particular attractive acquisitions because of their higher reimbursement rates although recent work by Ernst Berndt (2015) and his colleagues suggests the average net lifetime returns on biologics peaked between 1995 and 1999. Firm acquisition is also a strategy large firms employ when faced with a declining product portfolio due to patent expirations (Danzon et al 2007).

Despite all of the mergers and acquisitions occurring within the industry, researchers have not found consistent outcomes from the practice. Matthew J. Higgins and Daniel Rodriguez (2006) found that firms with prior relationships to the firms they acquired experienced positive long term outcomes because they were better able to evaluate the fit of the target firms products within their portfolios. Using a larger sample not restricted by prior relationships, Patricia Danzon and her colleagues (2007) found no evidence mergers created positive long term outcomes; furthermore, their findings suggest that “mergers that are motivated to address R&D gaps through cost savings and economies of scale are unsuccessful in the long run” (325). Finally, John LaMattina (2011) argued that the amount of total merger activity within the industry is having a

⁵ Biologics include a variety of products, often developed from organic processes, and differ from chemical pharmaceuticals because they are more complex mixtures with properties that are not easily identifiable.

negative impact by reducing innovation. His argument is based on data from large mergers that resulted in the elimination of entire research sites and aggregate level data showing declining research and development spending among Big Pharma firms. LaMattina's (2011) conclusions are supported by the work of Sarah Kruse and her colleagues (2014) who found pharmaceutical executives and other insiders anonymously indicated that the short term strategies of mergers and alliances aimed at increasing profitability were undermining long term research productivity. Research productivity, particularly the development of new drugs, is another important issue to address because as a high technology industry pharmaceutical firms are dependent on innovation for survival.

4.6.2 Strategies of Innovation and Productivity

There has been considerable discussion about the state of pharmaceutical innovation and research for more than 40 years (Fisher et al. 2015, Grabowski et al. 1978). Pharmaceutical innovation is typically measured as the number of New Molecular (sometimes Chemical) Entities (NME/ NCE) approved per year by the FDA (DiMasi et al. 2003, Munos 2010, Paul et al 2010). Total industry productivity is measured by either the number of products in the research pipeline (Fisher et al. 2015) or the number of New Drug Applications (NDA) approved per year by the FDA (Munos 2010).

Figure 4.1 shows the trends for NDA and NME approvals between 1944 and 2014 (Total NDA data from 1953 is missing because human and animal approvals were counted together). NDA applications peaked during the 1950s and average 120 per year with a standard deviation of 77. The large number of approvals that occurred during the

late 1940s and 1950s was the result of regulatory changes that encouraged companies to submit applications for drugs that had already been on the market combined with the

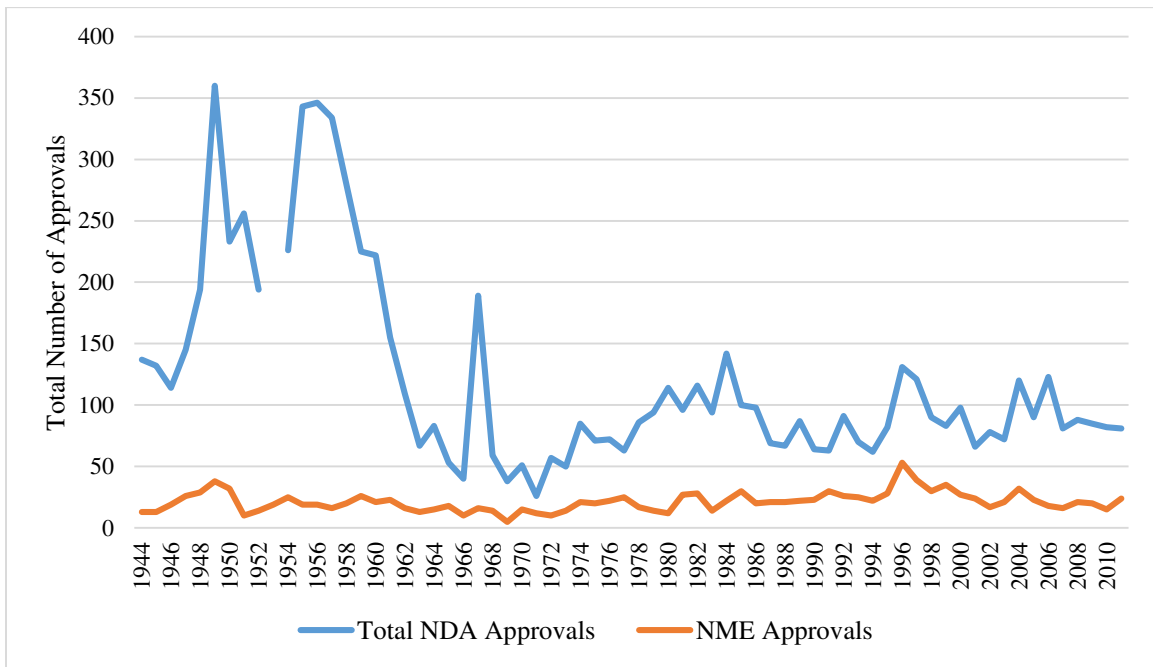


Figure 4.1 Approved FDA Submissions by Application Type, 1944-2014

increased organizational focus on developing new drugs. The trend for NME submissions has been more stable with an average of 22 per year and a standard deviation of eight. Interpreting the organizational strategy for NME submissions requires further discussion on the changes in research and development cost.

The cost of bringing a new drug from concept to market has risen exponentially over the past decades from \$138 million (Hansen 1979) to \$318 million (DiMasi et al. 1991) to \$802 million (DiMasi et al. 2003) and is now estimated at \$1.8 billion (Paul et al. 2010). These estimates combine the out-of-pocket cost for bringing a drug to market with the *capitalized cost*, the expected return on investment required by investors with alternative investment opportunities (DiMasi et al. 2003, Paul et al. 2010, Vogel 2007). The high cost of research is argued to be due to the high failure rate of drugs during the

development process; reported cost estimates are derived from the aggregate cost of research on all products and divided by the number of successful products.

Current calculations for the NME success rates range from 8% (Paul et al. 2010), 11% (Kruse et al. 2014), 11.5% Munos 2010), to 13% (DiMasi et al. 2010). The fact that there is variation is not surprising because calculations are limited by available data on pharmaceutical pipelines with some scholars having access to propriety information while others rely on publically reported information. The FDA collects data and reports on compounds only if they begin phase I clinical testing but does release reports on pre-clinical testing, leaving researchers working with public data no information on drugs that never reach human testing.

DiMasi et al.'s (2010) work on pharmaceutical research is particularly insightful because they calculated success rates for both NMEs and biologics tested in humans between 1993 and 2004 using proprietary information. Their data indicated NMEs had a success rate of 13% while biologics had a success rate of 32%. DiMasi et al. (2010) also analyzed success rates by company origin and therapeutic class for the total combined sample of NMEs and biologics. Stratifying the sample by self-originating and in-licensed compounds, they found drugs that were in-licensed had higher success rates than self-originated compounds: 27% to 16%. Furthermore, the data showed many of the in-licensed drugs were acquired after phase I or II testing, indicating pharmaceutical firms wait to form alliances after a product demonstrates potential. Finally, by comparing the drugs in eight therapeutic classes they found that systemic anti-infective agents, which include antivirals and vaccines, had the highest success rate at 15.6%.

Researchers argue that the effect of high development cost on the industry is a reduction in innovation (DiMasi et al. 2003, Paul et al. 2010, Vogel 2007), and compounded by the reduction in research programs and facilities due to mergers and acquisitions, some researchers even worry the industry is at risk of dying (Berndt et al. 2015). Pammolli and Riccaboni (2004) point out that the paradox within the industry is that increased research has not lead to an increased flow of new drugs, findings which Munos (2010) reiterates and adds too by stating the rate of new biologics fails to deliver on the promised innovations of the biotechnology revolution. The trend line for NME approvals in Figure 4.1 supports their findings. Both Munos (2010) and Paul et al. (2010) reported companies claim they need between 2-3 new drug approvals a year to remain profitable; a target that both researchers noted firms historically have never met.

The odds of a pharmaceutical company receiving a NME approval in any given year are small. The number of NME approvals per year follows a Poisson distribution with most pharmaceutical corporations not receiving a NME approval during any given year (Munos 2010). Figure 4.2 shows the number of NMEs approved per year plotted with the 95% confidence interval around the population mean. The data in Figure 4.2 does not indicate a declining trend in innovation as measured by the number of NME approvals per year. In fact, the number of NME approvals in 2012, 2013, and 2014 were all above the upper bound of the 95% confidence interval. Scholars consider the largest outlier in the data, 1996, a historical artifact. The increase in both NDA and NME approvals in 1996 is argued to be the result of the FDA clearing out backlogged applications after the passage of the Prescription Drug User Fee Act in 1992 rather than a true period of increased productivity.

In addition to declining innovation, industry researchers have also expressed concern about the impact of declining revenue. Pharmaceutical corporations in the United States have pursued a blockbuster profit model where a small handful of products account for the majority of a firm's revenue stream (Aitken et al. 2009, Grabowski and Kyle 2007). According to Berndt et al.'s (2015) calculations, the industry faces hazardous

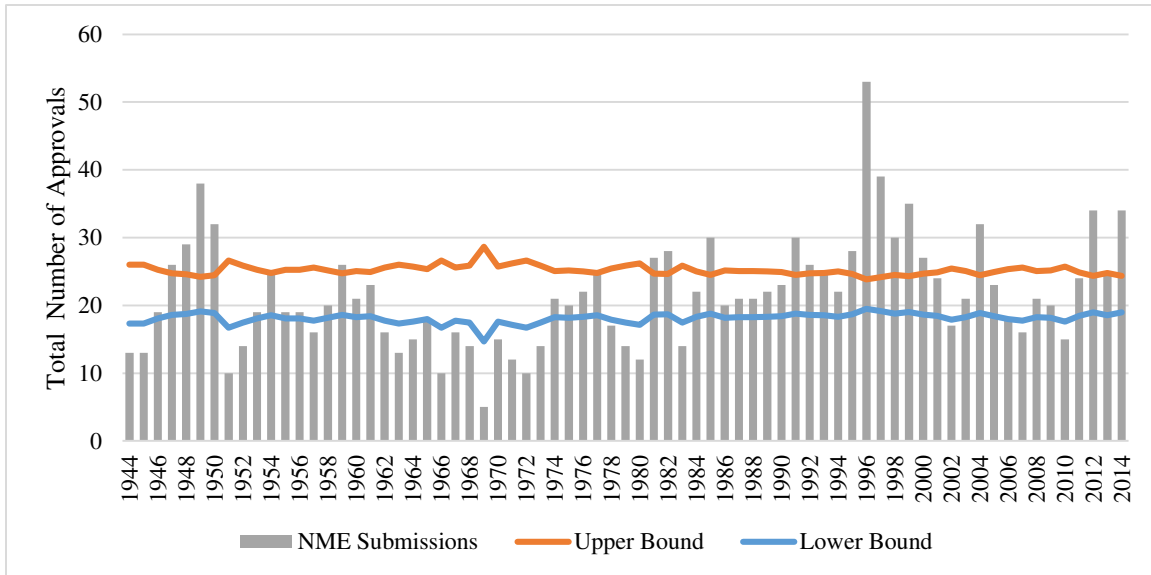


Figure 4.2 Number of NME Approvals per Year, 1944-2014

declines tied to the reliance on blockbuster drugs for income. Vogel (2007) provided data that further underscored the precarious financial position of this profit model by citing research showing only 3 out of 10 NMEs generate enough income to cover their research and development cost. Finally, Aitken et al. (2009) pointed out the shift in prescription drug spending from brand name drugs to generics is making it harder for research-oriented pharmaceutical firms to predict future income streams because the market for blockbuster products is shrinking.

In conclusion, the organizational strategies of Big Pharma firms have been impacted by the dynamics of the modern pharmaceutical field. Scientific advancements

strongly influenced the field in the 1970s and 1980s leading to the emergence of new organizational forms with settlements between incumbents and challengers achieved through collaborative negotiations. Changes in politics created favorable conditions for a series of legislative acts that while designed to foster innovation, also strengthened the position of large corporations. Finally, rising concerns on cost and generic competition have encouraged mergers and acquisitions as strategies to retain market share but leave industry analysts wondering if there is a sustainable future.

4.7 Conclusion

Table 4.1 Key Changes in the Pharmaceutical Field, Early 20th Century – 1990s

| <i>Period</i> | Dominant Logics | Dominant Stakeholders | Active Stakeholders | Reactive Stakeholders |
|--------------------------------------|------------------------|--|---|---|
| <i>Early 20th Century</i> | science | medical profession | FDA, patients | patent medicine companies, ethical compound manufacturers |
| <i>1920s – 1940s</i> | science | medical profession, pharmaceutical research corporations | FDA, generic manufactures, research universities | patients |
| <i>1940s – 1960s</i> | care & science | FDA, pharmaceutical research corporations | medical profession, patients | generic manufactures |
| <i>1970s – 1990s</i> | science & commerce | pharmaceutical research corporations (Big Pharma) | biotechnology firms, FDA, managed care organizations, financial investors | patients, medical profession, generic manufactures |
| <i>1990s – Today</i> | commerce | pharmaceutical research corporations (Big Pharma) | FDA, managed care organizations, financial investors | patients, medical profession, generic manufactures |

The historical analysis in this chapter indicates how different institutional logics were incorporated into the pharmaceutical field over time. Table 4.1 shows the broad changes in dominant logics and stakeholders. Dominant stakeholders are the stakeholders with the most power during a period and subsequently determine the dominant logic of the field. Active stakeholders hold enough power to influence the direction and structure of the field but do not define the field. I use the term reactive stakeholder, as opposed to passive stakeholder, for the final group because while these stakeholders still demonstrate agency, they do not engage in collective action to alter the field but act collectively only in response to the actions of the other stakeholders.

In general, the historical analysis demonstrates the importance of existing structures and external shocks in shaping an organizational field. Medical professionals who applied the logic of science by classifying drugs as either ethical preparations or patent medicine were able to dominate the early field. Highly publicized incidents of drug contamination in the early and mid-20th century allowed federal regulators at the Food and Drug Administration to gain dominance by using the logic of care as a strategy for arguing the necessity for increased regulation. Finally, the rising financial power of American corporations combined with an anti-government political movement facilitated pharmaceutical corporations' ascension to the position of dominant stakeholder during the 1980s. In the next chapter, I analyze data gathered on pharmaceutical corporations and drug approvals between 1997 and 2014 to determine if the three logics within the field effect pharmaceutical organizations by creating distinct organizational categories.

CHAPTER 5

A QUANTITATIVE EVALUATION OF ORGANIZATIONAL STRATEGY

5.1 Introduction

The historical analysis in the preceding chapter demonstrates that while pharmaceutical corporations display organizational similarities, it is a mistake to conclude that the field is composed of a homogenous organizational model. Existing research shows that the institutional constraints of regulation and pharmacology do not fully explain the different organizational forms observed in the historical analysis. For example, Arora et al. (2014) categorized pharmaceutical corporations by the structure of their research process as either centralized, hybrid, or decentralized firms and found that this organizational characteristic influenced innovation strategy. While all of the firms in their sample pursued a mix of innovation strategies, centralized firms relied more on internal research and decentralized firms more on acquiring external research. The fact that this structural characteristic resulted in similar commercial outcomes between research strategies indicates that while the research process connects to the organizational model it is not explainable by outcome-based efficiency, suggesting that a latent construct, such as logic orders, influences the original selection of organizational models and research strategies.

Innovation strategy is one possible measures of organizational behavior that can be used to categorize pharmaceutical companies, and the historical analysis in Chapter 5

presented several others. Organizations can be divided between companies developing novel pharmaceutical products and those manufacturing generics. Alternatively, companies can be categorized by whether or not they are engaged in research and development on biologics. On the other hand, companies could be grouped by basic structural characteristics; for example, diverse Big Pharma compared to small research firms. While these organizational differences may be the result of institutional effects, using them as a priori categories for comparative analysis will not evaluate the casual proposition that institutions effect organizational strategy. Indeed, Arora et al. (2014) noted a limitation of their work was that it did not demonstrate causality between organizational strategy and structure; i.e. they could not answer the question of whether the centralized structure results in a strategy focused on internal research or if a strategy of internal research results in a centralized structure. To answer this question, general practices can be analyzed first for latent constructs and then the components from these constructs can be used as measures to determine organizational categories through a casual modeling technique. The organizational strategies can then be compared between the emergent groups against theoretically predicted logic orders to assess if the identified latent constructs are institutional effects.

Based on the historical analysis, the characteristics defining organizational differences in the field can be classified into two broad categories: organizational structure and research path components. Measures of organizational structure are variables such as firm size, centralization, and ownership. Measures of research paths are variables such as generic production, portfolio diversity, and biologic research. This chapter applies quantitative analyses to corporate financial data and FDA drug approval

data as sources of organizational structure and research paths measures to determine if latent constructs exists in the field and cause unobserved organizational categorization.

The study design treats field level effects as the independent variable and organizational outcomes as dependent variables, which aligns with the recent methodological argument made by Royston Greenwood and his colleagues (2014) on the current direction needed in institutional logics research. Figure 5.1 illustrates the general theoretical model for this analysis drawn from the discussion in Chapter 2 and the findings from Chapter 4. The source of the latent constructs within the organizational field is unspecified in the model because it is the focus of the qualitative analysis. The variables sets in the model are operationalized as the corporate and FDA data.

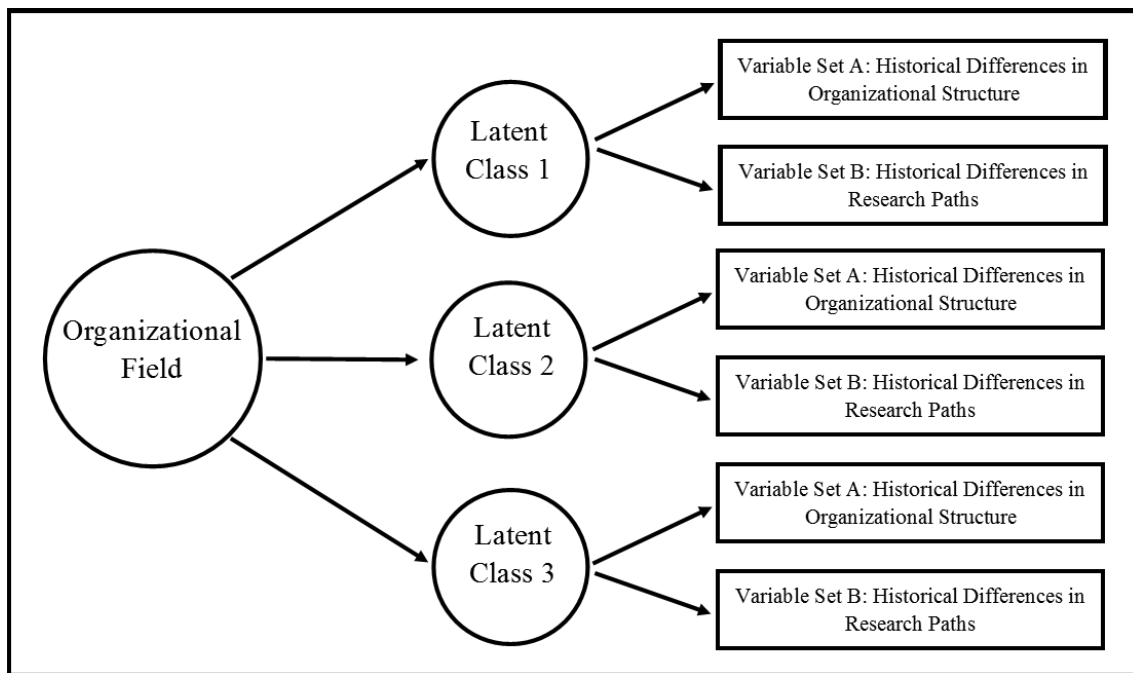


Figure 5.1 Model of Theoretical Prediction for Latent Class Formation

The goal of this chapter is to determine if these organizational measures result in the emergence of classes within the sample by building a model reflecting the theoretical position of Figure 5.1 and using that model to conduct a latent class analysis. While

previous research has analyzed drug approval data collected from the FDA (for examples see Grabowski and Kyle 2007 and Kapczynski et al. 2012), to my knowledge no prior research has applied this data to analyze latent organizational strategies, making the use of this data as an operationalization of latent strategy a novel contribution of this project.

To accomplish the goals stated above, I used three techniques for latent variable analysis: exploratory factor analysis, structural equation modeling, and latent class analysis. These methods are a progression of increasingly sophisticated statistical techniques for identifying latent constructs within data. Each analysis follows a model fitting strategy whereby the measures that fail to be significant are excluded from the final model. Using this method allows me to build models that are more parsimonious by eliminating variables and constructs that fail to fit in the next level of analysis. At the same time, this multi-method approach also serves as a validity assessment because the failure to find latent constructs at lower level does not support moving on to the next analysis.

5.2 Data

The purpose of this section is to detail the process used to construct the quantitative dataset and demonstrate that these data are valid operationalization of organizational structure and research paths. The dataset combines information from two secondary sources: (1) the Food and Drug Administration's public database of drug approvals, and (2) Mergent Online database of corporate financial reports. Information was collected for the years between 1997 and 2014 because 1997 was the earliest date information was available in the Mergent database and 2014 was the most recently available data. As is common in organizational research using secondary data or data

from third party sources, after the data was collected ad hoc sampling criteria were applied to generate a final sample with complete information. For examples of prior organizational research using similar ad hoc sampling procedures see Authors et al. 2008, Bidwell 2011, and Reyt and Wiesenfeld 2015.

5.2.1 Food and Drug Administration Data

The FDA database is publically available on the FDA’s website:

<http://www.accessdata.fda.gov/scripts/cder/drugsatfda/index.cfm?fuseaction=Reports.ReportsMenu>. The FDA database provides details on each new drug application and

biologic license application approved in the United States in downloadable Excel files. Table 5.1 shows the list of variables gathered from the FDA database. Adhering to the

strategy-as-practice literature (Vaara and Whittington 2012), each application is viewed as the outcome of an organizational decision that potentially represents a cohesive

underlying organizational strategy. Specifically, the variables new drug application chemical type, biological licensing application, orphan drug, and review type contain

information that indicate strategic decisions within the drug development process. This data, then can reveal if distinct organizational research paths exists because organizations

have agency in application process (Babiarz and Pisano 2014).

Table 5.1 Variables from the Food and Drug Administration Database of Approved Drug Applications, 1997-2014

| Variable Name | Description | Value Format |
|-----------------------------|---|------------------------|
| New Drug Application Number | Unique numerical code assigned to application by the Food and Drug Administration | six digit numeric code |
| Drug Name | Brand name of submitted drug assigned by the application company | string variable |
| Active ingredients | List of primary active chemicals in drug | string variable |

| | | |
|------------------------------------|---|---|
| New Drug Application Chemical Type | Numeric code assigned the by Food and Drug Administration to indicate the type of approval application is seeking | 1 = New molecular entity 2 = New active ingredient 3 = New dosage form 4 = New combination 5 = New formulation or new manufacturer 6 = New indication 7 = Drug already marketed without an approved New Drug Application 8 = Over-the-counter switch 10 = New indication submitted as distinct New Drug Application |
| Biological License Application | Dummy variable indicating if the application is for a biologic agent | 1 = Biological license application |
| Orphan Drug | Dummy variable indicating if the application is for an orphan drug | 1 = Orphan drug application |
| Review Type | Binary variable indicating the review status of the application | 0 = Standard review 1 = Priority review |
| Application Company | Company listed as the application company | string variable |
| Application Day | Day of the month the application was approved | two digit numeric code (01 - 31) |
| Application Month | Month of the year the application was approved | two digit numeric code (01 - 12) |
| Application Year | Year application was approved | four digit numeric code (1997 - 2014) |

Biological license applications (BLA) are for biological products isolated from natural sources, not chemically derived, and therefore are not classifiable by new drug application (NDA) chemical types. Review classification also only applies to NDAs and contains two categories: priority review or standard review. The FDA determines if an application receives priority review status but the company submitting the application can

request priority review. Priority review status indicates that the drug represents an advancement over the current available therapy; officially defined as:

“evidence of increased effectiveness in treatment, prevention, or diagnosis of condition; elimination or substantial reduction of a treatment-limiting drug reaction; documented enhancement of patient compliance that is expected to lead to an improvement in serious outcomes; or evidence of safety and effectiveness in a new subpopulation.” (FDA 2014)

Priority review results in the FDA making an approval decision within 6 months compared to the 10 months granted for standard review. Standard review is the default status and indicates that the drug has similar therapeutic qualities to those currently on the market. Orphan drug status can apply to both NDAs and BLAs. The categories of priority review and standard review are mutually exclusive but orphan drugs can be categorized by either review process.

There are 557 unique company names listed in the sample. Correcting for inconsistencies in the coding (for example listings for Aqua Pharms and Aqua Pharms LLC were recoded to Aqua Pharms) reduced the number of companies to 397 unique entries with a mean of 4.66 submissions per company. The data is right skewed with a median of two submissions and a range of 4 to 67 submissions in the upper quartile. To ensure enough data at the organizational level, a cutoff of five submissions was applied to generate a sample of 92 companies to collect financial data on. Using the number of submissions as a sampling criteria biases the sample towards large and older corporations. Previous researchers have explicitly used organizational size and age as sample restrictions (for examples see Chandler 2007 and Powell and Sandholtz 2012),

however, number of submissions is more appropriate for this study because it maximizes the data on actions needed for analyzing strategy.

5.2.2 Corporate Financial Data

Annual corporate financial information was retrieved from the Mergent Online database, an online database of financial information on publically traded corporations. Database access is available through the Thomas Cooper Library at the University of South Carolina for students, faculty, and staff. The information in this database covers the end of fiscal years 1997 to 2014. The Mergent database allows users to build reports on singular companies that are downloadable as Excel files. Table 5.2 shows the variables gathered from this database. Consistent with prior organizational research, expense variables are operationalized as information on strategic actions, income variables as the outcomes of strategic actions, and demographic variables as controls and descriptors. These are widely used measures in the research to operationalize organizational structure (for examples see Arora et al. 2014, Chandler 1977, and Funk 2014).

Table 5.2 Variables from the Mergent Online Database of Annual Corporate Reports, 1997-2014

| Variable Name | Description | Format |
|---------------------------------------|--|-----------------|
| Company | Name of publically traded corporation | string variable |
| Total Revenue | Reported annual total revenue in millions of US dollars | numeric value |
| Marketing and Administrative Expenses | Reported annual, marketing, selling, and general administrative expenses in millions of US dollars | numeric value |
| Research and Development Expenses | Reported annual research and development expenses in millions of US dollars | numeric value |
| Operational Costs | Reported annual operational expenses in millions of US dollars | numeric value |
| Total Expenses | Reported annual total expenses in millions of US dollars | numeric value |
| Litigation Expenses | Reported annual litigation expenses in millions of US dollars | numeric value |

| | | |
|---|--|---|
| Acquired in Process R&D | Reported annual expenses on continued research and development projects acquired through a merger of acquisition in millions of US dollars | numeric value |
| Joint Venture Income | Reported annual revenue from joint venture projects in millions of US dollars | numeric value |
| Net Income | Reported annual net income in millions of US dollars | numeric value |
| Net Income per Basic Stock Share | Reported annual income per basic share of common stock in US dollars | numeric value |
| Total Number of Employees | Reported number of employees employed during the fiscal year | numeric value |
| Return on Assets | Reported return on assets of company, calculated by Mergent | percentage |
| Report Date | Year of annual report | four digit numeric code (1997 - 2014) |
| <i>Additional variables</i> | | |
| Merger and Acquisition | Dummy Variable to indicate if application company is an acquisition or merger with parent company | 1 = application company is an acquired component of parent company |
| Subsidiary | Dummy Variable to indicate if application company is a subsidiary of parent company | 1 = application company is subsidiary of parent company 2834 = pharmaceutical preparations corporations 2836 = biological products, excluding diagnostics, corporations |
| Standard Industrial Classification Code | Four digit industry code | 2841 = surgical and medical instruments corporation 3851 = ophthalmic goods corporations 2821 = plastics, materials, and resins corporation 2824 = organic fibers non-cellulosic corporation |
| Foreign | Dummy Variable to indicate if company is incorporated outside of the United States | 1 = company is incorporated outside of the United States |

The Mergent database did not contain data on private companies, which required the exclusion of 13 organizations because they were private companies during at least a portion of the study period. Consistent with prior research (Funk 2014), subsidiaries were treated as components of the parent corporations instead of individual organizations and drug approvals from subsidiaries and acquired companies were recoded to the parent company. Through this process, the sample was refined to a final set of 59 organizations. Two demographic variables were added to the dataset: Standard Industrial Classification Code and Foreign. Standard Industrial Classification (SIC) Code does not change for individual organizations but seven companies either changed their incorporation location or used foreign subsidiaries to submit some applications during the study period which results in the variable being a continuous variable ranging between 0 and 1 when the dataset is collapsed by company and year.

5.2.3 Therapeutic Class

The last data added was a variable for therapeutic classification types. Two sources were used to determine the therapeutic classification of each drug: the 2014 Prescription Medications – Drug Information file from the National Health and Nutrition Examination Survey (NHANES) and the World Health Organization’s Anatomical Therapeutic Chemical (ATC) database. The classification system in the NHANES file, Lexicon Plus, originated from the private data collection corporation Cerner Multum. The WHO (ATC) system was developed through international collaboration and the detailed history is available on the WHO website (http://www.whooc.no/atc_ddd_methodology/history/). The Lexicon Plus system is based on the ATC system but there are some

proprietary differences that result in more therapeutic categories. Table 5.3 lists the therapeutic categories of the variable.

Table 5.3 Therapeutic Class Categories

| |
|--------------------------------------|
| Anti-infective Agents |
| Antineoplastic |
| Antiparasitic Agent |
| Blood and Blood Forming Organs Agent |
| Cardiovascular System Agent |
| Nervous System Agent |
| Dermatological Agent |
| Gastrointestinal Agent |
| Genitourinary Agent |
| Hormones and Hormone Modifier |
| Immunological Agent |
| Metabolic Agent |
| Miscellaneous Agent |
| Ophthalmic Agent |
| Psychiatric Agent |
| Respiratory System Agent |

5.2.4 Complete Dataset

The final dataset contains 1,202 drug approvals matched with financial data from 59 companies. Two-tailed t-test were used to compare the means of the approved FDA chemical types between the sample and excluded cases. Table 5.4 shows the means and test statistics for this comparison. To assess if the companies with more than five submissions that were excluded from final sample due to extraneous criteria drove these results, the t-test were rerun with these companies dropped. Using the reduced data, NME was no longer significant but OTC switches, already marketed and new formulation remained significant at the same alpha levels.

Table 5.4 Comparison of Sample To Excluded Cases of FDA Approvals, 1997-2014

| | Excluded Cases | Sample | Test Statistic |
|---|-----------------------|---------------|-----------------------|
| NDA Chemical Type | | | |
| New molecular entity | 0.214 | 0.265 | -2.44* |
| New active ingredient | 0.020 | 0.020 | 0.01 |
| New dosage form | 0.404 | 0.398 | 0.25 |
| New combination | 0.088 | 0.113 | -1.70 |
| New formulation or new manufacturer | 0.154 | 0.078 | 5.12*** |
| New indication | 0.032 | 0.042 | -1.46 |
| Drug already marketed without an approved NDA | 0.028 | 0.012 | 2.54* |
| Over-the-counter switch | 0.003 | 0.013 | -2.14* |
| Biological License Application (BLA) | 0.049 | 0.051 | -.014 |

* = $p < 0.05$, ** = $p < .01$, *** = $p < .001$

Time was an important factor to consider in this analysis. The first problem of time that needed to be address was that research and development expenses in a given year do not typically reflect the pharmaceutical output of that year; pharmaceutical development is a complicated multiyear process (Angell 2004, Applbaum 2009, Azoulay et al. 2010, Vogel 2007). Some scholars argue that research and development cost should be lagged to reflect the delayed outcome of the expense (Cullman and Zloczynski 2014). Using a lagged variable has a data cost by creating missing cases for the earliest years of each corporation but was applied here to address the issues raised in previous research. Two lagged variables for research and development costs: a 2-year lag and a 3-year lag, were created and tested through Poisson regressions (Appendix A and B) using new molecular entity and biological license applications as dependent variables. These analyses indicated that the 2-year lagged variable is the best fit.

Drug approvals are rare events, which results in sparseness in the dataset. To address this issue, the data was collapsed by company and year prior to analysis. The financial variables collapse as means and the chemical type and therapeutic class

variables were broken into dummy variables to collapse as counts. To avoid skewing the analysis because of size differences in both number of submissions and revenue, all of the non-demographic variables were converted into rates. The financial expense variables were converted rates using total expense as the denominator. Rates for mergers and acquisitions, and subsidiary submissions were calculated using the total number of drug (NDA combined with BLA) approvals as the denominator. Rates for chemical type and therapeutic class were calculated using the total number of drug approvals as the denominator. I also converted firm size using the natural log because the variable had a non-parametric distribution. Table 5.5 shows the descriptive statistics for the final sample.

Table 5.5 Descriptive Statistics by Company, N = 59

| Variable | Mean | Std. Dev. | Min | Max |
|--|-------------|------------------|------------|------------|
| Marketing and Administrative Expenses Rate | 0.38 | 0.12 | 0.07 | 0.64 |
| Operational Costs Rate | 0.35 | 0.16 | 0.04 | 0.74 |
| 2 Year lagged Research and Development Expenses Rate | 0.17 | 0.08 | 0.05 | 0.39 |
| Acquired in Process R&D Rate | 0.01 | 0.02 | 0.00 | 0.07 |
| Litigation Expenses Rate | 0.01 | 0.03 | 0.00 | 0.19 |
| Merger and Acquisition Submission Rate | 0.02 | 0.06 | 0.00 | 0.32 |
| Subsidiary Approval Rate | 0.13 | 0.24 | 0.00 | 0.97 |
| Joint Venture Income Rate | -0.01 | 0.07 | -0.44 | 0.17 |
| Return on Assets | 5.05 | 11.41 | -41.36 | 20.03 |
| Net Income per Basic Stock Share | -9.78 | 95.25 | -725.48 | 73.41 |
| Total Revenue | 11,384.98 | 13,696.34 | 56.95 | 52,823.94 |
| Net Income | 1,755.38 | 2,485.49 | -52.17 | 9,866.69 |
| Total Approvals | 16.93 | 16.35 | 2.00 | 70.00 |
| Total Number of Employees | 29,384.99 | 33,796.06 | 112.50 | 114,512.50 |
| Firm Size (log of Employees) | 9.09 | 1.95 | 4.43 | 11.65 |
| Anti-infective Agent Rate | 2.12 | 3.28 | 0 | 13 |
| Antineoplastic Agent Rate | 0.09 | 0.13 | 0.00 | 0.60 |
| Antiparasitic Agent Rate | 0.00 | 0.00 | 0.00 | 0.01 |
| Blood and blood forming organs Agent Rate | 0.05 | 0.12 | 0.00 | 0.76 |
| Cardiovascular System Agent Rate | 0.05 | 0.08 | 0.00 | 0.36 |

| | | | | |
|--|------|------|------|------|
| Nervous System Agent Rate | 0.15 | 0.22 | 0.00 | 0.80 |
| Dermatological Agent Rate | 0.03 | 0.09 | 0.00 | 0.57 |
| Gastrointestinal Agent Rate | 0.10 | 0.20 | 0.00 | 1.00 |
| Genitourinary Agent Rate | 0.01 | 0.04 | 0.00 | 0.19 |
| Hormones and Hormone Modifiers Rate | 0.09 | 0.15 | 0.00 | 0.67 |
| Immunological Agent Rate | 0.03 | 0.11 | 0.00 | 0.71 |
| Metabolic Agent Rate | 0.07 | 0.14 | 0.00 | 0.76 |
| Miscellaneous Agent Rate | 0.03 | 0.08 | 0.00 | 0.50 |
| Ophthalmic Agent Rate | 0.05 | 0.15 | 0.00 | 0.71 |
| Psychiatric Agent Rate | 0.05 | 0.16 | 0.00 | 1.00 |
| Respiratory System Agent Rate | 0.08 | 0.16 | 0.00 | 0.75 |
| New Molecular Entity Rate | 0.26 | 0.22 | 0.00 | 1.00 |
| Biological License Application Rate | 0.07 | 0.16 | 0.00 | 0.88 |
| New Active Ingredient Rate | 0.03 | 0.10 | 0.00 | 0.67 |
| New Dosage Rate | 0.40 | 0.21 | 0.00 | 0.90 |
| New Combination Rate | 0.07 | 0.10 | 0.00 | 0.40 |
| New Formula Rate | 0.10 | 0.13 | 0.00 | 0.57 |
| New Indication Rate | 0.05 | 0.07 | 0.00 | 0.33 |
| Already Marketed without New Drug Application Approval | 0.02 | 0.05 | 0.00 | 0.29 |
| Other-the-Counter Switch Rate | 0.01 | 0.02 | 0.00 | 0.14 |

5.3 Methodology

The methodological approach follows the process of *structuration*⁶ applied by Weber et al (2013) and developed from Weick's (1995) work on sense-making within organizations. The structuration process states institutionalization occurs over time as distinct practices become interconnected through repetition and form coherent institutional frameworks. Applied to Figure 5.1, the theory predicts combinations of specific actions form organizational strategies in an established field subject to institutional pressure. As an established field, the theoretical assumption for the

⁶ Structuration comes from the work of Anthony Giddens (1984) and is a recursive conceptualization of social structure whereby the actor's perception and abilities are determined by the social structure that the actor's actions produce and reproduce.

pharmaceutical industry is that institutionalization has already occurred and, therefore, outcomes from general practices can identify the latent connections between actions.

The dataset contains a large number of items and it is unlikely that all of them operationalize a latent institutional framework; both the practice-as-strategy and structuration argument hold that not every practice is a component of an institutional framework. Applying a multi-step analysis is a method to achieve parsimony in the model and determine what measures contribute to the formation of organizational subgroups in the pharmaceutical industry. Exploratory factor analysis is the first step to identify existing connections between organizational actions. An exploratory factor analysis will address the basic question of whether latent constructs exist within the data as well as the specific measurement items that are connected. Structural equation modeling is the second step to assess if the identified factors interconnect through a larger relational structure. The structural equation model will determine if the measures form a coherent framework and if there are causal relationships between the latent constructs.

A logical method for evaluating organizational strategy is to study the decision-making processes behind an organization's central objective, the process known as strategy-as-practice (Schraven et al 2015, Vaara and Whittington 2012). For pharmaceutical companies practice is developing and selling pharmaceutical products. The application of drug approval data a measure of organizational strategy is a novel contribution of this project but supported by prior research showing that these decisions are strategic actions. The advent of discovery by design research processes and studies on the pharmaceutical pipeline (Fisher et al. 2015, Sowlay and Lloyd 2010) indicate that drugs reaching the market are the result of deliberate choices made within the

organization. While using only approval data leaves out research projects that never reach the clinical testing phase or are abandoned prior to approval, this constraint presents an accurate measure of the outcomes that become subject to negotiation between stakeholders within the field.

The first purpose of the exploratory factor analysis is to examine the dataset to determine if there are latent constructs to warrant further analysis. This is a conceptual quantitative first step in structuration (Weber 2013) because it identifies connections between different actions. The variables in the dataset represent different organizational decisions; therefore, that factors identified in the model should provide relational information on general organizational strategies in the field. Following a model fitting strategy, as opposed to model testing, allows some measure to not load on any factors without contradicting the overall theoretical expectation that latent constructs exist.

Based on the existing research, several predications can be made about possible latent constructs. Corporate financial information can reveal the organizational structure of a pharmaceutical firm and, therefore, can illustrate the focus of organizational strategy (Chandler 2005, Davis et al 2004, Roy 1997, Richard et al. 2009, Powell and Sandholtz 2012). The financial information, including the structural components of subsidiary, merger, and acquisition, form the basis of attention for the organization. A factor loading return on assets (ROA), net earnings per basic share, and marketing and administrative expenses would indicate strategies of profitability. If research and development, acquired R&D, and joint R&D cost, load together it could indicate an organizational focus on innovation.

The chemical type and therapeutic class variables illustrate organizational research strategy because each submission is a specific organizational action. The drug information is more challenging for predicting possible factor outcomes, but drawing on Fisher et al.'s (2015) work on the drug pipeline, new molecular entity application is expected to load with antineoplastic agents (cancer drugs) because cancer dominates the majority of the drugs under development. Antivirals (anti-infectives) and painkillers (central nervous system agents) are the other top drug classes in development expected to load with new molecular entity application, along with priority review and orphan drug status. New combination, new indication, and new formulation are predicted to load together since they are aspects of drug expansion and possible indications for an organizational strategy of medicalization.

In summation, the factor analysis will reveal latent constructs at the field level. These constructs are not all expected to contribute to organizational differences. It is likely some of the constructs will be the result of structural constraints placed on the organizations within the field. The contribution of the factor analysis in this research is to determine if latent constructs not readily explainable by external constraints exist. These factors are the most likely to provide the measures for the components that comprise an institutional framework.

Structural equation modeling allows for the determination of a causal relationship between the factors derived from the factor analysis (Acock 2013, Bollen 2011). This is an important next step because the central argument, field level constructs effect organizational strategy, is unsupported by factor analysis alone since the direction of effects is unclear in first-generation statistical techniques (Bagozzi and Yi 2012). As a

second-generation statistical technique, structural equation modeling provides a method for distinguishing latent constructs that are causal indicators of organizational strategy.

Furthermore, since it is theoretically possible not all of the identified factors from the factor analysis will connect in a single coherent framework, applying a model fitting strategy allows for the elimination of unrelated factors. The contribution of the structural equation model to this research is that it will identify the presence of an interconnecting framework of pharmaceutical practices. Drawing from the strategy-as-practice research, the structural equation model will indicate distinct organizational level strategies within the field.

To determine if the measure of the identified strategies create organizational subgroups, the indicators from the best fit structural equation model will be used to conduct a latent class analysis. Mo Wang and Paul Hanges (2011) proposed latent class modeling as a more robust analysis technique for identifying organizational heterogeneity compared to current methodologies relying on categorization through qualitative techniques or stratification by demographic characteristics. Clustering analyses based on categorical variables is common practice but this method is problematic for evaluating causal claims because while differences may emerge between the groups, the researcher is unable to evaluate if the differences are a result of the characteristic used to define the groups (Wang and Hanges 2011). Latent class models can support causal claims because the techniques statistically derive the groups from a range of indicators; therefore, the researcher is able to determine which indicators are important for class separation by evaluating the class prevalence rates. The interpretation of latent classes is based on the

results of the analysis and it is inappropriate to decide a priori how many classes are in the data or how to categorize those classes (Collins and Lanza 2010, Masyn 2013).

Latent class analysis uses categorical variables, which require the transformation of the chemical type and therapeutic class variables from counts into ordinal categories. With a sample size of only 59 cases, a simple dichotomous transformation (1 = received an approval, 0 = did not receive an approval) is appropriate given the prevalence of no approvals in all categories. Using dummy variables does prevent the measurement of potential differences due to variations in approval rates, but given the small sample size, it is unlikely much variation would have been picked up in a more detailed categorical transformation.

5.4 Exploratory Factor Analysis

Since the dataset contains a large number of variables and there is no theoretical expectation on which items best measure latent constructs in organizational strategy, the purpose of the factor analysis is to determine first if latent constructs exist and then to eliminate the items that fail to load on any factors. The factor analysis also provides the opportunity to assess the identified latent constructs against the findings of previous research to interpret potential underlying strategies in the field.

Prior to analysis, the dataset was split between the financial variables and the drug information variables because running all of the variables in a single factor analysis produced a Heywood⁷ case. When the factor model for the drug information variables is unrestricted it still converges as a Heywood case solution, but I think in this instance, the

⁷ Heywood cases are “conceptually implausible or impossible estimates in which a communality is estimated to be 1 or greater than 1” (Fabriger and Wegener 2012: 32). It is important to pay attention of Heywood cases because they can be the result of misspecification or a violation of the assumptions for factor analysis.

solution is due to the small sample size and not a specification error. When the number of factors in the model is constrained, the solution ceases to converge as a Heywood case.

Table 5.6 shows the oblique rotation loadings for the common factor model of the financial indicators and Table 5.7 shows the factor output for the chemical type and therapeutic class indicators. Fit was determined by evaluating the eigenvalue and scree plot output. Since this was an exploratory factor analysis, a liberal approach was used to retaining factors by also assessing the cumulative variance provided by the factors with 75% as the desired the cutoff point.

Table 5.6 Financial Variable Exploratory Factor Model, Oblique Rotations

| | Scale & Profit Focus | Research Focus | Administrative Focus | <i>Uniqueness</i> |
|----------------------------------|---------------------------------|-----------------------|-----------------------------|-------------------|
| Marketing & Administrative Costs | -0.21 | 0.27 | 0.74 | 0.32 |
| Operational Costs | 0.21 | -0.78 | -0.42 | 0.08 |
| Cost of 2 Year Lagged R&D | 0.19 | 0.87 | -0.04 | 0.34 |
| Cost of Acquired R&D | -0.24 | 0.20 | -0.48 | 0.61 |
| Cost of Joint R&D | 0.13 | -0.28 | 0.14 | 0.85 |
| Cost of Litigation | -0.08 | 0.00 | 0.04 | 0.99 |
| Merger & Acquisitions | 0.16 | -0.11 | 0.14 | 0.92 |
| Subsidiary | 0.31 | -0.24 | 0.06 | 0.78 |
| Firm Size | 0.84 | 0.01 | 0.03 | 0.31 |
| Non SIC | 0.14 | 0.07 | -0.41 | 0.81 |
| Foreign | 0.46 | 0.03 | 0.45 | 0.61 |
| Net Earnings per Basic Share | 0.21 | -0.08 | -0.09 | 0.93 |
| Return on Assets | 0.80 | 0.05 | -0.02 | 0.40 |

Note: Factor loadings above 0.5 are in bold to aid interpretation.

The financial indicators suggest that organizational focus differs by the allocation of resources. Within the sample as a whole, the allocation of the three main expense categories: marketing and administrative, operational, and research and development, is stable over the 15-year period (two years are lost due to using a lagged R&D variable).

The standard deviation of these variables in the sample is greater than the standard deviation for most individual companies, suggesting that allocation patterns become established within an organization. This stability of allocation patterns is expected given the findings from dominant logic research that shows logics create inertia at the organizational level (Bettis and Parhalad 1995). What is interesting about the model in Table 5.6, however, is that it indicates inertia also occurring at the field level. Operational cost loads negatively on both the research focus and administrative focus factors suggesting that reductions in this category may be a common industry practice for improving the bottom line.

The model in Table 5.6 shows a tradeoff in expense allocations between a strategy focused on research costs and one focused on administrative costs that suggest decisions about these practices may result from different perspectives. The factor model also suggests a connection between firm size and profitability. Given the industry history, this factor could indicate either a strategy of scale where larger companies are better able to target multiple profitable markets or a strategy of consolidation tied to organizational longevity. In summary, the factor model for the financial variables clearly shows the existence of distinct underlying concepts related to organizational structure can be drawn from the financial measures.

The therapeutic class and chemical type factor model in Table 5.7 indicates eleven distinct strategies. There appears to be two predominant underlying constructs driving the model based on the item with the highest loading on each of the factors; factors defined by the therapeutic target and factors defined by FDA application type. Factors indicating strategies driven by therapeutic targets are diabetes combination

research, important research, endocrine research, and aging research. Factors indicating strategies driven by the FDA application type are innovative research, research altering current treatments, and diverse and genetic research.

Table 5.7 Chemical Type and Therapeutic Class Variable Exploratory Factor Model, Oblique Rotations

| | Innovative Research | Diverse & Genetic Research | Non-Neurological Research | Important research | Research Altering Current Treatments | Expansionary Research | Diabetes Combination Research | Not Gastrointestinal Research | De-professionalization Research | Endocrine Research | Aging Research | Uniqueness |
|-------------------------------|---------------------|----------------------------|---------------------------|--------------------|--------------------------------------|-----------------------|-------------------------------|-------------------------------|---------------------------------|--------------------|----------------|------------|
| <i>Therapeutic Categories</i> | | | | | | | | | | | | |
| Anti-Infective | -0.17 | -0.05 | 0.02 | 0.93 | -0.08 | -0.07 | -0.03 | 0.11 | 0.05 | 0.02 | 0.07 | 0.11 |
| Antineoplastic | 0.34 | 0.35 | -0.12 | 0.01 | 0.65 | 0.06 | 0.03 | 0.21 | -0.02 | 0.02 | -0.20 | 0.17 |
| Blood Agents | -0.07 | 0.19 | 0.36 | -0.24 | -0.24 | -0.16 | -0.08 | 0.33 | -0.23 | -0.31 | 0.00 | 0.37 |
| Cardiovascular Agents | 0.11 | -0.18 | 0.10 | 0.02 | 0.01 | -0.23 | 0.04 | 0.29 | -0.08 | -0.24 | 0.64 | 0.29 |
| Nervous System | 0.07 | -0.21 | -0.86 | -0.21 | 0.02 | -0.17 | -0.14 | 0.05 | -0.06 | -0.08 | -0.10 | 0.16 |
| Dermatological | 0.03 | -0.22 | 0.36 | 0.09 | -0.13 | -0.25 | 0.02 | 0.32 | 0.04 | 0.07 | -0.48 | 0.34 |
| Gastrointestinal Agents | -0.10 | 0.02 | 0.16 | -0.03 | -0.08 | -0.06 | -0.01 | -0.90 | -0.12 | 0.03 | -0.13 | 0.17 |
| Genito-urinary Agents | 0.02 | -0.04 | 0.13 | 0.09 | 0.04 | -0.02 | -0.03 | 0.08 | -0.01 | 0.38 | 0.68 | 0.35 |
| Hormones | -0.03 | -0.02 | 0.16 | -0.09 | 0.01 | 0.02 | -0.13 | -0.04 | -0.16 | 0.86 | 0.10 | 0.18 |
| Immunological | 0.66 | 0.08 | 0.03 | -0.04 | -0.12 | 0.11 | -0.05 | 0.12 | -0.01 | 0.09 | 0.19 | 0.46 |
| Metabolic Agents | 0.00 | 0.06 | 0.01 | -0.26 | -0.13 | 0.05 | 0.83 | -0.02 | -0.02 | -0.13 | 0.08 | 0.21 |
| Miscellaneous Agents | -0.03 | 0.76 | 0.00 | 0.01 | 0.19 | -0.13 | -0.04 | 0.10 | -0.06 | 0.09 | -0.06 | 0.35 |
| Ophthalmic Agents | -0.14 | -0.23 | 0.37 | -0.01 | 0.09 | 0.03 | -0.28 | 0.01 | -0.13 | -0.41 | 0.08 | 0.47 |
| Psychiatric Agents | -0.21 | -0.09 | -0.03 | -0.13 | -0.03 | 0.82 | -0.10 | 0.02 | -0.13 | -0.09 | -0.08 | 0.24 |
| Respiratory Agents | -0.13 | -0.12 | -0.05 | -0.23 | -0.07 | -0.18 | 0.01 | 0.03 | 0.82 | -0.04 | -0.09 | 0.20 |
| <i>Chemical Types</i> | | | | | | | | | | | | |
| NME | 0.77 | -0.15 | -0.11 | 0.10 | -0.05 | -0.17 | 0.00 | -0.32 | 0.00 | -0.24 | 0.13 | 0.14 |
| BLA | -0.05 | 0.88 | 0.16 | -0.02 | -0.16 | -0.05 | -0.05 | -0.12 | 0.04 | -0.08 | 0.00 | 0.18 |
| New Active Ingredient | -0.28 | 0.01 | -0.60 | 0.28 | -0.11 | 0.12 | -0.08 | 0.23 | -0.14 | -0.13 | -0.03 | 0.36 |
| New Dosage Form | -0.51 | -0.24 | -0.10 | -0.12 | -0.39 | -0.02 | -0.14 | 0.18 | -0.07 | 0.26 | -0.03 | 0.26 |
| New Combination | -0.19 | -0.23 | 0.20 | 0.17 | 0.17 | -0.08 | 0.80 | 0.06 | -0.08 | 0.04 | -0.12 | 0.18 |
| New Formula | -0.11 | -0.21 | 0.30 | -0.30 | 0.54 | -0.09 | -0.30 | 0.15 | 0.03 | 0.12 | -0.13 | 0.22 |
| New Indication | 0.29 | -0.13 | 0.20 | 0.02 | -0.01 | 0.82 | 0.11 | 0.05 | 0.15 | 0.09 | -0.01 | 0.15 |

| | | | | | | | | | | | | |
|------------------------|-------------|-------|-------|-------------|-------------|-------|-------|-------|-------------|-------|-------|------|
| Already Marketed | -0.26 | -0.04 | -0.01 | -0.03 | 0.82 | -0.05 | 0.01 | -0.03 | -0.08 | -0.02 | 0.19 | 0.23 |
| OTCs Switch | -0.02 | 0.08 | 0.14 | 0.16 | 0.00 | 0.12 | -0.11 | 0.09 | 0.81 | -0.10 | 0.04 | 0.28 |
| Priority Review Status | 0.35 | 0.05 | 0.11 | 0.62 | 0.05 | -0.13 | -0.12 | -0.20 | -0.13 | -0.18 | -0.08 | 0.26 |
| Orphan Drug Status | 0.67 | -0.02 | 0.03 | -0.05 | -0.02 | 0.01 | -0.12 | 0.19 | -0.14 | 0.09 | -0.19 | 0.44 |

Note: Factor loadings above 0.5 are in bold to aid interpretation.

The factors associated with the therapeutic targets represent a range of therapeutic classes but they can be connected through general trends in public health. The factors of diabetes combination research, endocrine research, and aging research represent therapeutic classes that contain diseases or conditions that are primary health concerns in the industrial world. Diabetes has been documented as an emerging health issues for many devolved nations; while ageing is a negative social status. The item inti-infective agents loads on the factor important research and represents general anti-viral and anti-biotic drugs in addition to HIV medications. Taken together, these four factors suggest a larger underlying construct representing a therapeutic targeted research strategy.

The factors associated with the FDA application types appear to represent strategies focused on developing drugs representing advancements in treatment or targeting high status groups. Factors of innovative research and diverse and genetic research contain the items new molecular entity and biologic license application approvals, both items that are used in prior research to measure innovation. The items loading on the factor research altering current treatments represent alterations to existing treatments but the loading of antineoplastic agents suggest that this factor may connect to the other two because it represents research on the high status therapeutic category of cancer. Taken together, these three factors suggest an underlying construct representing a

research strategy on scientific advancement. However, not all of the factors fit into these two descriptive categories of therapeutic targeting or scientific advance.

The factors of expansionary research and de-professionalization research are the factors that most closely align with the thesis of medicalization. The loadings of the items for both therapeutic class and application type are close in strength, but each factor only has two items loading, making the interpretation of medicalization a weak argument. Historical events during the study period also raise doubts as to whether both of these factors are accurate measures of medicalization. The factor of de-professionalization research is mostly likely a historical artifact representing Merck, Johnson & Johnson, and Sanofi-Aventis switching the successful allergy medications Claritin, Zyrtec, and Allegra to over-the-counter medications following their patent expirations. The items loading on the factor of expansionary research, psychiatric agents and new indication, make sense historically and support the medicalization thesis; however, this factor does not contradict the counterargument that expansionary research could be driven by scientific advancements. The remaining two factors, non-neurological and not gastrointestinal, lack a clear interpretation of potential underlying constructs.

In summary, the factor analysis models suggest coherent organizational strategies exist within the field. The financial model indicates that three latent constructs are present, but the low number of items loading on each factor means caution needs to be taken in the interpretation of these findings. While the chemical type and therapeutic class model suggests some factors may connect through larger underlying constructs related to either a research strategy focused on therapeutic targets or one focused on scientific progress, there is not enough data in the model to interpret whether these

strategies are driven by technical aspects in pharmacologic research or the structure of the approval process. The factor outputs from both models show latent factors exist in the dataset, which supports the second step of the analysis, building a structural equation model; however, only the factor analysis of the financial variables justifies the elimination of potential measures.

5.5 Structural Equation Model

The purpose of the structural equation model is to assess the latent constructs from the factor analysis models for causal connections and determine if the factors interconnect through a larger framework. Given the results of the factor analysis models, the measures of organizational structure from the financial variables are more likely covariates to drug development strategies than casual indicators. The failure of the model testing the financial variables to converge supports this interpretation; therefore, these measures were excluded from further model building.

I began the structural equation modeling process for the drug variables by running individual models for each of the 11 factors in Table 5.6. To ensure that there were enough indicators for each construct to reach a solution, all of the variables in a factor with a loading of 0.30 or greater were included in the models. Models that converged were retained and all retained models were added in a stepwise process starting from the innovation research factor, the factor that explained the highest proportion of variance. Figure 5.2 shows the final best fit model.

The goodness of fit statistics for the model in Figure 5.4 are satisfactory: $\chi^2(40) = 44.84$, $p=0.276$, RMSEA = 0.045, CFI = 0.95, TLF = 0.93, and SRMR = 0.10. Analysis of the modification indices indicated that the correlation between orphan drug status and

antineoplastic ratio would improve model fit. This relationship makes conceptual sense because a potential strategy for altering a drug's market segment is through expanding the patient base by utilizing orphan drug requests.

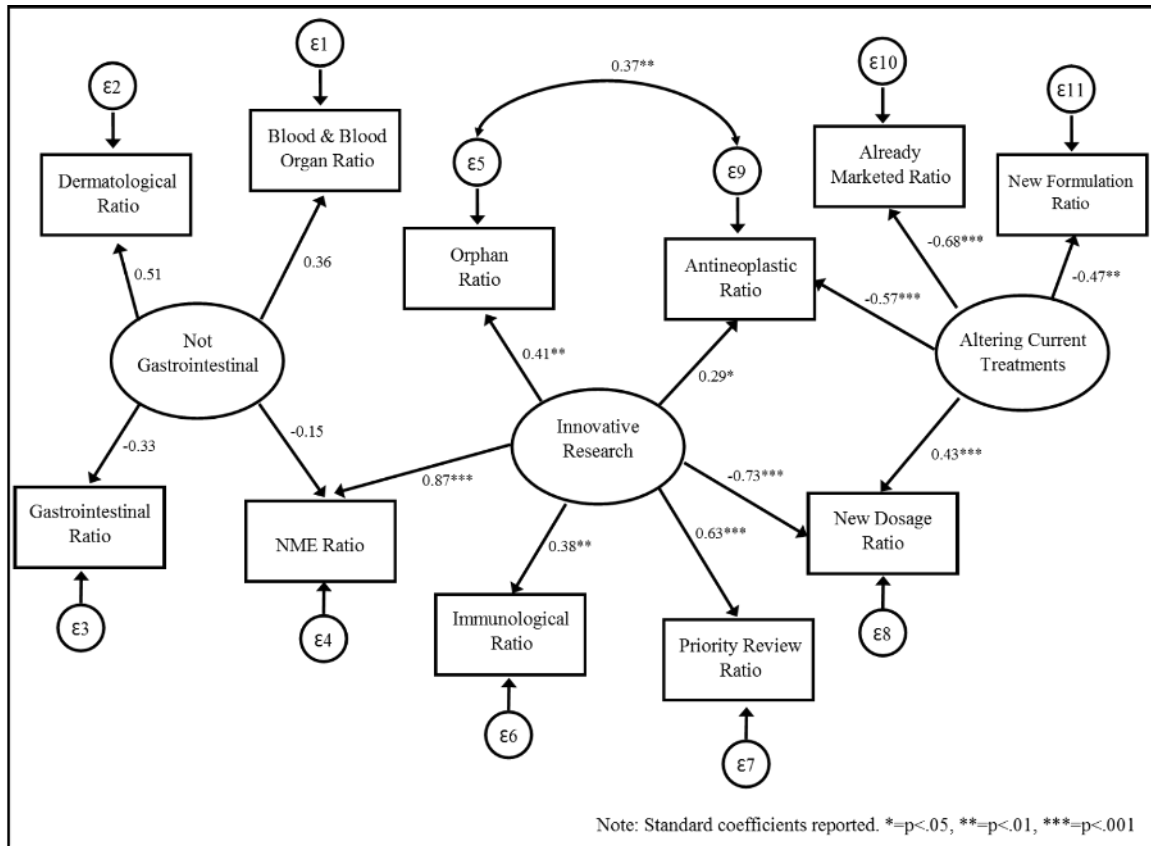


Figure 5.2 Best Fit Structural Equation Model

The model indicates a path dependency in the drug development strategy of pharmaceutical companies. The inverse relationship between the items loading on the factors of innovative research and alternating current treatments shows approvals for alterations to cancer drugs reduces the number of new molecular entity approvals a company receives. This finding is interesting in comparison to previous research on path dependencies in the pharmaceutical industry.

Cook et al. (2011) used economic modeling to argue that the path from treatment A to innovative treatment C could be shorted by the development of the intermediate

treatment B that was an alteration of treatment A. While my finding does not contradict this argument, it does question the spillover effect Cook et al. (2011) assumed would occur internally from the development of treatment B. The model in Figure 5.2 instead shows that developing alternations to existing drugs, either through new dosage or new formulation approvals, cost a company through a reduction of innovative approvals. This finding suggest then that a competitor firm rather than the originator firm as proposed by Cook et al. (2011) may realize the spillover effect from an intermediate treatment.

Further analysis of the data supports the presence of a bifurcated research path dependency within the field. Creating variables for innovative research and altering current treatments revealed that corporations with higher rates of innovate research had lower rates of altering current treatment approvals. The mean rate of alteration approvals by corporations above the median for innovative approvals was 0.40, and the mean rate of alteration approvals by corporations below the median for innovative approvals was 0.62. The same trend occurs comparing the rate for innovative approvals of corporations above and below the median for alteration approvals, 0.36 to 0.90.

Another interesting finding from the model is the significant correlation between antineoplastic and orphan drug approvals. While the ratio of orphan drug approvals loads on the innovative research factor along with the ratios for new molecular entities and priority review approvals, as covered in Chapter 4, orphan drug approvals can be granted for existing treatments. Considering that cancer drugs represent the largest therapeutic category of drugs in the development pipeline and that new treatments are among the most expensive drugs on the market, this correlation could indicate a distinct strategy of expanding market coverage for the most profitable drugs in a company's portfolio. If the

treatment options are more effective for the target population than existing options, then this would still represent innovative research, but it also supports criticism of the Orphan Drug Act as being utilized by companies primarily for financial gain rather than stimulating novel research for underserved patient groups.

In summary, the model in Figure 5.2 shows that the connections between organizational research practices are not clearly explainable by the technical or scientific aspects of pharmacology. The trade-off that appears between developing innovative products and alterations to existing products is likely the result of organizational culture emphasizing one research path over the other. A more detailed explanation on this causal relationship requires additional organizational level data on the internal research practices at these companies and would be a good direction for future research.

In relation to the process of field structuration, the structural equation model significantly reduces the number of indicators contributing to measurable latent constructs in the data. This reduction is beneficial because it allows for a more parsimonious latent class analysis, as opposed to one including all of the variables, which increases the likelihood of finding meaningful class divisions (Collins and Lanza 2010). Additionally, the structural equation model indicates that the financial variables are more appropriately treated as covariates to the research strategies rather than as measures of latent constructs.

5.6 Latent Class Analysis

The purpose of the latent class analysis is to determine if the identified latent constructs of research strategy leads to distinct organizational types within the field. This will provide more meaningful organizational categories for studying the external effects

on pharmaceutical research and development than those based on historical characteristics. I used the variables from the best fit structural equation model, figure 5.4, to conduct a latent class analysis in Stata with the LCA Stata plugin developed by Lanza and her colleagues (2015). Table 5.8 and Figure 5.3 show the results of this analysis.

Table 5.8 Summary of Information on Selected Number of Latent Classes for Drug Development Strategies

| Number of Classes | Fit Statistics | | | | | | Class Proportions | | | |
|-------------------|----------------|--------|------|--------|--------|---------|-------------------|---------|---------|---------|
| | ρ | G^2 | df | AIC | BIC | ℓ | Class 1 | Class 2 | Class 3 | Class 3 |
| 1 | 11 | 278.85 | 2036 | 300.85 | 323.7 | -365.61 | | | | |
| 2 | 22 | 197.15 | 2024 | 243.15 | 290.93 | -324.76 | 77% | 23% | | |
| 3 | 33 | 176.01 | 2012 | 246.01 | 318.72 | -314.19 | 52% | 26% | 22% | |
| 4 | 44 | 161.16 | 2000 | 255.16 | 352.8 | -306.77 | 26% | 28% | 22% | 24% |

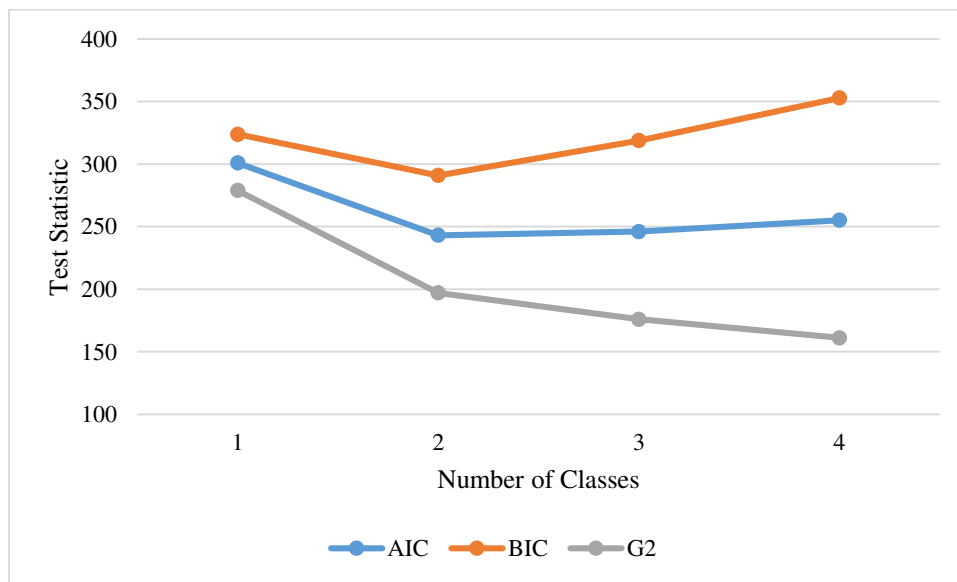


Figure 5.3 Fit Statistic Comparison between Class Solutions

The data in Figure 5.3 and Table 5.8 indicate that the two class solution is the best fit model. Figure 5.4 shows the prevalence rates for the 11 variables in the model (0 = no approvals from that class, 1 = all class members received an approval).

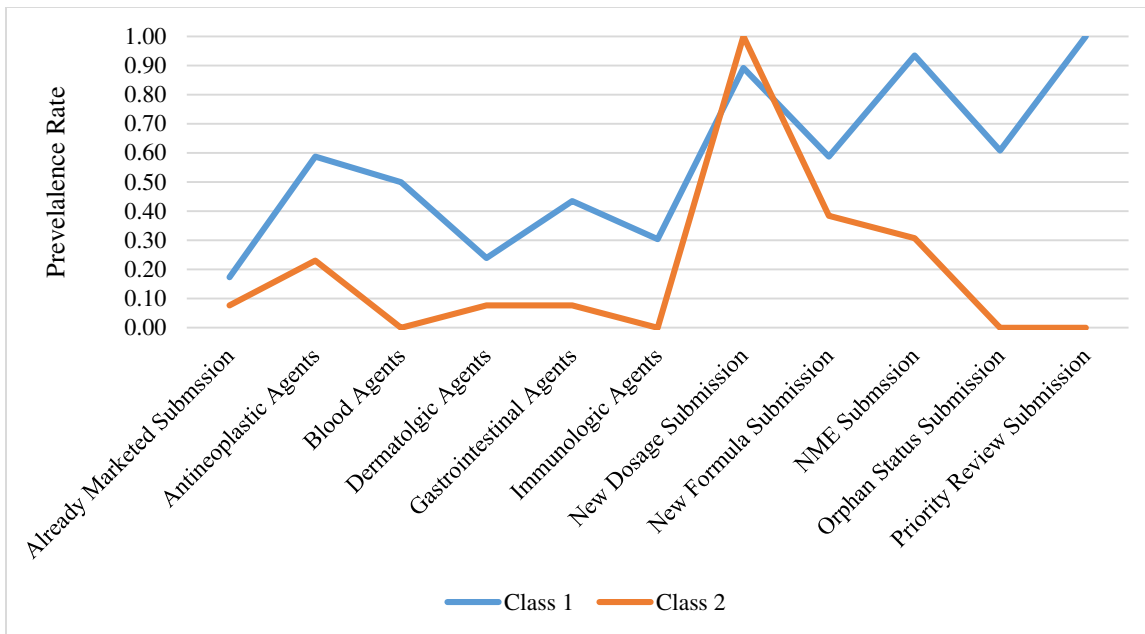


Figure 5.4 Class Prevalence Rates

Figure 5.6 shows that the model does not have great class separation. The largest differences occur in priority review, NME, and orphan status approvals, all with above 60 percent difference in prevalence rates between classes. The least amount of separation occurs with dermatological agents, new dosage, and already marketed submissions. The data in Figure 5.6 indicates a possible interpretation of the classes but is not very clear. To assist with interpreting the classes, I looked at the descriptive data for the variables excluded from the latent class model.

Comparing the data in Table 5.9 with the data in Figure 5.6 suggest that the organizational subgroups in the latent class model are separated into innovative corporations (class 1) and modification corporations (class 2). The innovative corporations receive more new molecular entities, orphan drugs, and priority review approvals. They were also more likely to develop antineoplastic, anti-infective, and biologic drugs. Modifiers were more likely to receive approvals for metabolic,

Table 5.9 Means by Latent Class for Financial, Chemical Type, and Therapeutic Variables not Included in Latent Class Model

| Financial Variables | Class 1 | Class 2 | Test statistic |
|---|----------------|----------------|-----------------------|
| Marketing & Administrative Cost | 37% | 38% | -0.23 |
| Operational Costs | 34% | 36% | -0.39 |
| 2-Year Lagged R&D Cost | 17% | 15% | 0.97 |
| Merger & Acquisition Approvals | 3% | 0% | 1.44 |
| Subsidiary Approvals | 16% | 5% | 1.45 |
| Number of Employees | 33,874 | 13,500 | 1.97 |
| Percent not in Pharmaceuticals | 43% | 0% | 1.38 |
| Percent Foreign Submission | 44% | 52% | -0.52 |
| Return on Assets (ROA) in \$s | 6.96 | -1.72 | 2.54* |
| Net Income per Basic Share in \$s | 3.13 | -55.46 | 2.01* |
| <i>Chemical & Therapeutic Variables</i> | | | |
| Anti-infective Agents | 13% | 8% | 0.81 |
| Cardiologic Agents | 5% | 4% | 0.41 |
| Nervous System Agents | 14% | 19% | -0.77 |
| Genitourinary Agents | 2% | 0% | 1.36 |
| Hormones | 9% | 6% | 0.58 |
| Metabolic Agents | 6% | 13% | -1.62 |
| Miscellaneous Agents | 4% | 1% | 0.99 |
| Ophthalmic Agents | 6% | 1% | 1.04 |
| Psychiatric Agents | 2% | 15% | -2.87** |
| Respiratory Agents | 5% | 18% | -2.63* |
| BLA Submissions | 9% | 0% | 1.70 |
| New Active Ingredient Submissions | 1% | 8% | -2.29* |
| New Combination Submissions | 7% | 9% | -0.62 |
| New Indication Submissions | 5% | 5% | -0.35 |
| OTC Switches | 1% | 0% | 1.30 |
| <i>Sample Size</i> | <i>46</i> | <i>13</i> | |

* = $p < 0.05$, ** = $p < .01$, *** = $p < .001$

psychiatric, and respiratory agents. Based on the factor analysis in Table 5.7, these therapeutic classes are connected to the chemical type submissions of new active ingredient, new combination, and OTC switch, which are all applications defined as modifying existing drugs. Using the variables for innovative research and altering current treatments that were applied to test for path dependency in the structural equation model,

innovative corporations have a lower rate of approvals for alterations to current research than modification corporations, 0.47 to 0.66 ($p < 0.020$ in a two-tailed t-test). Conversely, modification corporations have a lower rate of innovative approvals than innovative corporations, 0.18 to 0.78 ($p < 0.000$ in a two-tailed t-test).

In relation to the financial information, there does not appear to be a difference in how expenses are allocated between the classes; as percentages of total expenses, marketing and administrative cost, operational cost, and the 2-year lagged R&D cost are similar between classes. In terms of organizational structure, innovators are larger, more likely to make use of subsidiaries, engage in mergers and acquisitions, and be outside the SIC industry category of pharmaceutical manufacturing and development. The innovator strategy appears to be more beneficial for organizations because they were more likely to have higher returns on assets and positive valuation on net income per basic share, both outcomes that make organizational survival more likely.

In conclusion, the latent class analysis indicates that there are two organizational groups in the sample demarcated by organizational strategy. These subgroups pursue distinct organizational strategies focused on either innovation or modification. The evidence of path dependency suggests that the latent constructs driving categorization are the result of organizational culture and not the result of technical or regulatory pressures. Furthermore, the fact that multiple organizations fall into each category means that the aspects of organizational cultural influencing the class separation are collective, and therefore not likely to be the result of unique internal organizational identity. Whether or not the source of these latent constructs is attributable to logics orders is not assessable from this model and requires further analysis using qualitative methods.

5.7 Conclusion

The analyses in this chapter revealed several important findings. The factor analysis showed that underlying latent constructs effecting organizational strategy can be identified from measures of general organizational practices. This finding is not restricted to the pharmaceutical industry and can applied by strategy-as-practice researchers in other fields. Of interest to researchers in the pharmaceutical industry, the factor analysis indicates that measures of organizational structure drawn from financial variables are most likely covariates to research strategies rather than determinants. This finding makes sense given the long-term research horizons and uncertainty in pharmaceutical development.

The structural equation model revealed several key latent constructs that interconnect in a coherent research framework. The most important finding from the structural equation model is the existence of a path dependency creating a trade-off between innovative research and alterations to current treatments. While the model does not assess the scientific contributions alterations to current treatments may have on shortening the development period for innovative treatments, the findings indicate that a spillover effect is not likely to be realized internally because of the inverse relationship between the rates of innovative approvals to alteration approvals.

The latent class analysis showed that distinct organizational categories exists within the field as a result of the latent constructs within organizational research strategies. The separation of categories aligns with the path dependency revealed by the structural equation model, and based on the financial measures, lead to different economic outcomes. The model shows innovative corporations greater commercial

success than modifiers. This raises the question that if all of the organizations in the field are operating within a capitalist market system, why would some corporations persist in focusing on developing products that are alterations to current treatments? The latent class analysis cannot address this question but an institutional theory based prediction is that organizational culture has institutionalized the practices of innovation or modifications making it unlikely organizational members are aware of the connection between action and outcome. An analysis at the organizational level is necessary to determine if institutional factors do in fact contribute to the observed latent classes. The next chapter presents four case studies, two from each class, to elucidate if the latent class separation is driven by institutional logics by analyzing managerial attention with the organizations.

CHAPTER 6

FOUR CASE STUDIES ON DRUG DEVELOPMENT

6.1 Introduction

Applying the strategic action framework to analyze the incorporation of a new product within the pharmaceutical regime frames institutionalization as a causal process; therefore, evaluating how organizations negotiate the release of a new product provides a set of actions that can potentially reveal the dominant institutional logic of a company. This chapter is a set of four case studies on the market release of new molecular entities to elucidate if the latent classes identified in the previous chapter are organizational categories defined by distinct institutional orders. Figure 6.1 is the theoretical model illustrating the conceptual framework for this analytical step.

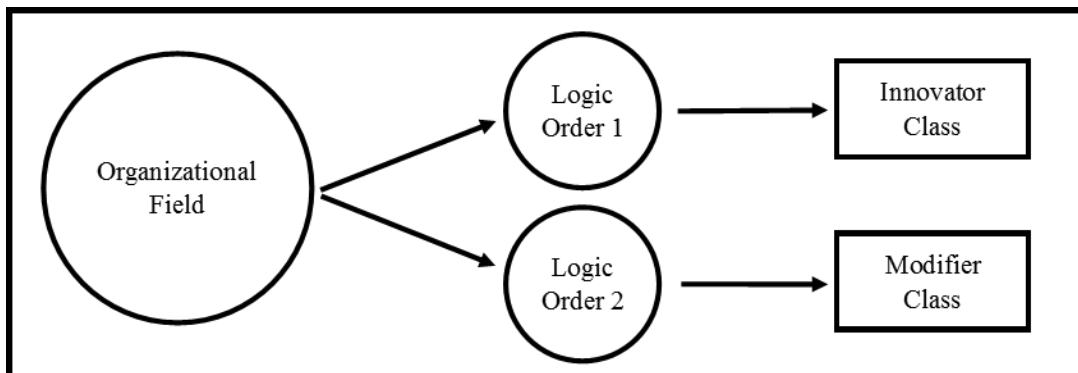


Figure 6.1 Model of Theoretical Prediction for Logic Order Effect on Organization Strategy

The data for the case studies came from two sources, academic medical journals and annual corporate reports. These sources directly address the dynamics between pharmaceutical corporations and two stakeholder groups: medical professionals and financial investors. The original goal of conducting a comprehensive analysis on all the major relationships between pharmaceutical corporations and the other stakeholders in the field ended up being beyond the scope of this project but the case studies conducted here show expanding the analysis to other stakeholders is a fruitful direction for future research. The case studies in this chapter show latent class analysis can identify organizational subgroups connected by organizational strategies; however, the data suggest that the differences between the innovator and modifier classes is the result of more than just the alignment of organizational strategy to institutional logics.

6.2 Case Study Data and Methodology

Organizational scholars have a long history utilizing case study research and such work has led to many groundbreaking insights (Gibbert and Ruigrok 2010). Case studies provide an in depth analysis of organizational practices that is difficult to achieve in large sample studies and is an appropriate technique for directly comparing organizational strategies between groups. The main criticisms of case study research focus on the issue of the validity. There are two methods researchers have followed to assess the validity of case study data: triangulation through multiple data sources or using multiple coders to generate interrater reliability coefficients. This study uses triangulation by drawing data from two different sources: academic journals and annual corporate reports.

The relationship between case studies and theory can be either inductive or deductive based on the goals of the researcher. Chandler's historical analyses (1977 &

2005), used case studies inductively to develop broad theoretical explanations on organizational structure and change. Scott and his associates (2000) applied case studies deductively to elucidate the propositions derived from their quantitative analyses. This study follows the lead of Scott et al. (2000) and uses case studies to elucidate if the innovator and modifier classes identified in the previous chapter are the result of different logic orders on organizational strategy.

6.2.1 Case Study Selection

Rather than directly selecting organizations from each latent class, two drugs from each class were selected as case study subjects. This allows the analysis to focus on strategies of drug development by analyzing the actions taken during the release of a specific product. Considering the propriety nature of pharmaceutical development and corporate practices in a competitive market system, the case histories are not exhaustive; however, previous research has shown the data does exist to evaluate the organizational strategy of pharmaceutical corporations during the drug development process (Abraham 1995, Applbaum 2009, Matheson 2008).

A strategic selection method criterion (Small 2009) was employed by drawing the sample from the pool of new molecular entity approvals within each class. New molecular entity is an appropriate criterion because it requires interorganizational negotiations and therefore increases the availability of data: journal articles that inform physicians about a new treatment option are more prevalent during the early stages of a prescription drugs life cycle, and new products are more likely to be featured in annual corporate reports. In addition to providing potential cases in both classes, this criterion also allowed for the selection of cases that were within a few years of each other, which

acts as a control for historical events within the field. The drugs selected for case study analysis are Novartis's *Tasigna*, Johnson & Johnson's *Invega*, Sepracor's *Lunesta*, and Novo Nordisk's *Levemir*.

6.2.2 Data & Methods

Data were gathered from two sources: academic medical journals and annual corporate reports. One medical journal article for each drug was found on PubMed by searching the chemical name of each drug within three years of the FDA approval date. In order for an article to be selected for analysis, one or more authors had to be clearly identified as affiliated with the application company. Seven years of annual corporate reports on each corporation were collected from the Mergent online database. A period of seven years of reports was chosen for saturation; for example, Fiol (1989 and 1990) only analyzed three years of reports. The drug approval year was the midpoint with the three years of reports preceding and following the approval year completing each sample.

The data were analyzed using basic content analysis procedures (Weber 1990). While there is academic criticism on using content analysis for analyzing latent constructs, the methodology has become an accepted process for evaluating a wide range of organizational issues (Duriau et al 2007). In relation to this project, content analysis has been used for over thirty years to evaluate organizational strategy (see Bettman and Weitz 1984, Bowman 1984, Ditlevesen 2012, and Stanton and Stanton 2002).

The institutional logics perspective informed the construction of the codebook for the evaluation of the case study data. The rhetorical analysis of organizational material has been used successfully in prior research to evaluate the effects of institutional structure on organizational strategy (Stanton and Stanton 2002, Suddaby and Greenwood

2005). Discourse related to organizational strategy within the academic journals and annual corporate reports was coded through an iterative coding process. Table 6.1 shows the final codebook. The entirety of the academic journals were read and coded; however, only the letter to shareholders and sections discussing the case study drug were coded in the annual corporate reports.

Since the purpose of this analysis was to elucidate the latent classes found in the quantitative analysis, the content coded in each source was statements about organizational strategy. Rather than counts of words or phrases, cohesive statements (sentences and paragraphs) were coded as single units of discussions on organizational strategy. The example of strategies discussing the need for care in Table 6.1 is two sentences from the 2005 Novo Nordisk letter to shareholders. The goal of this coded methodology was to ensure the identification of each strategy was correct by including the context of each statement.

Table 6.1 Codebook for Case Study Analysis

| Research articles | Example |
|--|--|
| <i>author(s)</i> | Turkoz et al |
| <i>author affiliations</i> | all are Ortho-McNeil Janssen Scientific Affairs (J&J subsidiary) |
| <i>funding sources</i> | Ortho-McNeil Janssen Scientific Affairs, LLC |
| <i>journal</i> | Neuropsychiatric Disease and Treatment |
| <i>reporting method of treatment effects</i> | "22% reduction from baseline" - relative effect |
| <i>treatment groups</i> | pooled analysis of 3 prior studies: five groups on various strengths against one placebo group |
| <i>alternative treatments</i> | no alternative medication tested but listed studies of other drugs that have found similar results |
| <i>framing of need</i> | "the damaging effect that negative symptoms have on the ability of patients with schizophrenia to participate fully in society." |
| <i>reporting method</i> | ANCOVA, path analysis, structural equation modeling |

| | |
|---------------------------|---|
| <i>iatrogenic effects</i> | ADRs 10% or greater are listed |
| <i>trial duration</i> | three 6-week studies |
| <i>sample size</i> | 937 treatment & 337 placebo |
| <i>study limitations</i> | goodness of fit statistics for path analysis were below acceptable range |
| <i>drug genesis</i> | not discussed |
| <i>other</i> | results consistent with hypothesis that indirect symptoms are improved by the drug, but the data is not significant |

| Annual Corporate Reports | Example | Logic Order |
|-------------------------------------|--|--------------------|
| Research & Development | | |
| <i>research pipeline</i> | "For several years Novartis has received more approvals for new medicines than competitors." (Novartis 2010:9) | commerce |
| <i>publications and conferences</i> | "We expect to provide data on arfomoterol Phase III studies at appropriate medical meetings as we advance through the drug development process." (Sepracor 2003:3) | science |
| <i>research failures</i> | "A hope for stroke patients faded away." (Novo Nordisk 2007:2) | care |
| <i>research processes</i> | "Our two separate, six-month, placebo-controlled studies of the product have provided extensive data supporting the drug's suitability for nightly administration over long periods of time without the complications of significant next-day effects, tolerance and rebound, which are observed with other drugs used to treat insomnia." (Sepracor 2005:2) | science |
| <i>new projects</i> | "LUNESTA represents a new approach to the treatment of insomnia, and has the potential to bring these patients real relief." (Sepracor 2004:2) | care |
| Patient Health | | |
| <i>need for care</i> | "We have a responsibility as part of our vision to try to influence the negative trends of this global health issue and avoid unnecessary human suffering and a staggering cost to society. That is why we wish to be a catalyst for changing diabetes." (Novo Nordisk 2005:4) | care |
| <i>awareness of need</i> | "As part of our marketing strategy for 2007, we have begun the rollout of a new physician education campaign containing some of these data, which we believe will further distinguish LUNESTA as a unique treatment available for the millions of people in the U.S. who have insomnia." (Sepracor 2006:2) | commerce |

| | | |
|---|---|----------|
| <i>access to care</i> | "But thanks to our strong financial results in 2004, we were able to expand our "access to medicines" programs for uninsured and indigent patients suffering from leprosy, malaria, tuberculosis, chronic myeloid, leukemia and other diseases, all part of our important worldwide corporate citizenship program." (Novartis 2004: 8) | care |
| Health Care Industry | | |
| <i>perception of industry structure</i> | "Our perspectives on health policy are straightforward: We are champions of a health care system that provides incentives for innovation, that permits public and private health care systems to co-exist, that is characterized by strong and well-respected regulatory authorities, that is centered around the best interests of patients and consumers, that provides for physician and patient choice, and that allows these choices to be made on the basis of broadly available, well-founded, clinical and economic evidence." (Johnson & Johnson 2005:4) | commerce |
| <i>intellectual property rights</i> | "The cost increases associated with the growing demand for healthcare services, diagnostics and medicines lead political activities aimed at reducing expenditures on medicines, via price reductions and generic substitution. Unfortunately, these efforts go even further and also encompass attempts to weaken patents and intellectual property rights." (Novartis 2008: 7) | commerce |
| <i>interorganizational relations</i> | "We work actively to promote collaboration between all parties in the healthcare system to achieve common goals." (Novo Nordisk 2006:2) | care |
| <i>public perceptions on industry</i> | "Clearly the global regulatory environment is growing tougher; pressure is being put on companies over the cost of health care, and private enterprise is under close public scrutiny." (Johnson & Johnson 2004:3) | commerce |
| Organizational Structure | | |
| <i>company principles</i> | "Thanks to the power of our operating model and the character of the people we attract, we have been able to deliver exceptionally consistent performance decade after decade." (Johnson & Johnson 2007:4) | commerce |
| <i>mergers and acquisitions</i> | "Thanks to our strategy, in 2008, Novartis stayed on course and completed several targeted acquisitions and strategic investments that both strengthened the portfolio and enhanced our internal growth drivers" (Novartis 2008:6) | commerce |

| | | |
|-------------------------------|---|----------|
| <i>alliances</i> | "During the first quarter of 2005, we signed a research and development agreement with San Diego-based ACADIA for development of new drug candidates targeted toward treatment of CNS disorders, primarily neuropsychiatric/neurologic conditions and neuropathic pain, as well as a possible 5-HT2A antagonist for use in a combination product with LUNESTA for sleep-related indications." (Sepracor 2004:3) | science |
| <i>organizational culture</i> | "Measurement of working climate indicates that this has been accomplished without affecting employee morale. In fact morale is at an all-time high!" (Novo Nordisk 2003:4) | care |
| <i>business structure</i> | "Our decentralized management approach encourages our businesses to develop products and marketing strategies tuned to local cultures, enabling them to explore new product categories and even new business models." (Johnson & Johnson 2007:6) | commerce |

While the case studies are focused on the development of specific drugs, most of the annual corporate reports in the sample contained little information on the drugs. This required expansion of the analysis to include the entire content of the letter to the shareholders. The content in the annual corporate reports was coded in a two-stage process similar to Powell and Sandholtz's (2012) methods. The first pass coded the material into four main categories of organizational strategy: research and development, patient health, health care industry, and organizational structure. The second pass coded the material within each category into the logic order of science, care, or commerce.

The four main categories were identified as descriptive characteristics during the initial reading of a selection of annual reports. These categories are not interpretations of latent constructs, i.e. this is not grounded theory, rather the categories were employed to efficiently separate the data to evaluate the content based on the logic orders. This process allowed for coherent strategies related to the logic orders to emerge between different areas of organizational strategy, thereby clearly identifying the overall

alignment of each corporation's organizational strategy. The dominant logic of the organization was determined as the logic order that contained the most statements of organizational strategies.

Annual corporate reports are an appropriate source for data to evaluate organizational logics because these publications have shifted from being primarily accounting reports to tools organizations use strategically to communicate organizational identity to outsiders (Doriau et al 2007). Researchers do not typically examine the entire report but focus their analysis on specific sections (Stanton and Stanton 2002). The letter to shareholders was selected here as the component to evaluate the general organizational strategy of each corporation because letters to shareholders have been utilized similarly in previous research to indicate causal relations between management ideology and organizational actions (Bettman and Weitz 1984, Doriau et al. 2007, Fiol 1989 and 1990).

Neither of these data sources is neutral in relation to institutional frameworks. The academic journal articles are components of science and the annual corporate reports are components of commerce. However, this does not mean the content only reflects these two logics. The factual content, clinical data and corporate performance metrics, is not the content analyzed. The analysis focuses on interpreting the discussions of strategy that resulted from the factual content. For example, in the academic articles treatment effects are coded as reported as either relative or absolute measures because Woloshin et al. (2008) stated that reporting treatment effects in relative terms was a strategic method employed to make treatment outcomes seem more impressive to physicians. This tactic then is aligned with the logic of commerce if the study authors are affiliated with the drug company because making the trial outcome seem more impressive would benefit the

company as physicians would be more likely to the prescribe the drug. In a similar fashion, analyzing components within the letter to shareholders can also reveal organizational strategies aligned with logics other than the logic of commerce.

6.3 *Tasigna* (nilotinib) and Novartis: Innovator Class

The FDA approved *Tasigna* (nilotinib) on October 29, 2007 as part of the chemotherapy treatment for leukemia. Deininger's (2008) article is a review of two new second line treatment options available for chronic myeloid leukemia and is focused on the results of the clinical trials for *Tasigna*. The author, Michael W. Deininger, is affiliated with the Division of Hematology and Medical Oncology at the Oregon Health and Science University Cancer Institute. He is further identified as a consult for Novartis in the disclosure section.

This article is the only journal article in the sample that compared the effects of competing treatment options from different companies. What is interesting about this tactic is that the actual clinical studies were not comparative trials but Deininger (2008) attempted to distinguish the drugs from each other based on results from separate studies. He concluded that the results do not clearly indicate one products is superior, both appear to have benefits and drawbacks, but *Tasigna* appeared to have more potential for patients. The general tone of the article indicates an alignment with the logic of care. Deininger (2008) framed the competition between second line drugs as beneficial primarily for patients because it is "an important step on the path to individualized cancer therapy" (4030). Furthermore, whether or not *Tasigna* meets the potential predicted treatment targets, it is still "another piece of good news of CML patients" Deininger (2008:4030).

These statements connect with the trends aligned with the logic of care in the annual corporate reports.

One of the organizational strategies that emerged from the Novartis letters to shareholders was the company's efforts to provide medicines for patients that could not afford them. The 2004 letter to the shareholders discussed the company's recently opened research center for tropical disease, which is managed as a not-for profit organization and targets the treatments of neglected diseases in developing countries. The center is part of the company's broader goal of providing access to patients in need in line with the belief that the right to health is a basic human right. This concern for patients is repeated in all of the letters through statements mentioning the company's multiple access-to-medicine programs. This aligns with the logic of care and can be viewed as a tactic to secure moral legitimacy for the company by appealing to general humanitarian concerns.

Additional examples of Novartis addressing broader health issues occur in later reports. The 2006 letter to shareholders explained that corporate citizenship was an important issue at Novartis and that was why the company engaged in multiple access-to-medicine programs, connecting this topic between strategies of patient care and organizational structure. In the 2007 letter, the section covering the access-to-medicines programs was expanded to include a discussion on corporate citizenship and a new corporate commitment to environmental sustainability. The 2008 letter announced the launch of a vaccines institute in Italy that would focus on developing vaccines for patients in developing countries, and in the 2009 letter, Novartis is stated to have played a crucial part in the successful campaign against leprosy, the near eradication of which is framed as a public health milestone. Finally, the 2010 report noted that in addition to

continuing to provide medicine to those without access, Novartis was now taking a holistic approach to health care access by expanding its philanthropic programs to include management and technical training to assist countries in building health care infrastructures.

The organizational principle of providing access continues to be visible in the unusual diversification of the company by selling both prescription and generic drugs. The letters framed the generic segment of the company as providing access to medicine for patients in the industrial world who can afford to pay for medication, but not the high prices of brand name drugs. The generic drug business “provides affordable treatment options following the expiry of patents” (Novartis 2006:6). In the 2008 letter this strategy is attributed to helping maintain the overall fiscal performance of the company in the deteriorating economic climate and it is indicated the strategy is becoming legitimized within the industry because it “now enjoys broad support and that a growing number of major pharmaceutical companies are also investing in generic pharmaceuticals” (Novartis 2008:6). This strategy of product diversification is a good illustration of the overall organizational strategy of Novartis. The letters discussed how the generics business allowed the company to provide access to more people while at the same time touting the strategy as successful in contributing to growing profitability. Entry into the generic market as a strategy aligns with both the logics of care and commerce because Novartis stated it allowed the company to provide care to an underserved population but at the same time was profitable. Other components within the letters indicate that Novartis is equally aligned to the logics of care and commerce.

Examples of actions that align with the logic of commerce are seen in all of the reports. The 2004 letter stated the need for strong intellectual property rights and keeping the industry profitable was necessary to develop innovations for future generations. The letter also discussed the company's acquisition strategy as designed to improve its generic portfolio. Tasigna was first mentioned in the 2006 letter, which stated its expected launch date and projected Tasigna to reach peak annual sales of 1 billion dollars. The fact that the earliest discussion of Tasigna is framed around projected profitability is an example pragmatic legitimacy as an explanation of drug development and aligns with the logic of commerce. The use of pragmatic legitimacy as an explanatory tactic for strategies reflecting the logic of commerce becomes clearer in the discussions on strategy related to the health care industry.

Over a page in the 2007 letter is devoted to an ideological discussion of anti-market assaults on the pharmaceutical industry and why commercialization is the appropriate strategy for pharmaceutical development. The 2007 letter stated explicitly the three biggest challenges for Novartis were increased pressure on costs, erosion of patent rights, and growing public mistrust. Later in the letter, the CEO stated, "I personally feel the level of hostility toward innovation goes too far when industrialized countries take for granted that they have the healthiest population in the history of mankind but at the same time demand breakthrough medicines with no side effects and offered at minimal prices" (Novartis 2007:8). This letter more than the others reveals the company as conflicted between seeking to expand access to care while also existing as a profitable commercial corporation. The connection between innovation and commercialization is an example of cognitive legitimacy tied to the market ideology; specifically that capitalism incentivizes

innovation. The 2008 letter to shareholders continued to criticize the larger structural issues of the health care industry but the critique was toned down from the previous year. Finally, the CEO stated in the 2009 report “I would like to emphasize that our primary purpose as a pharmaceutical company is to discover and develop effective medicines and successfully bring them to market” (10), again reinforcing the connection between development and capitalism found in the logic of commerce as the dominant component of the organizational strategy.

In conclusion, it is clear Novartis is a company that cares. None of the other case studies discussed extensive programs providing access to medicine consistently nor did they mention founding multiple organizations dedicated to addressing a wide range of health issues targeted to low profit markets. Yet at the same time Novartis is still a commercial company stating in response to policies of price controls that people need to realize innovation has a price and that patients benefit from the financial success of industry. As a large corporation, the letters mentioned multiple products each year making it difficult to focus on the development of Tasigna, and Tasigna was only briefly discussed elsewhere in the annual reports. Based on the content in the letter to shareholders, my conclusion is the organizational strategy of Novartis is not dominated by on logic but equally aligned with the logics of care and commerce.

6.4 *Invega* (paliperidone) and Johnson & Johnson: Innovator Class

Invega is a psychotherapeutic agent approved by the FDA on December 19, 2006 for the treatment of schizophrenia. The article by Turkoz et al. (2008) is a pooled analysis of data from three prior studies to test for the indirect effects of Invega. The data analyzed came from random controlled trials that tested five strengths of Invega against

placebo groups. All four study authors are employees of Ortho-McNeil Janssen Scientific Affairs, a wholly owned subsidiary of Johnson & Johnson.

The need for an analysis of indirect effects is framed around the complexity of schizophrenia, which causes both positive and negative symptoms in patients. The goal of this analysis was to separate the total effects between direct and indirect effects through path analysis to test the hypothesis that the drug has a direct effect on the negative symptoms of schizophrenia that contribute indirectly to patient outcomes. The authors' conclude the findings support this hypothesis: "these data suggest that paliperidone ER improves the negative symptoms of schizophrenia through a direct effect as well as an indirect effect on positive and mood symptoms" (Turkoz et al 2008:957). However, the data only shows the direct effect is significant; neither of the mediated effects tested, indirect effects on positive and negative symptoms, were significant in the model. While the authors' noted that these indirect effects were not significant in their discussion of the results, the fact that they concluded that the study supported the hypothesis of indirect effects indicates the intent of this article aligns with the logics of commerce because the measurable outcomes of the drug are overstated. The analysis of the data from the annual corporate reports supports further the interpretation that Johnson & Johnson pursues an organizational strategy aligned with the logic of commerce.

The annual corporate report sections on Invega give the impression Johnson & Johnson is primarily focused on scientific advancements and patient care. The 2007 annual report is the only one that discussed Invega in detail. The section on Invega opened with a personal story of a patient struggling with schizophrenia and how receiving treatment finally led to him becoming a better-functioning person. The section

then discussed the history of schizophrenia research at the company and the multiple breakthroughs made since 1953. The conclusion of the section stated Invega was one more product that will enable patients to return to fulfilling their dreams. This section on Invega contained no discussions that aligned with the logic of commerce, most of the discussion is focused on improving patient health and advances in treatment, but the content in the letters to shareholders indicates the strategic focus of the company was actually aligned with the logic of commerce.

The 2003 and 2004 letters appeared balanced between the three logics. The 2003 letter contains statements of care: “Patients’ stories of the impact of this technology are inspiring, and remind us that our business – the business of health care – is a meaningful endeavor and an extraordinary responsibility”; statements of science: “While financial achievements are important in themselves, more significant are the health care advances they enable that are the foundation for our future”; and statements of commerce “Productivity initiatives such as Process Excellence help us exploit every opportunity to maximize the resources of this vast organization”. The 2004 letter contained similar statements but there was more discussion about the how the organizational structure meet targets related to science, care, and commerce. In addition, the 2004 letter is the first to mention regulatory pressures on the cost of care as a factor influencing organizational strategy.

It becomes clear in the 2005 letter that while Johnson & Johnson is making research advances and improving people’s lives, the dominant organizational strategy of the company aligns with the logic of commerce. The letter opens with a statement that growth was primarily the result of managerial decisions rather than discoveries or

improved treatments: “An improvement in mix toward higher margin products, productivity increases driven by cost containment efforts, and positive interest and other incomes all helped drive impressive earnings growth” (Johnson & Johnson 2005:1). The letter also discussed the general structure of health care systems in more detail and made clear the company position is health care systems should be based on market principles where products have both clinical and economic value.

The 2006 letter is the first letter in the sample to integrate performance metric graphs into the text. The bottom of the first page presents three bar charts showing net sales, diluted earnings per share, and dividends per share between 2002 and 2006. The incorporation of these graphs that were previously in a separate section of the report emphasized the focus of the strategic statements in the letter is commercial productivity. The 2006 letter also discussed in detail the four strategic principles of the company: (1) founded on the values embodied in the Credo, (2) broadly based in human health care, (3) a decentralized business operation, and (4) a long-term management strategy. Each of these principles is explained in relation to specific organizational strategies. The credo “challenges employees to put the needs and well-being of the people they serve first”; being broadly based offers “advantages that enable us to *elevate* our performance” (emphasis in the original); decentralization combines the best properties of small firms with the resources of a large corporation; and long term management is another “source of enduring financial strength” (Johnson & Johnson 2006). While these principles cover the range of all three logics, the letter connected these principles through a broader organizational commitment to “delivering capital-efficient, profitable growth”, therefore,

using pragmatic legitimacy to indicate that components of science and care are strategically adopted to meet the company's commercial needs.

The 2007 letter was the first to discuss philanthropic sponsorships, but it is clear the strategy of sponsorship is part of the organization's commercial strategy: "Our sponsorship of the 2008 Olympics in Beijing is boosting awareness of our companies and our brands throughout the Asia-Pacific region" (Johnson & Johnson 2007:6). The letter discussed the four key business principles again but they were modified from the principles listed in previous years to: (1) winning in health care, (2) capitalizing on convergence, (3) accelerating growth in emerging markets, and (4) developing leadership and talent. These new principles are more commercially focused and indicated the organizational strategy was increasingly focused on market based tactics. Winning in health care is a particularly interesting principle because the explanation focused on managerial changes to the organizational structure and indicated Johnson & Johnson considers the health care industry a competition between organizations rather than an institution for social improvement. The letter to shareholders in the 2008 and 2009 annual reports contained similar content to the years of 2006 and 2007 with one notable exception. The 2008 letter addressed the broader economic issues of the global recession and discussed how the company remained strong by highlighting the fact it was the third best performing stock in the Dow Industrial Average for the year.

In conclusion, the data indicates the dominant organizational strategy for Johnson & Johnson aligns with the logic of commerce. While the content of the material discussed scientific advances and concern for patient health, these topics were ultimately woven together as part of an organizational identity based on a profitable commercial enterprise.

Components of science and care were presented predominantly as elements of cognitive legitimacy; the company engaged in scientific research and patient care because that is what pharmaceutical corporations do, not because these actions defined corporate goals. Components of science and care were also presented pragmatically to explain strategies designed to provide the company with a competitive edge.

Turkoz et al. (2008) stated there was a clear need to improve schizophrenia treatment and learn about how current treatments effect the entire range of negative symptoms. This position represents the logics of both care and science, but the authors conclusion, that Invega could treat indirect symptoms, is unsupported by the data indicating the primary interest of the author's was market expansion. This article also represents the use of pragmatic legitimacy; the data did not support the hypothesis on Invega, but neither did it disprove the hypothesis, so practitioners are encouraged to adopt the treatment because it could improve their patients' outcomes. The actions in this situation are legitimized through positions of self-interest. Johnson & Johnson gets increased sales and physicians can switch their patients to a medication that may or may not improve their condition but shows no indication it will worsen the symptoms.

6.5 Lunesta/Estorra (eszopiclone) and Sepracor: Modifier Class

The FDA approved Lunesta (eszopiclone) on December 15, 2004 for the treatment of primary insomnia. Walsh (2007) and colleagues article presented the findings from a Phase IIIB/IV clinical trial Sepracor submitted to the FDA. Ten of the six authors' work for Sepracor and the article stated the company provided the funding for the trial. The research design was a standard, double-blind randomized trial of the treatment against a placebo with the treatment effects reported through relative measures

against the control group and as absolute measures calculated against the baseline of the treatment group.

The authors stated the clinical trial had several unique components compared to previous insomnia studies. First, the trial was long, lasting for over six months, and the researchers used a non-standard methodology for sleep studies by gathering data beyond sleep quality. Walsh et al. (2007) stated the most significant aspect of the trial was it “is the first to demonstrate that long-term treatment of primary insomnia with eszopiclone 3mg, or any hypnotic, enhanced quality of life, reduced work limitations, and reduced global insomnia severity, in addition to improving quantitative, patient-reported sleep variables” (967). While the article focused on these improvements to patients, the overall tone of the article framed eszopiclone as a scientific breakthrough in sleep therapy and indicated a strategy aligned with the logic of science. The early years of the annual corporate reports also focused on the scientific discoveries and advances in patient treatments made by Sepracor.

The shareholder letters in 2001 and 2002 framed Sepracor as a company founded on innovative research. The letters also highlight the organizational structure by stating Sepracor is a unique, integrated small pharmaceutical organization that can take a product from development to commercialization. Even though the letters highlight the company’s scientific abilities, a significant portion of income was derived through royalties from out-licensed products, indicating that Sepracor’s early infrastructure was more supportive of research and development than commercialization. Both the 2001 and 2002 letters discussed in detail only one commercialized product that was developed in-house, Xopenex an asthma treatment. Both letters discussed Lunesta, under the current brand

name Estorra, as a promising product in the late-stage pipeline. Outside of the letter to shareholders, there were lengthy sections in the reports containing a discussion on the current clinical research results for Lunesta and an explanation of insomnia and its effect on people's lives. These sections framed insomnia as an under-treated health need but indicated the organizational strategy for developing Lunesta focused on scientific discovery rather than capitalizing on an unmet market demand.

About a quarter of the 2003 letter to shareholders was devoted to Lunesta. The primary focus of this section was on the general scientific progress being made in treating sleep disorders and the specific research being conducted by Sepracor. "As the science surrounding GABA continues to evolve, we feel privileged to be at the forefront of research for the treatment of sleep disorders" (Sepracor 2003:2). The letter highlights that 2,700 patients were enrolled in the phase III trials submitted to the FDA for approval and how the company was conducting an additional long-term follow-up study specifically because "the surprising absence of scientifically robust, long-term efficacy data" (Sepracor 2003:2). The content of the letter indicates Sepracor presents a public identity based on scientific accomplishment. This is a strategy of moral legitimacy because it is justifying the alignment of non-commercial strategies with the general social promise of scientific medicine. This tactic is seen explicitly in the claim that the need for insomnia treatments is that sleep is a fundamental component of good health. This strategy suggests Sepracor's dominant organizational strategy aligns with the logic of science.

In the 2004 letter, Estorra has been rebranded as Lunesta and discussion on the drug again takes up about a quarter of the letter. The letter discussed the continued Lunesta trials and framed the company's interest in the ongoing research around gaining

a better understanding on the relationship between insomnia and other commonly occurring conditions. Stating that Sepracor is interested in furthering scientific knowledge on insomnia by investigating comorbidity causality is another instance of a non-commercial organizational strategy justified through moral legitimacy. The content of the first four annual corporate reports indicated Sepracor is aligned predominantly with the logic of science; however, starting with the 2004 letter to shareholders, an increasing amount of the discussion on organizational strategy is devoted to market based tactics. For example, the 2004 letter discussed the need for expanding the Lunesta sales force to achieve product growth and highlighted how the company's unique infrastructure makes it an ideal partner for a U.S. biotech corporation seeking to commercialize a new product.

In the 2005 letter, the Lunesta content is focused more on patient care and commercialization than scientific discovery. While future developments are still mentioned as important to the company's long-term plans, the letter stated the expansion of the sales force had driven short-term growth rather than the introduction of a new product. The discussion of organizational strategies for market development as well as issues related to the health care industry is even more prevalent in the 2006 letter. However, the final section of the letter stated, "Increasingly, our focus will be on future opportunities in the form of candidates that we generate from our internal discovery capabilities" (Sepracor 2006:3), indicating Sepracor was still strongly tied to the logic of science.

The final Sepracor letter to shareholders analyzed was a notable departure from the previous six. The entire structure of the letter was different and focused almost entirely on market related organizational strategies. Part of this shift could be attributed to

a new CEO who initiated structural changes as part of an “objective to create a stronger and more productive commercial organization” (Sepracor 2007:3). While the letter still mentioned specific products, it no longer contained sections discussing the development of the products. What is particularly interesting about this letter is that while the content was predominantly market orientated, the opening section described Sepracor as a pioneering research company that was built on the scientific advancement of dividing chiral drugs into parts. This origin story is absent from all of the early letters and seems to be included here as a tactic of pragmatic legitimacy for altering the organizational strategy.

In conclusion, Lunesta was the most challenging case to analyze. The early Sepracor annual reports aligned with the logic of science but the tone and substance of the reports took a notable departure in 2005 towards the logic of commerce. What is interesting about this apparent shift in organizational strategy is that while there was a change in management as the founder and CEO retired in early 2007, Sepracor was subsequently acquired in 2009 by the Japanese firm Sumitomo Dainippon Pharma. This information suggests that the shift in tone aligning the company with the logic of commerce and presenting this change through tactics of pragmatic legitimacy could have been part of a broader organizational strategy to become an acquisition target. Furthermore, while the importance of scientific research was dominant in the majority of the letters, the organizational strategy of out-licensing also was mentioned frequently as a method of profitability, indicating the company was always pursuing a strategy of external commercialization.

Finally, toward the end of the annual reports in a legalese section on licensing agreements, is the information that the compound leading to Lunesta was in-licensed through a 1999 data package acquisition from Rhone-Poulenc Rorer SA. The exact intent of this acquisition is not stated but that Rhone-Poulenc Rorer SA received an out-license for a Sepracor developed product in return suggest the early company was focused more on research and development than commercialization, meaning they traded a developed compound for an undeveloped one with the intent of developing it in-house. In conclusion, Sepracor was originally a company aligned with the logic of science but between 2001 and 2007 its primary alignment shifted to the logic of commerce. The reason for this shift is unclear from the current data but the retirement of the founder indicates the change in organizational strategy could originate with the new management.

6.6 *Levemir* (insulin detemir) and Novo Nordisk: Modifier Class

Levemir is a modern insulin for treating diabetes approved by the FDA on June 16, 2005. The article by Hermansen and colleagues (2006) presented the data from a 26-week clinical trial comparing Levemir to an existing insulin treatment also produced by Novo Nordisk. Two of the six authors of the study were Novo Nordisk employees. The treatment effects were reported as relative differences between the two products and the authors concluded the newer product, Levemir, offered a clinically important improvement over the existing the treatment option.

In addition to the scientific presentation of the data, the authors also discussed several aspects of patient care. Levemir patients in the trial experienced reduced hypoglycemic incidents and gained less weight; both of these outcomes were framed as further benefits of the drug rather than clinical treatment targets. The discussion of the

trial protocols also made clear the authors' concern for general patient safety and information on the individual investigators at the 58 research sites is provided in an online supplement, making this the most transparent journal article in the sample. Furthermore, seven patients who experienced adverse events during the trial, allergic reactions or injection site infections, were withdrawn from the study by the researchers. These actions indicate a strategy interested in demonstrating the moral legitimacy of the research by focusing on patient safety in addition to clinical efficacy and suggest Novo Nordisk's organizational strategy aligns with the logic of care. A strategic focus on patient care is also evident within the annual corporate reports.

Strategic discussion in the earliest letter analyzed, 2002, focused primarily on the organizational structure of the company. The report framed the recent acquisition of a Brazilian company as being "able to make our product portfolio available to a greater part of the Brazilian diabetes community than in the past" (Novo Nordisk 2002:2). The term "diabetes community" rather than diabetes market and the statement on making the product portfolio available rather than expanding both indicate an organizational strategy aligned with the logic of care. An organizational focus on care is further supported by the discussion on care related strategies extending beyond the patient. The 2002 letter discussed a pilot study on corporate climate to evaluate company morale and the 2003 letter reported the results of the first company wide survey showed overall high employee morale. While the other companies discussed employees, they focused on metrics such as leadership skill and industry accomplishments; the fact that the Novo Nordisk letters reported on corporate morale and took pride in the high results further indicates the company's organizational strategy aligns with the logic of care.

The corporate focus on care becomes stronger in the later annual reports. The 2003 letter stated the executive management was requesting the board of directors alter the Articles of Association to “specify that the company, besides its financial purpose will strive to achieve its objectives in an environmentally and socially responsible way” (Novo Nordisk 2003:3). The inclusion of interest on the environment and social wellbeing beyond the commercial requirements of the company represents a tactic of moral legitimacy to support the broader organizational alignment with the logic of care that could be perceived as deviant by financial stakeholders. In 2004, defeating diabetes is stated as both the passion and business of the company while the leadership position of the company in the diabetes market is framed as being able to meet previously unmet medical needs. The organizational strategy to meet the demands of a competitive business environment is stated as a “long-term, holistic perspective” taking a “multi-pronged approach to providing better access to health through capacity building, a preferential pricing policy for the poorest nations, and funding through the World Diabetes Foundation” (Novo Nordisk 2004:1). These tactics all reinforce an underlying strategy aligned with the logic of care.

The letter in 2005, the year Levemir was approved, demonstrated the strongest commitment yet to organizational strategies focused on patient care. The subtitle to the letter: “Poised for continued growth – but not at any cost” reinforced the company’s primary focus was on patient health and that strategies sacrificing patient health for commercial gain were not in the interest of the company. The title statement is explained as an ethical strategy for growth that includes corporate transparency and care for the environment. The letter also reiterated the goal of the company is to defeat diabetes and

stated that the increased profits from cost reduction measures were put back into research and development. The U.S. approval of Levemir is framed as good news for patients and physicians and only elsewhere in the annual report is it stated that the U.S. market is the world's largest and most profitable market for diabetes treatments.

The 2006 letter restated some of the major strategies aligned with the logics of care: the goal of defeating diabetes, tackling environmental problems, and maintaining good employee morale. This letter departed from the earlier ones in how it highlighted the company's philanthropy efforts. The 2006 letter opened with the story of a little girl diagnosed with diabetes and how her quest to raise awareness on the condition led to the initiation of the United Nations World Diabetes Day. The letter mentioned later that Novo Nordisk was a sponsor of the first World Diabetes Day. The 2006 letter also discussed the promotion of collaborative efforts to fight diabetes reiterating that the goal of defeating diabetes requires collaboration between health care stakeholders. The statement that collaboration is necessary is a distinctly different from an organizational strategy dominated by the logic of commerce that would view health care as a competition.

The 2007 letter again mentioned the company's participation in World Diabetes Day and stated Novo Nordisk hosted the "first Global Changing Diabetes Leadership Forum in New York" (2007:3). The goal of defeating diabetes and the discussions on corporate philanthropy reveal Novo Nordisk primary interest was in improving the lives of patients. The final letter analyzed, 2008, continued to indicate the company's alignment with the logic of care even though there was an increased focus on market issues related to the declining global economic conditions. In addition to a new program

to provide treatment to poor children, the 2008 letter also stated the need to make sure the global economic downturn does not impede access to care.

In conclusion, the data indicates the organizational strategy of Novo Nordisk aligns primarily with the logic of care. The company pursued organizational programs designed not only to address the medical needs of care for patients but also global environmental issues and internal employee morale. The introduction of Levemir highlighted the product as an improvement in patient health and discussed how the product was a step towards tailored care. The most important aspect of the logic of care revealed in the data is Novo Nordisk's stated goal of defeating diabetes. Diabetes is a chronic condition with the potential for maximizing profits through a lifetime of treatment, but defeating diabetes would undermine the continued growth in profits for a company focused on diabetes treatments. The use of the term defeat orients the strategy around the treatment of disease rather than a market competition to expand product share. Further indicating Novo Nordisk dominant organizational strategy aligns with the logic of care is the recognition that defeating diabetes requires collaboration between health care stakeholders.

6.7 Discussion: Evaluation of the Classes

The data show the pharmaceutical field of the United States is a field of institutional pluralism and that organizations within the field pursue organizational strategies aligned with different logic orders. The latent class analysis resulted in the emergence of two organizational subgroups within the sample, but the case studies reveal that while the organizations within these subgroups demonstrate alignments to different logic orders, the class separation is not solely the result organizational strategies adhering

to the different logic orders. Conversely, within class similarities show that the quantitative assessments successfully identified latent constructs of organizational strategy that separate organizations within the field, which shows that the mixed-methods approach used in this project is a valuable addition to the research literature.

The theoretical propositions in Chapter 2 expected the different processes of institutional legitimacy to align with different logic orders but the data indicates that this is not the case. I observed tactics of cognitive legitimacy used most often to support strategies aligned with the dominant logic of the field, commerce. Theoretically, this makes sense because cognitive legitimacy comes from following expectations because deviation is unthinkable. Tactics of pragmatic legitimacy also aligned with the logic of commerce. While my original expectation that the alignment between pragmatic legitimacy and the logic of commerce was based on the logic of commerce defining self-interested organizational strategies as appropriate, an alternate interpretation is that pursuing organizational practices aligned with the dominant logic of the field is a strategy of self-interest separate from the component of self-interest within the logic of commerce. Drawing from the general organizational theory literature, it is understood that organizations act in various ways to ensure survival; therefore, strategies aligned with the dominant logic of a field are a pragmatic method to meet this goal regardless of the dominant logic order within the field.

Drawing from the case study data, the clearest example of institutional effects on organizational strategy is seen by comparing Novo Nordisk to Johnson & Johnson. Both corporations used combative phrasing to describe the company's central principles but the direction of the action is different. Johnson & Johnson's strategy of "winning in

health care” was directed at expanding the number of health care markets where the company occupied leadership positions. This strategy is a clear reflection of the logic of commerce because the competition is between Johnson & Johnson and other health care corporations for dominance within the market. Conversely, Novo Nordisk’s strategy of “beating diabetes” framed the competition as occurring between the corporation and the disease, reflecting the logic of care. Furthermore, while Novo Nordisk occupied a dominant position within the diabetes treatment market, the company explicitly noted that meeting the goal of defeating diabetes would require collaboration between stakeholders. Collaboration between stakeholders to reduce morbidity rates is an opposing strategy from that of the logic of commerce.

Another key example from these two case studies is the differences in organizational strategies on corporate philanthropy. While both organizations engaged in strategic philanthropy, Johnson & Johnson explicitly pursued philanthropic opportunities to commercialize and expand the company’s brand. For example, Johnson & Johnson legitimized sponsorship of the 2008 Beijing Olympics pragmatically as a way for the company to increase awareness in the Asia-Pacific region. On the other hand, Novo Nordisk legitimized sponsorship of the United Nations World Diabetes Day as spreading awareness about a specific health concern with brand awareness as a side note. The data on Johnson & Johnson and Novo Nordisk clearly show distinct dominant organizational strategies aligned with different logic orders. If these were the only case studies, then it would be appropriate to change the label of innovator class to commercial focused companies and modifier class to patient focused companies, but the other two case studies indicate that the class separation is more complicated.

Novartis and Sepracor were companies with conflicting internal alignments between logic orders. It is clear that Novartis is committed to maintaining health care within a commercial market system, aligning with the logic of commerce. Novartis' organizational tactics of labeling criticism against the pharmaceutical industry as scapegoating and arguing against price controls by stating that innovation has a price are both strategies of cognitive legitimacy supporting the market model of health care. These statements also imply that Novartis is not acting primarily in a self-interested manner, for example engaging in price differentiation between markets is framed as following the rules of the game. This line of reasoning aligns with cognitive legitimacy, meaning that it is not just profits driving Novartis strategy but a cognitive constraint on seeing health care organizations as able to operate outside of a market system. On the other hand, Novartis also engaged in organizational practices for non-commercial reasons that align with the logic of care.

Novartis had extensive corporate philanthropy programs targeting underserved populations. While Johnson & Johnson's strategy demonstrated corporate philanthropy within the pharmaceutical industry is just as susceptible to self-interested practices as in other industries (King 2006), it is clear that the Novartis programs were focused on providing access to medicine rather than expanding brand awareness. This is the root of the conflict in analyzing the Novartis data for institutional effects. On one hand, Novartis is upfront about pursuing strategies of profitability because this is the dominant expectation of the organizational field, but on the other hand, constantly highlighting non-profit charity work appears to be a tactic designed to counter industry critics by demonstrating that the company also engages in non-market practices.

Comparing Novartis with Novo Nordisk provides an alternative explanation for this conflicting interest. Both companies originate and are incorporated in Europe and both companies specifically discussed organizational strategies of corporate social responsibility and environmental sustainability, two topics that were absent in the Johnson & Johnson and Sepracor reports. What appears as tactics morally legitimizing practices related to the logic of care could actually be a reflection of different organizational expectations placed on European companies.

Cheah et al (2007) noted that within a sample of multinational corporations investor responses to corporate social responsibility varied because corporate social responsibility was normative in the United Kingdom but not in the United States. This research indicates that the data on corporate social responsibility and environmental sustainability practices for the two European companies in my sample may more accurately be a reflection of cognitive legitimacy based on the organizational expectations for European businesses. Reviewing the data again suggests that while Novartis is exceptional within the sample for its extensive access to medicine programs, some content classified as representative of the logic of care may more correctly align with the logic of commerce for European companies. Taking in to account all of the other examples of strategy aligned with the logic of commerce, it is correct to reinterpret commerce as Novartis' dominant logic. Novo Nordisk, however, remains aligned with the logic of care due to the continued dominance of care related strategies after corporate social responsibility and environmental sustainability practices were recoded.

Sepracor was a complicated company to analyze for another reason. Sepracor underwent organizational changes not experienced by the other corporations in the study.

Figure 6.2 shows the financial expense data for the four organizations in the sample. Sepracor is a clear outlier compared to the other three organizations. Research and development is the largest expense category during the first three years but then marketing and administrative expenses becomes the largest cost category. This change corresponds to the release of Lunesta, which the annual corporate reports note included a significant increase in sales personnel. In addition to the data in Figure 6.2, Sepracor was the only company that did not distribute dividends to shareholders. According to the annual corporate reports, the company policy was to reinvest income in the business and management did not anticipate ever paying dividends. This financial data reiterates that Sepracor originated as an organization aligned with the logic of science but this alignment shifted to the logic of commerce during the research period.

The data show Johnson & Johnson and Novartis both align with the logics of commerce, which the historical analysis in Chapter 4 shows is the current dominant logic of the organizational field. Rather than innovators, it seems more appropriate to relabel this organizational subgroup as the commercialization class. Novo Nordisk and Sepracor, however, are not aligned with the same institutional logic. There are two possible explanations for this. First, the small sample size could have prevented a three class solution in which Novo Nordisk and Sepracor would have been in different classes from being the best fit. A larger sample size may be able to detect differences within the modifier class that the current study was unable to identify. The second explanation is that the modifier organizations do actually have a homogenous organizational strategy in the sense that while these organizations do not share the same logic, they do align as organizations pursuing alternative strategies from the dominant logic of the field.

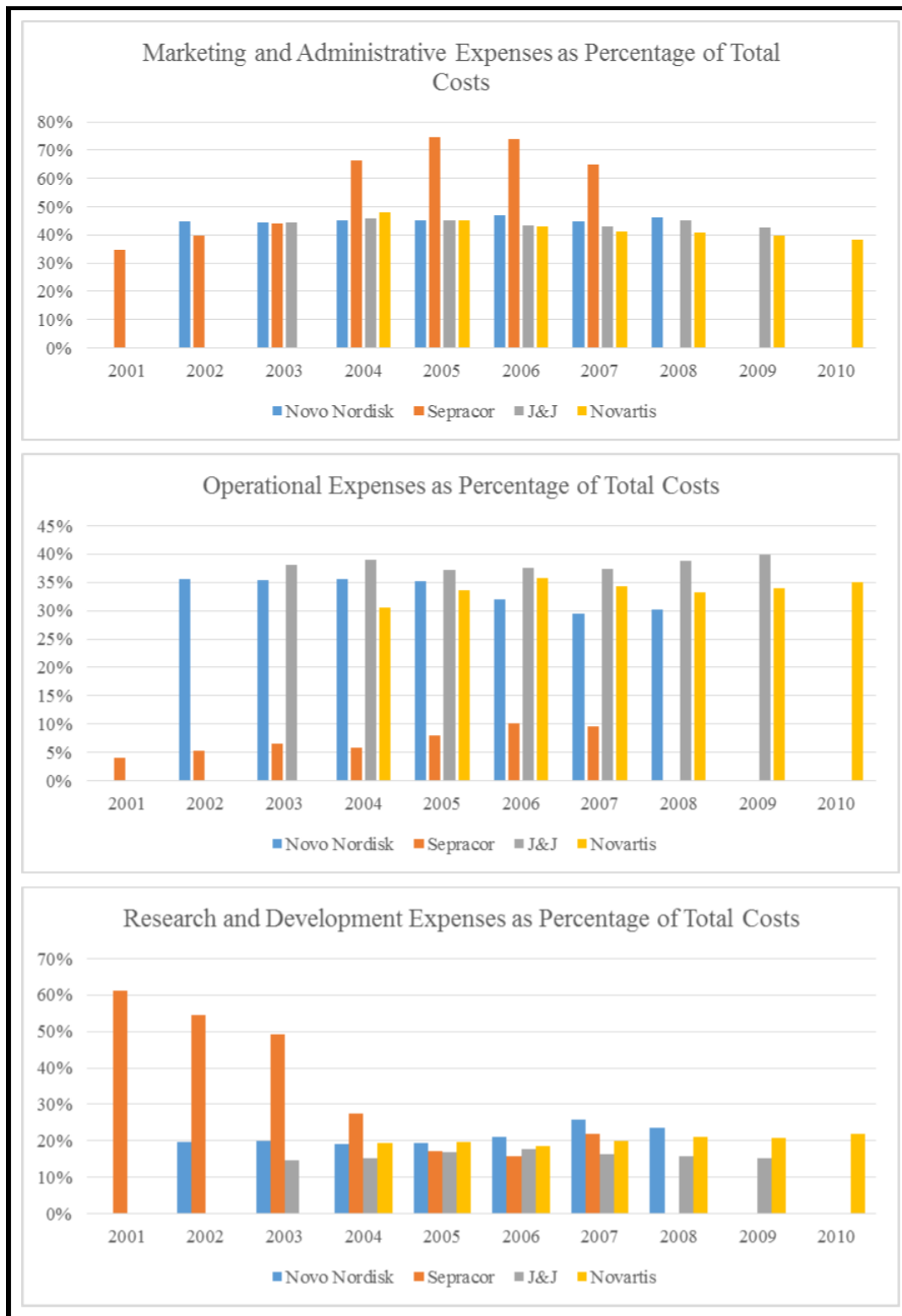


Figure 6.2 Allocation of Financial Resources between Case Study Organizations

Furthermore, Novo Nordisk and Sepracor both apply moral legitimacy tactics as support for their alternative organizational strategies.

Quirke's (2013) research showed that rouge organizations can encompass multiple different organizational strategies deviating from the dominant logic of the field but all of the schools were oriented towards a common goal of educating students to meet the demands of living in an industrial economy. Specifically, Quirke noted all of schools pursued strategies that would lead to college. My data shows a similar effect since neither Sepracor nor Novo Nordisk deviated from the dominant field goal to develop commercial pharmaceutical products. Constructing alternate strategies that still meet the dominant expectations creates the possibility for internal conflict and results in a tenuous connection with the alternate logic as other stakeholders in the field evaluate the organization negatively for failing to meet the expectations of the dominant logic (Kraatz and Block 2008). However, the data indicates that both Sepracor and Novo Nordisk reduced the potential for conflict over alternative strategies by utilizing tactics of moral legitimacy to appeal to broader health related social concerns.

For example, in the Sepracor letters, statements about the company's research strategy, especially on Lunesta, were legitimized as supporting the broad goal of increasing scientific knowledge. While research is expected to occur within a pharmaceutical company, the dominant expectation is that the company is down-stream working on commercializing the knowledge of scientific researchers rather than up-stream generating knowledge (Cockburn 2004, Hess and Rothaermel 2011). Engaging in basic scientific research would be a deviation to other stakeholders because it is a misallocation of resources away from commercialization. Sepracor utilized tactics of

moral legitimacy to support its research strategy by connecting the work to general social health through claims such as sleep being essential for good health and a productive society.

Novo Nordisk used statements of moral legitimacy to support organizational strategies that aligned with the logic of care also by appealing to broad social issues of health. The goal to defeat diabetes is legitimized explicitly through the size of the problem as affecting the functioning of society. In 2006, Novo Nordisk stated 10% of the world's population had diabetes or the pre-stages of the disease, making it the largest health challenge of the century with the potential to increase public health spending and reduce productivity. This legitimizes the organizational strategy of defeating diabetes by appealing to the broad goal of maintaining a functioning society.

The modifier class then can be viewed as connected through the use of organizational strategies employing tactics of moral legitimacy to justify alternative organizational strategies and goals. This indicates that when organizations exist within a field of institutional pluralism, pursuing strategies that deviate from the dominant expectations require organizations to justify those practices through moral legitimacy by appealing to general social expectations outside of the field. Moralizers then is a more appropriate label than modifiers for this class of organizations.

Returning to the path dependency identified in the structural equation model, the case studies reveal a division within classes rather than between classes, Figure 6.3. Novartis and Novo Nordisk had more innovative approvals than alterations to current treatments while Johnson & Johnson and Sepracor had more alternation approvals than innovative approvals. These results do not support the expected effect of the path

dependency observed in the Chapter 5, but the finding supports the re-labeling of the classes to commercialization and moralizers. At the same time, this data could be an artifact of the case study selection criteria that constrained the sample to organizations that received a new molecular entity approval. In summation, this data suggest that the path dependency is primarily an organizational level effect rather than a field level effect.

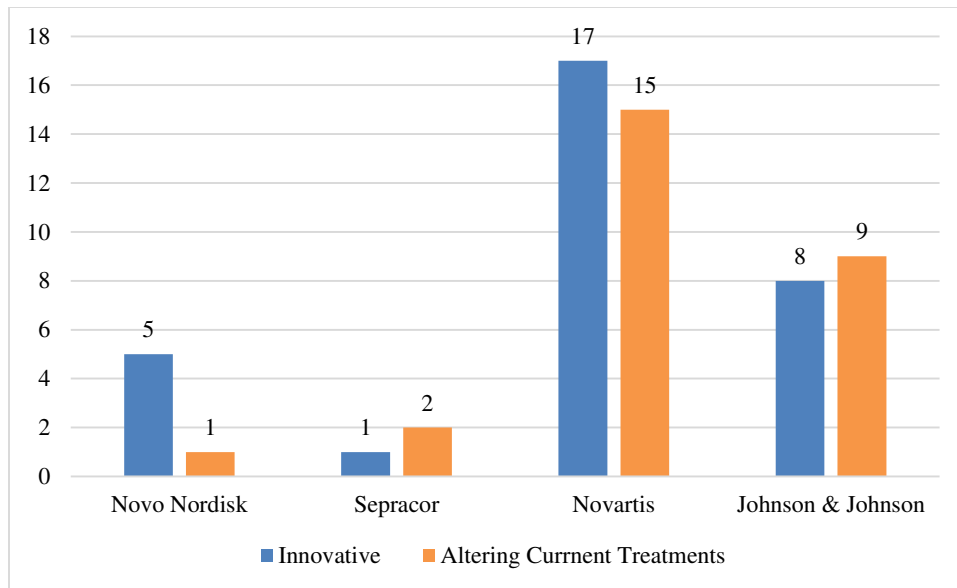


Figure 6.3 Number of Approvals by Type During the Case Study Period

A question that emerged from the case studies is what affect does scope, in terms of diversity in an organization’s research portfolio, have on the class separation. The variable for firm size, number of employees, was not significantly different between the classes but the moralizer organizations in the case study are clearly smaller than the commercialization class. Furthermore, the letters to shareholders of the moralizers focused on few products while the commercialization class mentioned multiple products. Using a Herfindahl index⁸ to calculate the scope of organizational research in the total

⁸ The Herfindahl index ($H = \sum_{i=1}^N s_i^2$) is used to measure market concentration but Arora et al. (2009) applied it as a measure of portfolio diversification where s is the percentage of a product portfolio

sample revealed that the mean portfolio of the commercialization class was more diverse than the moralizer class (0.38 to 0.63, $p < 0.000$ in a two tailed t-test).

This finding adds another explanatory layer to the interpretation of the class separation, and suggests that successfully legitimizing an alternative organizational model may be dependent on the scope of the organizational portfolio. A focused portfolio may lend itself to tactics of moral legitimacy precisely because the few products can be clearly connected to an alternate external social values; Novo Nordisk presented diabetes as a global problem while Sepracor linked sleep deprivation to general well-being. Using moral legitimacy to support a diverse range of products requires a large organizational investment in identifying diverse social values because applying the same value to a range of products would increase the chance the alternate logic would be perceived as illegitimate. Conversely, alignment to a dominant logic within a field may lead an organization to expand its scope because the uncontested legitimacy may provide the necessary slack for experimentation in new product directions.

In summary, the case studies show qualitative differences in organizational structure and practices between the classes identified from the latent class analysis. The quantitative analyses suggested that the class separation was driven by a path dependency in the research process between pursuing innovative developments compared to seeking alterations to existing treatments, but the case studies show this differentiation is not an accurate interpretation. Rather than being the result of differences in research decisions, the case studies reveal that the differentiation of classes occurs between organizations that align with the dominant logic of the field and those that pursue alternative logics. Of

composed by *i* therapeutic categories. Values for H range from 1 to 0 where 1 equals a portfolio with no diversity.

particular importance in the distinction between classes is the use of legitimacy tactics, whereby, organizations not aligned with the dominant logic seek to justify their deviation by aligning their strategies to a set of broader social values.

6.8 Conclusion

While previous research has shown that institutional logics influence strategy within an organization (DiMaggio 1990, Powell and Sandholtz 2012), the results of this study indicate that this effect is attenuated at the field level. Specifically, when organizations in a field of institutional pluralism have a range of strategy options between different logic orders, the strongest effect is between strategies that align or deviate from the dominant logic of the field.

This study applied a finer grain definition of institutional logics in line with the previous work by Dunn and Jones (2010), Powell and Sandholtz (2012), and Scott et al. (2000) but the results suggest an alternative conceptualization of institutional logics in line with Thornton et al. (2012) as an alternative to assess institutional effects on organizations. Thornton et al.'s (2012) theory predicted a two class solution because the logics of science and health are not distinct logics but components within the logic of professions. My findings align with this broader conceptualization of institutional logics; however, I am hesitant to relabel the moralizers to professionals because the data shows a clear difference in organizational strategies between the two cases. Furthermore, the evidence also indicates science and care are distinct logics because they have both been identified as the dominant logic within in the pharmaceutical field and medicine in general during different periods (Dunn and Jones 2010).

The case studies add a richer understanding to the organizational dynamics within a field subject to institutional pluralism. These four case studies demonstrate that organizations are both aware of the dominant logic within the field and the other logics that shape the expectations of other stakeholders. Managerial attention is strategic in presenting the decisions and actions of corporations as institutionally legitimate. The findings show that institutional logics are not just internalized through organizational culture but form the frameworks corporations use for interorganizational actions.

In summation, the case studies demonstrated that managerial attention is structured by institutional logics. The dominant strategies of Sepracor and Novo Nordisk were not aligned with the dominant logic of the field, however, both corporations were aware that the logic of commerce structures the field and strategically supported actions aligned with alternative logics by appealing to other social goals rather than challenging the logic of commerce. At the same time, the data from Novartis and Johnson & Johnson shows these organization were aware that the logics of care and science are evaluation frameworks for other stakeholders in the field and utilized components of this logics to discuss certain strategies. In the end, while a corporation may have a dominant logic, organizational legitimacy under institutional pluralism requires that the company address components from each logic that dominates key stakeholders.

CHAPTER 7

CONCLUSION

7.1 Limitations and Future Directions

Data availability was the most significant limitation in this project. The variables in the dataset are operationalized as measures of organizational strategy but they do not represent the complete decision making process that occurs during drug development. This dataset also lacks information on drugs not approved or submitted to the FDA, so organizational strategies related to abandoning or discontinuing research are not analyzed. Finally, the data collected was aggregated at the organizational level that obscures internal dynamics of organizational practice. These limitations, however, are not unique to this project but a reality of conducting organizational research because detailed internal data is rarely publically available, especially the data needed to conduct an analysis at the field level.

Another limitation is the quality of the data sources themselves. In his recent work, Rob Kitchin (2014) discussed at length common problems for researchers using secondary datasets. Related specifically to this project, Kitchin (2014) noted using secondary data leaves the data management practices unknown to the researcher and means that the data collection process may not have focused on the information of interest. I found several errors in the FDA data that led me to suspect that while the source is presented as archival information, the data management practices are

inconsistent with this goal. The errors I found were incorrectly coded application companies. For example, the FDA listed Pfizer as the application company granted approval for Torisel on May 30, 2007 but the application for Torisel was actually submitted by Wyeth Pharmaceuticals. Pfizer acquired Wyeth Pharmaceuticals in 2009 at which point the sales and the intellectual property rights for Torisel transferred to Pfizer. This example suggests the FDA database is managed to identify the current manufacturer rather than the original manufacturer even though the description of the variable indicates otherwise. If this is the case, it would explain the declining rate of matching in the sample. However, while this a problem, it is not a problem unique to this study, and any research using the FDA database will be similarly biased.

The sampling criteria for constructing the quantitative dataset excluded companies that received less than five FDA approvals, which biases the data towards larger and established companies and creates the potential for selection bias. This is an important limitation to consider for interpreting the results because companies that challenge the dominant logic within an organizational field may have different outcomes than companies accepting the dominant logic but pursuing strategies aligned with an alternate logic. Based on the data analyzed here, the pharmaceutical field in the United States is an organizational field where institutional pluralism exists and the dominant logic is unchallenged; both of the companies in the moralizer class demonstrated support for the pharmaceutical industry as a commercial industry.

However, this could be a misinterpretation of institutional effects if the reason excluded companies failed to reach the minimum of five approvals was that they challenged the commercialization of the field. A direction for future research would be to

assess this possibility by shortening the period for collecting data to gather exhaustive data on all of the companies that received FDA approvals. This way companies that only received a few approvals would be included in the analysis and could be assessed for organizational strategies that challenge the dominant logic of the field. If further research concludes that no challengers exist in the field, this would suggest a field of sustained institutional pluralism might only be possible when the organizational practice is institutionalized. Specifically, the pharmaceutical regime might allow organizations to pursue alternative strategies because the practice of pharmaceutical development is not contested whereas in organizational fields with contested practices, institutional pluralism might only exist during periods of field negotiation.

The sparseness of the data limited the possibilities for the use of longitudinal analysis techniques. Longitudinal data allows for latent transition analysis and provides a richer interpretation of classes based on the prevalence of class switching (Collins and Lanza 2012). While there is no universally accepted sample size for a latent transition analysis, Collins and Lanza do not recommend researchers attempt the analysis with sample sizes smaller than 300. My sample size of 59 organizations is well below the recommended limit, making it methodologically questionable to conduct a latent transition analysis.

My original intent for selecting the cases studies was to use the experience of a product-harm crisis as the selection criteria. A product-harm crisis⁹ creates a situation where stakeholder interaction related to diverging interests become more visible because

⁹ A product-harm crisis occurs following the revelation that a consumer good has a detrimental effect on consumers after its release on the general market. Product-harm crises are not isolated to the pharmaceutical industry but occur in many industries (Chen et al 2007, Cleeren et al. 2013).

the situation is a direct challenge to product legitimacy and organizational reactions to this challenge should identify the dominant organizational strategy (Cheah et al. 2007). Based on previous research the expectations during a product-harm crisis are that pharmaceutical corporations act to counter the negative claims and perceptions of other stakeholders using a variety of organizational tactics to protect the established validity of a product in the face of contradictions from new data (Abraham 1995, Applbaum 2010). The most visible product-harm crises lead to the withdrawal of a drug from the market making it an ideal selection criterion because the entire product lifecycle would be observed. However, none of the drugs withdrawn from the market during the study period came from organizations in the modification class so new molecular entity approval was selected as the alternate criterion.

A strength of this project is that the quantitative analyses provide a clear, empirical boundary for different organizational categories. The latent class analysis placed each organization in one, and only one, class. However, the quantitative methods are limited in capturing institutional logics by the data available and how organizational processes are reduced to measurable variables. A direction for future research to address this limitation is to increase the robustness of the dataset by including more information. Based on the literature review variables measuring in and out-licensing, research and financial alliances, percentage of income devoted to philanthropy, and occupational composition of employees would be valuable measures to include in the quantitative dataset. The case study analysis could also be expanded by including articles by unaffiliated medical professionals in response to the approval of new drugs and through

analyzing organizational material directed at potential patients, such as advertisements and awareness campaigns.

7.2 Conclusion

The United States pharmaceutical industry is a dynamic organizational system populated by organizations pursuing different strategies to reach different goals. This project explored the broader organizational field of the pharmaceutical industry to determine if distinctive categories of pharmaceutical organizations existed by analyzing data for latent constructs identifying differences in organizational strategy. The data revealed two categories of organizations: commercialization firms and moralizers. The larger group, commercialization firms, contained organizations pursuing strategies aligned with the dominant logic of the field while moralizers were organizations pursuing strategies aligned with different logic orders but connected through the use of moral legitimacy tactics to support deviant strategy.

This project contributes to the organizational studies literature through a novel approach to mixed-methods analysis for addressing the challenge institutional theorists' face in measuring institutional effects. Rather than deriving institutional effects through qualitative techniques, this study applied latent class analysis to identify subgroups and then used content analysis to assess those subgroups for components of institutional orders. This project faced many of the challenges previous researchers have encountered when analyzing institutional effects but triangulation through quantitative and qualitative methods provided data that demonstrates institutional effects on organizational strategy.

While the generalizability of the findings is limited, this project shows sustained institutional pluralism is possible within an established organizational field. The need to

address differing stakeholder expectations complicate identifying an organizations dominant logic, but analyzing multiple sources revealed coherent organizational strategies aligned with defined institutional logic orders. The findings show that the effect of specific institutional logics is attenuated at the field level. Specifically, that direct field level institutional effects on organizational strategy occur as a pressure to align with the dominant logic of the field or to justify alternative strategies aligned with other logics through appeals to broader social concerns interconnected to the field.

However, the central conclusion of this project rest on the assumption that each organization has a dominant logic (Bettis and Prahalad 1995). This perspective is not the only argument on the outcome of institutional pluralism. The hybrid organization model offers an alternative explanation on how organizations handle competing logic orders (Battilana and Dorado 2010, Pache and Santos 2013). Hybrid organizations selectively couple with components from multiple logic orders that are present in the field but resist domination by a single logic. This process allows these organizations to address the contradictory demands of multiple stakeholders without decoupling practice from identity (Westphal and Zajac 2001) or compromising (Oliver 1991).

The case studies provide evidence supporting the existence of hybrid organizations within the pharmaceutical industry. While Johnson & Johnson and Novo Nordisk both portrayed organizations aligned clearly with a single logic order, Novartis and Sepracor presented organizational strategies entangled between logics. Following the propositions of this project, I empirically determined a dominant logic in both organizations but I am not convinced that this model is the best explanation for these organizations. It is unlikely that all organizations in a sustained field of institutional

pluralism would have practices aligned with a single logic because sustained pluralism requires addressing competing legitimate alternative logics, but this does not mean that hybrid organizations could not coexist in a field where some organizations clearly align to a singular logic. However, the fact that Novartis and Sepracor belonged to different classes suggest that the effect of adopting a hybrid strategy has less impact than the division between the dominant field logic and alternatives.

This study provides several useful pieces of information for managers. First, the findings of the structural equation model challenge the existing advice on the value of developing alterations to current treatments. While the development of mediating drugs may shorten the timeframe for the development of innovative products, the path dependency found in the structural equation model indicates that managers need to be cautious in expecting that the spillover effect from mediating drugs will be realized internally. The findings from the case studies show that organizations can pursue strategies that deviate from the dominant logic within a field; however, managers need to legitimize this deviation by aligning with an alternative logic rather than challenge the dominant logic.

In summation, institutional logics affect organizational strategy by providing the templates for organizational practice and shaping the process of interorganizational negotiation. My findings show that pharmaceutical corporations in the United States adhere to two research path structures of defined as either innovation or alteration. At the same time, these corporations negotiate the competing demands of multiple stakeholders by either aligning with the dominant field logic or morally legitimizing their deviation through an alternate logic order.

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APPENDIX A

POISSON MODEL TEST OF RESEARCH AND DEVELOPMENT VARIABLES

| Variable | New Molecular Entity Approvals | | |
|---|--------------------------------|-------------|------------|
| | I | II | III |
| Foreign | 1.16 | 1.16 | 1.10 |
| Return on Assets | 1.01 | 1.01 | 1.01 |
| Firm Size | 0.96 | 0.96 | 0.99 |
| Non-Pharmaceutical SIC Code | 1.10 | 1.09 | 1.01 |
| Number of Priority Review Approvals | 1.26 *** | 1.26 *** | 1.25 ** |
| Number of Orphan Drug Approvals | 1.29 * | 1.29 * | 1.24 |
| Marketing and Administrative Expense Rate | 0.96 | 1.03 | 0.98 |
| Operational Costs Rate | 0.38 | 0.48 | 0.34 |
| Merger and Acquisition Approval Rate | 0.79 | 0.83 | 0.53 |
| Subsidiary Approval Rate | 0.92 | 0.93 | 0.84 |
| <i>PDUFA Period (1997-2001 comparison period)</i> | | | |
| 2002-2006 | 0.93 | 0.92 | 1.01 * |
| 2007-2011 | 1.01 | 0.99 | 1.11 |
| 2012-2014 | 1.45 | 1.40 | 1.63 |
| R&D Expenses Rate | 1.31 | | |
| 2 Year lagged R&D Expenses Rate | | 2.77 | |
| 3 Year lagged R&D Expenses Rate | | | 1.38 |
| Log likelihood | -389.11 *** | -388.15 *** | -345.85 ** |
| Pseudo R2 | 0.0463 | 0.0486 | 0.0442 |
| Observations | 437.00 | 437.00 | 398.00 |

notes: incidence rate ratios reported, total number of submissions used as exposure factor, *= $p < .05$, **= $p < .01$, ***= $p < .001$

APPENDIX B

POISSON MODEL TEST OF RESEARCH AND DEVELOPMENT VARIABLES

| Variable | Biologic License Application Approvals | | |
|---|--|-------------|-------------|
| | I | II | III |
| Foreign | 1.01 | 0.97 | 0.95 |
| Return on Assets | 0.98 | 0.99 | 0.99 |
| Firm Size | 1.77 ** | 1.65 ** | 1.58 ** |
| Non-Pharmaceutical SIC Code | 2.88 * | 2.66 * | 2.66 * |
| Number of Priority Review Approvals | 0.55 * | 0.58 * | 0.56 * |
| Number of Orphan Drug Approvals | 1.16 | 1.06 | 1.10 |
| Marketing and Administrative Expense Rate | 0.39 | 0.07 | 0.08 |
| Operational Costs Rate | 0.02 * | 0.00 ** | 0.00 ** |
| Merger and Acquisition Approval Rate | 0.40 | 0.30 | 0.39 |
| Subsidiary Approval Rate | 1.19 | 1.19 | 1.24 |
| <i>PDUFA Period (1997-2001 comparison period)</i> | | | |
| 2002-2006 | 1.67 | 1.67 | 1.26 |
| 2007-2011 | 1.80 | 1.86 | 1.35 |
| 2012-2014 | 4.02 ** | 3.97 ** | 2.66 |
| R&D Expenses Rate | 259.17 ** | | |
| 2 Year lagged R&D Expenses Rate | | 42.48 ** | |
| 3 Year lagged R&D Expenses Rate | | | 65.29 ** |
| Log likelihood | -144.88 *** | -145.44 *** | -142.98 *** |
| Pseudo R2 | 0.1600 | 0.1568 | 0.1455 |
| Observations | 437.00 | 437.00 | 398.00 |

notes: incidence rate ratios reported, total number of submissions used as exposure factor, *= $p < .05$, **= $p < .01$, ***= $p < .001$