

Institutional Evolution and Change: Environmentalism
and the US Chemical Industry

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**INSTITUTIONAL EVOLUTION AND CHANGE:
ENVIRONMENTALISM AND THE US CHEMICAL INDUSTRY**

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ABSTRACT

This paper empirically measures changes in the constituency of an organizational field centered around the issue of corporate environmentalism from 1960 to 1993, and correlates those changes with the evolving institutions adopted by the US chemical industry to interpret the issue. Four stages are identified, each representing a different field membership, interaction pattern and set of dominant institutions. The beginning of each stage is marked by the emergence of a triggering event. The article develops the ideas that: fields form around central issues, not markets or technologies; within fields, competing institutions may simultaneously exist within individual populations (or classes of constituencies); as institutions evolve, inter-connections between their regulative, normative and cognitive aspects can be detected, and; field level analyses can reveal the cultural and institutional origins of organizational impacts on the natural environment. The article concludes with future research challenges in understanding the dynamics by which events influence institutional change processes and the role of institutional entrepreneurs in channeling that influence.

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Institutional theory directs attention at forces that lie beyond the organizational boundary, in the realm of social processes (DiMaggio & Powell, 1991; Scott, 1995). Organizational action is seen, not as a choice among an unlimited array of possibilities determined by purely internal arrangements, but rather as a choice among a narrowly defined set of legitimate options determined by the group of actors which comprise the firm's *organizational field* (Scott, 1991). The form of this influence is manifested in *institutions*: rules, norms and beliefs which create descriptions of reality for the organization; explanations of what is and what is not, what can be acted upon and what cannot. Institutional theory, in short, asks questions about how social choices are shaped, mediated and channeled by the institutional environment.

One enduring criticism of neo-institutional theory has been its failure to adequately address the concept of change (DiMaggio, 1988; Brint & Karabel, 1991; Hirsch & Lounsbury, 1997; Hirsch, 1997). Institutions create powerful pressures for organizations to seek legitimacy and strive for social conformity (Ortu, Biggart & Hamilton, 1991). Therefore, analyses have typically found institutional phenomena reflected in an increasing homogeneity of organizations (Kraatz & Zajac, 1996). But, this focus on “isomorphism” (DiMaggio & Powell, 1983) facilitates a popular misconception of the theory as embodying only stability and inertia as its central defining characteristics (DiMaggio, 1995; Greenwood & Hinings, 1996). This article attempts to correct this misconception by reintroducing the “old” institutional concept of change, into the neo-institutional literature (Holm, 1995; Kraatz & Zajac, 1996; Greenwood & Hinings, 1996; Hirsch & Lounsbury, 1997).

Specifically, this article builds a framework for understanding how organizational fields and institutions co-evolve. Through a longitudinal analysis, it empirically measures changes in the constituency of an organizational field centered around the issue of corporate environmentalism from 1960 to 1993, and correlates those changes with the evolving institutions adopted by the US chemical industry to interpret and make sense of the issue. The notion that the field forms around a central issue — such as the protection of the natural environment — rather than a central technology or market

introduces the idea that fields become centers of debate, where competing interests negotiate over issue interpretation. As a result, competing institutions may lie within individual populations (or classes of constituencies) that inhabit that field, what I define as “situated” institutions. Not a static process, new forms of debate emerge in the wake of triggering events which cause a reconfiguration of field membership and/or interaction patterns. This notion that events alter social arrangements has received some support from other studies of organizational change (Meyer, 1982; Meyer, Brooks & Goes, 1990). The analysis is also built on the idea that institutional evolution involves transitions among their three levels, or what Scott (1995) refers to as *pillars*: regulative, normative and cognitive. While one pillar may be dominant at any given time, the three levels co-exist and are inter-connected (Hirsch, 1997). In the end, this framework describes the social dynamics by which field level debate forms around defining the meaning of corporate environmentalism and how that debate evolves over time as the field-level constituency is reconfigured and the dominant meanings and interpretations change (Jennings & Zandbergen, 1995). The remainder of this section will be devoted to defining the three central constructs of this article — the organizational field, institutions and disruptive events.

The organizational field. Strictly speaking, the organizational field is “a community of organizations that partakes of a common meaning system and whose participants interact more frequently and fatefully with one another than with actors outside the field” (Scott, 1995: 56). It may include constituents such as the government, critical exchange partners, sources of funding, professional and trade associations, special interest groups, and the general public — any constituent which imposes a coercive, normative or cognitive influence on the organization (Scott, 1991).

But more than just a collection of influential organizations, the field should be thought of as the center of common channels of dialogue and discussion. This important clarification leads to a conception of the organizational field that diverges from that predominant within the literature. The field is not formed around common technologies or common industries, but around “issues” which bring together various field constituents with disparate purposes. Not all constituents may realize an

impact on the resulting debate, but they are often armed with opposing perspectives rather than common rhetorics. The process may more resemble institutional “war” (White, 1992) than isomorphic dialogue. As such, it is important to distinguish between the organizational field and individual populations within that field — “classes of organizations that are relatively homogenous in terms of environmental vulnerability” (Hannan & Freeman, 1977: 166). For example, while environmentalists and chemical manufacturers may occupy a common organizational field through which they influence one another, it would be incorrect to assume that they share the same beliefs and attitudes towards the environment.

The presence of a field structure should be analytically detected, not through the emergence of a tangible pattern of organizational coalitions, but through an increase in the extent to which certain organizations interact; an increase in the information load which they share, and; the development of a mutual awareness that they are involved in a common debate (DiMaggio, 1983). Where some may define a field around companies with a common product or market (e.g. SIC classification), I suggest that the field is formed around the issues that become important to the interests and objectives of a specific collective of organizations. Issues define what the field is, drawing linkages that may not have been previously present. Organizations may make claims about being or not being part of the field, but their membership is defined through social interaction patterns. A field centered around issues rather than networks reveals greater complexity in field formation and evolution. For example, if an organization or population chooses to disregard an emerging issue, others may crystallize the field formation process for them. For example, chemical producers denied the importance of the book *Silent Spring* in 1962, but were forced into field level dialogue with government agencies, scientific organizations and conservation groups over issues of pesticide toxicity. Field membership may also be of a finite time period, coinciding with an issue’s emergence, growth and decline. For example, in 1979 residents of Love Canal, New York became influential in shaping the perceptions and beliefs around the issue of abandoned hazardous waste sites when 20,000 tons of chemical wastes were

discovered beneath their homes. Yet, as the remediation efforts began and the issue subsided, so did their influence.

Institutions and situated institutions. Organizational fields become “arenas of power relations” (Brint & Karabel, 1991: 355) where multiple field constituents compete over the definition of issues and the form of institutions which will guide organizational behavior. Institutional beliefs and perceptions are influenced by this field level competition, but situated within individual organizations or populations of organizations. Therefore, to fully appreciate the complexity of institutional dynamics, one must analyze both the specific institutions that lie at the center of an issue-based field and the competing institutions that may lie within the individual populations (or classes of constituencies) that inhabit that field.

Institutional influences on organizational behavior can take several forms, but taken together they guide the interpretation of issues as they emerge and persist. Scott (1995) argues that institutions fall into three nominal categories, called “pillars”: regulative, normative and cognitive. *Regulative* (or legal) aspects of institutions most commonly take the form of regulations. They guide organizational action and perspectives by coercion or threat of legal sanction. Organizations accede to them for reasons of expedience, preferring not to suffer the penalty for non-compliance. For example: corporations adopt new pollution control technologies to conform to environmental regulations; non-profits maintain accounts and hire accountants in order to meet tax law requirements (DiMaggio & Powell, 1983). In responding to a regulative institution, one might ask — What are my interests in this situation? (March, 1981). *Normative* (or social) aspects of institutions generally take the form of rules-of-thumb, standard operating procedures, occupational standards and, educational curricula. Their ability to guide organizational action and beliefs stems largely from social obligation or professionalization. Organizations will comply with them for reasons of moral/ethical obligation, or a necessity for conformance to norms established by universities, professional training institutions and trade associations. In responding to a normative institution, one might ask — Given my role in this

situation, what is expected of me? (March, 1981). *Cognitive* (or cultural) aspects of institutions embody symbols — words, signs, and gestures — as well as cultural rules and frameworks that guide our understanding of the nature of reality and the frames through which that meaning is developed. Organizations will abide by them often without conscious thought (Zucker, 1983). They form a culturally supported and conceptually correct basis of legitimacy which becomes unquestioned. For example, it is regarded as natural that environmental activists pursue idealistic or collectivist interests whereas corporations pursue economic and materialistic goals. These beliefs are taken-for-granted. Taken as a whole, the three pillars form a composite set of filters through which important issues are perceived and appropriate actions are developed (Fligstein, 1992).

Institutional evolution and disruptive events. At this point, with the organizational field and guiding institutions set, most depictions of institutional processes describe the forces that drive organizations toward inertia and isomorphism. While stability is one aspect of the institutional environment, this article strives to identify how these forces change. First, the organizational field should be seen, not as statically defined, but as evolving both through the entry or exit of particular organizations or populations (Barnett & Carroll, 1993) and/or through an alteration of the interaction patterns and power balances among them (Brint & Karabel, 1991; Greenwood & Hinings, 1996). Second, with an alteration of the field configuration comes an alteration of the corresponding institutions, which are reset at the field and population levels through political negotiation to reflect the interests of the newly formed field (Oliver, 1991).

To this last point, there is some dissension within the literature as to how the three levels of institutions might evolve and change. Scott (1995) depicts the regulative, normative and cognitive institutional pillars as analytically independent and self-contained. Co-evolution or interaction would not be expected. Hirsch (1997) counters that such a notion “seriously weakens the power of this otherwise intriguing and creative new typology” (Hirsch 1997: 1709). The institutional pillars are not analytically and operationally distinct but rather overlap, such that development at one level will

influence the development at other levels. This article's analysis of evolving institutions will shed some light on this debate.

One final issue to consider in the institutional change process is that of the initiating trigger. This article will consider a role for disruptive events in causing a sharp ending to what had become locked-in by institutional inertia (White, 1992). Various referred to as shocks (Fligstein, 1991), jolts (Meyer, 1982) or discontinuities (Lorange, Scott Morton & Ghoshal, 1986), events can take multiple forms, including "milestones (e.g. Earth Day, the Rio Summit); catastrophes (e.g. oil spills, nuclear accidents, toxic fires); and legal/administrative happenings (e.g. parliamentary hearings, trials, release of environmental white papers)" (Hannigan, 1995: 64). Whichever form they take, events have been central in explanations of change processes on various organizational levels. They have been described as creating disruptive uncertainty for the individual organization, forcing the initiation of unorthodox experiments that diverge from established practice (Meyer, 1982). They have also been described as throwing entire industries into the throes of quantum change, causing a restructuring process by the relocation of industry boundaries and an alteration of the base of competition (Meyer, Brooks & Goes, 1990). In similar fashion, this article will seek to identify triggering events which may cause a reconfiguration of the organizational field and the institutions that guide behavior.

CONTEXT: ENVIRONMENTALISM AND THE US CHEMICAL INDUSTRY

Since the early 1960s, there has been a continual redefinition of corporate environmental practice within US industry. In the course of this thirty-four year span, there has been rapid structural, technical and cultural change in corporate behavior. For example, in the 1970s, attempts to control pollution at industrial facilities focused on end-of-the-pipe treatments. In the 1980s, attention shifted toward waste minimization and pollution prevention in the production process. In the 1990s, attention shifted yet again to include concerns for product stewardship and life-cycle analysis, leading industries to reduce pollution by altering raw material and product choices. In the coming decade, emerging

conceptions of environmental protection are centering on concerns for sustainable development (Gladwin, Kennelly & Krause, 1995; Hart, 1997).

Throughout this time period, one industry that has continually been at the center of the evolving environmental issue has been the US chemical industry — from the principal villain in *Silent Spring*, to the specific target of most early and many more recent EPA regulations controlling industrial pollution, to a central contributor of contemporary concerns such as climate change and acid rain. This industry has been singled out in public opinion polls as the pre-eminent environmental threat from the 1970s (Erskine, 1971) through the 1990s (Cambridge Reports/Research International, 1992). The volume of the industry's waste streams exceeds that of the second most polluting industry sector (primary metals) by more than a factor of two (US Environmental Protection Agency, 1992). By 1992, the chemical industry spent nearly 10 percent of its capital expenditures on environmental compliance compared to an industry average of under 2 percent (US Department of Commerce, 1973-1992).

As a result of this legacy of pressure and scrutiny, environmental concerns within this industry emerged earlier and developed with more intensity than for other less controversial industries. Therefore, I expect that the history of chemical industry environmentalism will be richer and more developed than for other industries, making it an ideal candidate for study. It meets the criteria for an “extreme case,” one in which the process of theoretical interest is more transparent than it would be in other cases (Eisenhardt, 1989; Dutton & Dukerich, 1991). As such, it will offer valuable contributions both in elaborating institutional theory and providing insights into the substantive topic of management of the natural environment.

METHODOLOGY AND DATA

My objectives in this research were to capture longitudinal data regarding the evolution of three central variables over the period 1960 to 1993 : (1) The organizational field - who was relevant in defining legitimate environmental action for US industry; (2) Situated institutions - how was the

environmental issue framed and defined within the individual population of US chemical manufacturers which inhabit the field¹, and; (3) Disruptive events - what events were present at shifting points in the field or institutions. To capture these variables, I analyzed two independent data sources and used two different methodologies. Statistical analysis of federal case law participation was used to detect organizational field constituency. Content analysis of the trade journal, Chemical Week, was used both to characterize shifts in chemical industry conceptions of the environmental issue and to expose disruptive events that may have been influential in driving those shifts. The benefits of using two distinct and independent sources of data to build this analysis lies in the added credibility gained from their corroborating support for the composite model developed (Jick, 1979). Each data source will be discussed individually.

Federal case law. To capture field formation around the issue of environmentalism, I measured participation in federal environmental case law. Law is the visible manifestation of the relevant actors in the organizational field. Who is authorized to participate in the legal process reflects who possesses a legal voice in determining institutional norms. Law has a direct impact on corporate action and casts a revealing light over which players are relevant in determining such action by providing a formal system for actors to influence each other. It is, admittedly, an incomplete inventory, limiting the search to those actors which utilize legal channels to influence corporate behavior. It leaves out constituents that may exert institutional influence through other, less confrontational, channels. But, legal data provides one reasonable proxy for the field's measurement. Although subject to the errors just mentioned, it is a construction of the field based on who is found to have meaning to the field's membership (DiMaggio, 1991; Bourdieu & Wacquant, 1992).

The Westlaw® environmental law database (FENV-CS) contains documents strictly related the issue of environmental protection as argued in the US Supreme Court, Court of Appeals, District Courts, Bankruptcy Courts, Court of Federal Claims, US Tax Court, Military Courts and related federal and territorial courts. (A document is a case — a decision or order — decided by one of the

courts listed.) I used this database to identify both the emergence of new members and the shifting interaction patterns among them, as revealed by the volume of cases filed by and against the various constituents. I considered the outcome of the individual cases to be of less importance than the broad constituencies represented in the aggregate.

Initially, I collected a total of 5,588 legal citations for the time period 1960 - 1993. After duplicates were eliminated, the database numbered 3,572 citations. Plaintiffs and defendants were then classified by type. I found that once classified, 88 percent of the cases could be grouped into four categories: industry (e.g. companies, trade associations), government (e.g. city, state or federal), non-governmental organizations, or NGO's (e.g. environmental groups, employee groups, community groups, Indian tribes) and insurance companies. The remaining cases represented individuals whose institutional affiliation could not be identified and were excluded from further analysis in this study. The classified case data was then sorted and analyzed according to their respective populations. Field constituency was assessed as the presence of particular populations of actors in any given year. I used the entrance (or exit) of individual categories of actors involved in lawsuits or any shift in the direction of their lawsuit activity (plaintiff versus defendant) to represent the evolving nature of the organizational field.

What I found was that the constituent make-up of those participating in legal activity evolved through four distinct stages. The timing of these stages was determined through two steps. First, several ranges of possible transition stages were identified through a review of several environmental history references (Scheffer, 1991; Gottlieb, 1993). These ranges were then used to focus attention on periods of expected shifts in this study. For example, through historical references, it was expected that an institutional shift might be noted between 1969 and 1971 aligning with the Santa Barbara oil spill, Cuyahoga River fire, the first Earth Day, passage of the National Environmental Policy Act and the formation of the EPA. Similarly, another shift was expected between 1980 and 1985 due to the passage of Superfund, the administration of Ronald Reagan, the Times Beach evacuation, the Bhopal

disaster and the discovery of the ozone hole. The general legal trend data were compared to these anticipated shift periods to confirm general shifts in legal activity.

Second, the specific dates for the transitions were determined by performing multiple *t*-tests on the category specific data sets based on each possible date combination² and selecting the dates for which significance was highest. I calculated a *t*-test (two-tailed test assuming unequal variance) for each type of legal activity (e.g. NGO's versus industry, government versus industry), comparing annual mean number of cases filed in the prior stage with that of the following stage. (Non-parametric testing through the Mann-Whitney U-test yielded similar results.) In the first stage from 1962 until 1970, legal activity was negligible. Stage two begins in 1971, during which time the primary legal engagement involved suits between NGO's and the government (*t*-test $p \leq 0.001$) and between industry and the government (*t*-test $p \leq 0.001$). Stage three begins in 1983 with the only detected change being the initiation of legal engagement between NGO's and industry (*t*-test $p \leq 0.01$). Finally, stage four emerges over a three year period with the entry of a new player and the initiation of a new type of legal activity among exiting players. First, insurance companies and industry began to sue each other in 1987 (*t*-test $p \leq 0.001$) and second, industry began to sue other industry players in 1989 (*t*-test $p \leq 0.01$). A mean stage shift date of 1988 was used (which is also significant for the individual *t*-tests).

Insert Figure 1 here

Trade journal content analysis. Institutions are reflected within the content, rhetoric, and dialogue patterns among field constituents. Rather than attempting to capture such content within the entire field identified by the legal data, this part of the research study focused on the institutional framing of environmentalism situated within one population, US chemical manufacturers. As previously discussed, specific institutions may lie at the center of an issue-based field, but competing institutions may be located within individual populations that inhabit that field. To capture the institutions situated within the population of US chemical manufacturers, I performed a content

analysis (Stone et al., 1968; Weber, 1985) of environmental coverage within an industry trade journal. I chose trade journals because they provide specialized coverage for specific audiences. They provide information on issues common to other news services, but through frames of reference of the industry readership. Their role in the institutionalization process is two-fold. First, they act as an historical record of key issues and events as perceived from within industry as well as the motivating factors behind industry actions. Second, they are themselves organizational players whose output influences issue interpretation and is subject to the political pressures exerted by powerful figures within the industry (Molotch & Lester, 1975). Trade journal coverage is, by definition, a biased interpretation of events and issues, where the bias reflects the interests of its core readers and sources of information (Molotch & Lester, 1975; Clinton, 1996). As “a force within the society for socialization of the young and attitude change in the old” (Webb, Campbell, Schwartz & Sechrest, 1966: 78), trade journals represent the situated perspectives of both the constituent readership and the business press that represents them. As such, it reflects the attention of specific population.

To identify the situated perception of the chemical industry population, I considered analyzing Chemical Week, Chemical & Engineering News (C&EN) and Chemical Engineering (CE). C&EN and CE served both the chemical and petroleum industries and C&EN targeted academic and governmental audiences in its readership. Given this dilution in constituency, Chemical Week stood out as a central dedicated communication channel within the US chemical industry. As such, it would adequately depict the textual features of industry discourse within this particular field population.

Between 1960 and 1993, Chemical Week published 1,750 weekly issues. Within these, 2,358 articles were identified as relating to: the protection or preservation of natural resources; the political and social aspects of environmental protection; the technological or management concerns related to both regulatory compliance and pollution control; and business aspects of environmental regulation or pollution control.³ To begin, I used trends in aggregate article volume to represent the fundamental level of attention directed toward the issue by the industry. Other legitimate measures could have

included the length of articles (pages dedicated to environmental issues) or cover stories, but article volume was a more feasible measure given the content analysis of which it was a part.

I found that aggregate journal attention to the environmental issue mapped onto four stages similar to that of the legal data. I confirmed the timing of these stages by performing linear regression analysis to the quarter-year time trend data with date shifts detected by the legal data analysis. See Appendix B for the regression equation and results. Specifically, attention to environmental issues within the chemical industry grew in the early 1960s ($B_1 = 0.32, p \leq 0.001$), reaching a peak around 1970, after which attention declined through the 1970s ($B_2 = -0.19, p \leq 0.001$). Between 1982 and 1988, attention grew slowly ($B_3 = 0.17, p \leq 0.05$) and from 1988 to 1993 grew at a very rapid pace ($B_4 = 1.70, p \leq 0.001$).⁴

With stages identified, I then proceeded to manually code article content within the stages. Computer aided analyses were ruled out because the articles pre-dated digital storage and the volume of articles would have required enormous computer time in scanning. In the end, a fundamental analysis of the article content was conducted, allowing for a reasonable level of accuracy in manual analysis. My particular interests were in identifying who was identified as relevant in the journal's environmental coverage and how the environmental issue was framed. I coded the player in the article (whom was the article written about) and the action being taken by the player (what was the article written about.) Action was coded in terms of specific types and then grouped under four headings: management, regulation, enforcement and technology. The coding scheme is detailed in Appendix C. This scheme provided a measure for how the environmental issue was framed, out of which could be determined the institutional pillars that were active. For example, a predominance of regulatory or enforcement articles would suggest a stronger presence of regulative aspects of institutions, as these reflect a coercive mandate for action. A predominance of technology or management articles would suggest a stronger presence of normative or cognitive aspects of institutions, as these reflect a motivation for action centered more within industry.

The content data reveal that the four stages identified by the legal and attention data represent significantly different perspectives on the environmental issue. As shown in table 1A, each stage differed in terms of the balance of focus on technology, regulation, enforcement and management. These differences in journal content distribution were statistically significant (chi square = 42.365, d.f. = 9, $p \leq 0.005$). Table 1B shows journal content data more finely aggregated first by actor and second by the actions associated with each actor. This data reveals how each player was viewed by the journal and yields further insights into the institutional evolution of the issue.

Insert Tables 1A and 1B here

Finally, the trade journal analysis was used to identify specific disruptive events which might be considered influential in driving an evolution in chemical industry perspectives of the environmental issue. To help me identify important disruptive events during my analysis, I previewed several environmental history references (Scheffer, 1991; Gottlieb, 1993; Hoffman, 1997) and developed a preliminary list of prominent events (see appendix A). For example, concerns over pesticide hazards (Carson, 1962), urban smog, ocean oil spills and igniting midwestern rivers (Ophiem, 1993) have propelled what many refer to as the “modern” environmental era since the early 1960s (Scheffer, 1991). By familiarizing myself with this list as an initial guide, I could more easily identify critical events. Those events that received prominent attention prior to each of the four stages identified statistically by the data analysis were noted.

STATEMENT OF RESULTS:

INSTITUTIONAL EVOLUTION AND CORPORATE ENVIRONMENTALISM

By piecing together the legal and journal data, an institutional history of chemical industry environmentalism emerges, shown in figure 2. Conceptions of environmental management moved through four stages, each differentiated by the configuration of the organizational field driving

corporate environmentalism (based on legal activity), and the institutional pillars by which environmentalism was defined (based on journal content).⁵ The initiation of each stage corresponded to the emergence of one or more disruptive events noted as important within the trade journal analysis. While causal connections between any of the three variables (field, institutions and events) cannot be proven but only inferred, my purpose in this research is to provide a relatively complete description of how fields and institutions co-evolved in the context of a series of prominent events.

Insert Figure 2 here

Stage One: 1962-1970

In 1960, industry attention to environmental issues was low. Less than five environmental articles were written in Chemical Week and no federal environmental cases were filed. With this as a backdrop, concerns for environmental issues emerged and this study's institutional history began.

Disruptive events. The first environmental event to receive significant coverage within Chemical Week was the June 1962 publication of *Silent Spring* (Carson, 1962). Rachel Carson, the book's author, charged that the pesticide DDT was a persistent chemical in the food chain, and that continued use of this and other synthetic chemicals was disrupting the "web of life," posing a hazard to all living organisms including humans. While the journal dismissed the book's concerns as unrealistic and based on data and methods that lacked credibility, several fishkills on the Mississippi River in 1964 (one involved the death of over one million fish) intensified industry attention to the environmental issue.

Organizational field. Given that a mean of only 0.54 cases per year were filed between 1962 and 1970, the organizational field might be described as non-existent. However, I interpret this as reflecting a weakness in the data source. Since coverage within Chemical Week grew rapidly through this time period, the environmental movement may be more accurately described as emergent, but not yet turned to the courts to pursue change.

Chemical industry institutions. From 1962 until 1970, Chemical Week's environmental article volume grew by over five times. The dominant theme was that the environmental issue was a problem that could be solved independently through the industry's own technological prowess. Fifty-five percent of Chemical Week's environmental articles (see table 1A) and 66 percent of its industry specific articles (see table 1B) dealt with technology. Indicative of this optimism, one Chemical Week editorial boldly promised a "non-polluting auto by 1975, economically competitive extraction of oil from shale by 1980; and an inexpensive method for removing sulfur from coal before burning by 1983" (Chemical Week, 5/13/70: 5).

Overall, Chemical Week articles denied the severity of environmental problems and touted the industry's ability to solve them because doing otherwise would contradict the beliefs upon which its identity was based. The accepted belief was that engineering advancement improved the quality of life for all mankind (Florman, 1976). But, environmentalism challenged that notion, initiating a clash between the taken-for-granted beliefs within industry and society's emerging questions regarding their validity. *Silent Spring* became a touchstone for that clash, precipitating increased dialogue among certain types of chemical firms and marking the early formation of an organizational field centered on the issue of environmentalism (DiMaggio, 1983).

Stage Two: 1971-1982

In this study, the timing of revolutionary shifts were not generally precise (see footnote 3). However, the shift between the first and second stages occurred suddenly and coincides with two critical events that focused industry attention to the environmental issue.

Disruptive events. The first was the April 22 celebration of the first Earth Day, a national teach-in involving twenty million Americans on college campuses across the country. Industry was vilified during the event with students at one rally in New York calling the representatives of twelve leading companies (including two of the nation's ten largest chemical companies) the “handmaidens of Satan” (Chemical Week, 3/4/70: 64). This event captured the growing concern for environmental issues within the public and was followed by an emergence of environmental attention within the realm of government. On December 4, President Nixon initiated the second and more important event of the year — the creation of the US Environmental Protection Agency (EPA).

Organizational field. The establishment of the EPA precipitated a formal structure for the organizational field beyond the increasing dialogue that marked the field's formative stage in the 1960s. Legal data shows non-governmental organizations (NGO's) and industry fighting a battle over legitimate environmental practice with EPA at the center. NGO's filed a mean of 16.49 lawsuits per year from 1971 until 1982, with 91 percent of these directed at the EPA. (NGO's were rarely the defendant in a lawsuit.) Industry filed a mean of 28.92 lawsuits per year, with 98 percent directed at the EPA. For its part, the EPA increased its administrative actions against industry which, shown in figure 3, reached as high as 2,500 administrative actions per year by 1976. Between NGO's and industry, there was very little interaction. EPA had become the medium through which this interaction took place. The EPA might be described as either an adjudicator between NGO and industry conceptions of legitimate corporate behavior and/or a buffer by which NGO expectations were filtered for industry. In either case, the organizational field is depicted as comprising three actors, with

interaction patterns that reflect the reciprocal interplay between industry and government and the unilateral interplay between NGO's and government as depicted by the arrows in figure 2.

insert Figure 3 here

Chemical industry institutions. With the formation of the EPA, environmentalism had reached the level of a *regulative* institutional pillar for the chemical industry. From 1971 through 1982, the issue was framed, less as environmental protection and more as compliance with government standards. Over the period, regulation and enforcement articles displaced those on technology, garnering 55 percent of overall environmental coverage (see table 1A). At the same time, industry specific articles declined by 10 percent to be replaced by articles focused on government and, to a lesser extent, NGO's (see table 1B). Neither was viewed in a constructive light with 82 percent of government specific articles focused on regulatory development or enforcement and 44 percent of NGO specific articles focused on legal activities or protests (see table 1B).

This regulative framing of environmental issues was initially met with little opposition. Indicative of an optimistic outlook, one Chemical Week article anticipated a common set of environmental standards to “help bring order out of the confusion” and “pollution policy that is both sane and enforceable” (Chemical Week, 11/18/70: 5). Chemical Week articles displayed a confidence that the industry could resolve environmental problems as they were then perceived through technological development. EPA would simply identify what needed to be done. I interpret this to explain why attention to the issue dropped off through the decade (see Appendix B).

But, as a growing environmental regulatory infrastructure was developing by the late 1970s, journal rhetoric became increasingly concerned, displaying first resistance and then confrontation as it saw the EPA becoming too powerful and intrusive. Each sequential addition of regulation increased the burden on industry to implement greater levels of environmental controls at steadily increasing costs. Indicative of this concern, one editorial wrote, “Congress seems determined to add one more

regulation [Toxic Substances Control Act] to the already 27 health and safety regulations we must answer to. This will make EPA a chemical czar. No agency in a democracy should have that authority” (Chemical Week, 10/29/75: 5). Another wrote, “In little more than a decade, the US Chemical Industry has been smothered with upwards of 30 health and safety enactments. The US Chemical Industry [is] virtually run, not just regulated, from State and Federal Agencies [leaving behind] the biggest predator of them all, big government” (Chemical Week, 1/2/80: 5). By 1980, the regulative aspects of environmental legislation were at significant odds with the cognitive beliefs within industry regarding what was reasonable, breeding institutional tension within the organizational field.

Stage Three: 1983-1988

Although figure 3 shows a decline in EPA administrative enforcement since 1976 and civil enforcement since 1979, the chemical industry perception that EPA had exceeded its bounds was fixed. This mindset would drive the next institutional shift in 1983.

Disruptive events. In 1983, one environmental event received more editorial attention in Chemical Week than any other environmental event in the 34 years of this study — the firing of EPA Administrator Ann Burford Gorsuch. Gorsuch had been nominated for the post by President Reagan as part of his agenda of defederalization and regulatory reform. Responding to growing industry frustration with the burdens of environmental regulation, Gorsuch attempted to dismantle, or de-institutionalize (Jepperson, 1991), the EPA's growing environmental regulatory infrastructure. She announced that EPA wanted cooperation rather than confrontation with industry and extended overtures for a partnership with the regulated community. However, closed meetings created an air of favoritism and secret deals and Gorsuch's restrictions on EPA budget and staff created a widespread public and political backlash which resulted in her removal in 1983.

Organizational field. The end result of this debacle was a transformed field structure. No constituents were added, but the interaction patterns among existing constituents were shifted. NGO's increased their legal activity by over 100 percent from that between 1970 and 1982 and instead of directing all of that attention at the government, they now devoted one-third of their increasing efforts towards industry directly. I interpret this to suggest that NGO's now saw the EPA as prone to co-optation and at risk of becoming simply a government funded buffer for industry. For its part, EPA attempted to regain its institutional credibility by increasing civil and administrative actions and introducing for the first time, criminal actions against industry (see figure 3). In the end, the field was not expanded but rather restructured as shown in figure 2.

Chemical industry institutions. With the removal of Ann Burford Gorsuch, there emerged a new conception of environmentalism within Chemical Week that suggests that environmentalism was becoming established at the level of a normative institution. First, journal attention began to refocus attention on industry activity. To confirm a structural break in trends in the player focus shown in table 1B, a Chow test (Chow, 1960) for structural stability was performed for pre- and post-1982 industry specific environmental coverage. The Chow test results indicated that the regression equations for the two periods were significantly different (chow value = 6.35, $p \leq 0.001$) and the previously declining industry coverage now began to increase.

Journal attention also began to reflect a more cooperative posture with the EPA as well NGO's. Industry complaints about regulatory costs decreased from 17 to 4 percent of coverage while, despite the increasing enforcement shown in figure 3, government articles about enforcement declined from 21 to 11 percent (see table 1B). Contrary to past coverage and indicative of an industry effort to regain EPA as an ally, many editorials were now supportive of the embattled agency, "EPA has been criticized for going too slow on RCRA [Resource Conservation and Recovery Act]. Still, we think that it is doing a good job." (Chemical Week, 6/9/82: 3). And, "Critics expect overnight fix. EPA deserves credit for its pace and accomplishments" (Chemical Week, 11/3/82: 3). Similarly, articles

about NGO's shifted from a predominate focus on legal actions and protests to a 38 percent increase in articles about the research they perform. For example, "Nice guys may be back in style . . . the 60s and 70s saw too much confrontation with NRDC [Natural Resources Defense Council] and EDF [Environmental Defense Fund] versus the Pacific Legal Foundation and National Legal Center for the Public Interest. But new alliances like Clean Sites Inc. [CSI] and the National Coal Policy Project may begin an 80s era of cooperation" (Chemical Week, 9/12/84: 3).

Through this period, enforcement and regulation still gained a significant share of environmental coverage (see table 1A), but the increasingly pro-active tone represented environmentalism moving beyond a purely regulatory concern. While still active at the regulative level, corporate environmentalism was now becoming active as a *normative* institutional pillar as well. It became ethically appropriate to initiate controls that went beyond regulatory requirements as a matter of social obligation. Representing a more self-directed set of motivations, industry specific articles about environmental strategy increased from 3 to 16 percent (table 1B). The dominant values and expectations of the period drove the industry to conform to the emerging notions of "pollution prevention" and "waste minimization." As an April 1987 editorial argued, "Environmental law [is] more than compliance. Companies obeying the letter of the law are heading for trouble" (Chemical Week, 4/8/87: 3).

Stage Four: 1989-1993

Thus far, the field evolved among the three primary participants: industry, government and NGO's. The field would change again in 1988 to include new types of constituent interactions which would be reflected in a new conception of environmental management. This shift coincided with a series of events that depict a more drawn out shift than that of the previous two stages.

Disruptive events. From 1984 through 1990, a myriad of environmental events heightened concern for environmental issues within the pages of Chemical Week. The first was the 1984 methyl

isocyanate release at Union Carbide's Bhopal India plant which killed over 3,000 people and injured another 300,000. Viewed as an industry-wide issue, Chemical Week's first article on the event asked in its headline, "How will Carbide's Misfortune Shape Chemicals' Future?" (Chemical Week, 12/12/84: 8). Subsequent coverage was presented in a newly created "Bhopal" section which appeared weekly. Other events receiving prominent Chemical Week coverage included: the emerging concerns over the ozone hole in 1985; the enactment of the Toxics Release Inventory requiring companies to publicly report all forms of pollution created at their plants beginning in 1987; the treaty to halt the production of ozone depleting chemical in 1987 (the Montreal Protocol); the emerging concerns over global warming in 1988, and; the Exxon *Valdez* oil spill in Prince William Sound on March 24, 1989. Finally, one event which drove tremendous change within Chemical Week was the initiation of the Responsible Care program of the Chemical Manufacturers Association in 1990, which outlined a set of pro-active environmental principles that all members of the trade association would be required to adopt.

Organizational field. In the midst of these events, the makeup of the organizational field shifted in dramatic fashion to include a new player and a new interaction pattern in 1988 (see figure 2). First, lawsuits between insurance companies and industry emerged. With insurance companies as plaintiff, an annual mean of 16.75 lawsuits were filed. As defendant, an annual mean of 30.65 were filed. Most of these lawsuits were in response by cutbacks in pollution coverage by the insurance industry in the wake of the Bhopal disaster. Second, industry versus industry suits grew in prominence. While low levels of such activity had been noted since 1984, the numbers grew dramatically from only 2 in 1987, to 8 in 1988, and a mean of 14.3 through 1993. These cases were generally disagreements over liability for waste site cleanup under the aegis of the Superfund program.

Chemical industry institutions. The introduction of such economically based constituents coincided with a reconception of environmental management within Chemical Week. By the end of 1993, attention to the environment issue had reached unprecedented levels. And of that coverage,

management had grown to 28 percent of overall coverage (see table 1A) and 57 percent of industry specific coverage (see table 1B). One major reason for this major shift in posture was the Responsible Care program. Two entire issues were devoted to the program in each of the years 1991, 1992 and 1993. Representing what was an important component of Responsible Care — improving the image of the industry — the journal now devoted 10 percent of industry coverage to public relations.

Journal content reflected a belief that industry was now a part of the solution to environmental problems. Demonstrating strikingly proactive posture, the journal actively pursued debate on such emerging and controversial issues as Environmental Racism and Chlorine Phase-out. The journal's environmental coverage was now directed towards management, strategy and public relations as much as regulation and technology (see tables 1A and 1B). And in seeking solutions to environmental problems, NGO's were being seen as partners. Fifty-six of NGO specific coverage focused on their research (see table 1B) and their growing participation in business partnerships.

While the regulative and normative pillars are still active in this stage (as evidenced in table 1A) environmentalism might be described as beginning to enter the realm of a *cognitive* institutional pillar. Unfortunately, the presence of cognitive institutions is extremely difficult to measure. But environmental and core economic conceptions of corporate activity appeared to be merging within the journal. For example, what were previously environmental issues — recycling and water treatment — were now being covered as mainstream chemical industry market niches. Illustrating a new mindset, a November 1990 editorial proclaimed “Green line equals bottom line — The Clean Air Act equals efficiency. Everything you hear about the 'costs' of complying with CAA is probably wrong . . . Wiser competitors will rush to exploit the Green Revolution” (Chemical Week, 11/21/90: 5).

Some evidence suggests a culturally supported belief in baseline corporate environmental responsibilities. That companies would no longer dump hazardous wastes in an unsecured landfill could safely be considered a taken-for-granted belief. Even if a company chose to undertake such an activity, it would do so with the full knowledge that it was deviating severely from existing legal and

ethical institutions. Similarly, the wide-spread adoption of organizational and strategic innovations (e.g. environmental annual reports, pollution prevention programs, environmental vice presidents) and the growing rhetoric around "win-win" scenarios of gaining strategic advantage through environmental management (e.g. Schmidhieny, 1992; Porter & van der Linde, 1995) suggest some degree of taken-for-granted beliefs about legitimate corporate practice towards the environment.

IMPLICATIONS

This research was built from an empirical analysis of the evolving conceptions of corporate environmentalism from 1960 until 1993. As the results indicate, this period has been witness to a concurrent evolution in both the field of actors driving this evolution and the resultant institutions by which the chemical industry has defined the environmental issue. Further, these results offer contributions to the study of institutional theory and the relationship between organizations and the natural environment. For the remainder of this article, I will explain some limits to both areas as they presently exist, discuss what contributions this research offers towards overcoming these limits and present some possible next steps for future research.

Institutional Theory

One problem that plagues institutional theory is broad disagreement over the theoretical definition and empirical measurement of core concepts such as the organizational field and institutions (Dacin, 1997). Another is its failure to adequately address the issue of change (Hirsch & Lounsbury, 1996). This article's analysis offers contributions towards resolving each issue.

The organizational field. The representation of the organizational field in this article identifies field membership based on a central issue, not a common technology or market. An issue-based field is consistent with the notion that the organizational field is the center of common channels of dialogue through which normative and cognitive influence is exerted on the organization (Scott,

1991). With such a frame, the presence of a field structure should be analytically detected through an increase in the extent to which certain organizations interact and engage in a common debate (DiMaggio, 1983).

In this study, I empirically grounded the construct of the field through an analysis of organizational interaction patterns in the federal court system as they pertain strictly to the issue of environmental protection. Field membership was detected by who participated in the legal process and therefore possessed a legal voice in determining institutional norms regarding environmentalism. Thus, this article built a description of the organizational field whose membership and bounds were not externally imposed by the experimenter but emerged from the data. Furthermore, this article developed a longitudinal measurement of the field that exposed its evolving membership and interaction patterns. The field was empirically represented as a dynamic source of influence which had meaning to the organizations within it as legal cases have a direct impact on corporate perceptions and action.

But, one major limitation to this measure, as already mentioned, is that it restricts its view to field level constituents who utilize legal channels for interacting with other organizations. It overlooked many constituents who should be part of a model that captures all of the influence of institutional phenomena and change. For example, it failed to capture the presence of any field members between 1960 and 1970 although some form of institutional influence could be detected within the content analysis of Chemical Week. Who were the institutional entrepreneurs driving the emergence of the environmental movement during this period and how did they do it? In order to draw in these additional sources of influence, analysis must be located within each actor's particular communication and interaction channels. Investor influence, for example, can be identified through the filing of environmental proxy resolutions, which jumped from only 3 in 1989 to 43 in 1990 and a mean of 59.6 from 1990 through 1993 (IRRC, 1988-1994). The press influences legislative action and corporate policy through the volume and content of news coverage (Protess et al., 1987). The

detection of field constituency must be uncovered through an analysis of interaction channels that are relevant to each player.

Institutions. In order to capture the full scope of institutional dynamics, this article posits that we must analyze both the specific institutions that lie at the center of an issue-based field and the competing institutions that may lie within the individual populations (or constituencies) that inhabit that field. Supporting this notion, it captured the situated institutions of the chemical industry through the journal dialogue among US chemical manufacturers. It found these institutions to have evolved in content and form. This finding supports the view that the regulative, normative and cognitive institutional pillars are inter-connected with transitions possible among the three levels (Hirsch, 1997), rather than analytically and operationally distinct (Scott, 1995). The four stages of the study's history represented periods in which one institutional pillar was marked as dominant with evolution noted from one level to the next: (1) questioning of prior institutional beliefs, (2) a regulative institution, (3) a normative institution, and (4) a cognitive institution. During these stages, other pillars were still noted as active, sometimes at odds with and sometimes consistent with the dominant pillar.

This allowance for interconnection does not grant each level of institutions equal standing within the broader organizational field (Hirsch, 1997). For example, institutions in the regulative and normative pillars are "the products of human design, [and] the outcomes of purposive action by instrumentally oriented individuals" (DiMaggio & Powell, 1991: 8), such that we may expect to find more opportunity for deviance and contestation (Hirsch, 1997). But, institutions at the cognitive pillar are the most entrenched. They form taken-for-granted beliefs and are resistant to change (DiMaggio & Powell, 1991; Hirsch, 1997). In the history of chemical industry environmentalism, the belief that technological progress improved the quality of life but required the acceptance of a certain level of risk persisted as a cognitive institution, despite the gradual incorporation of associated environmental institutions. For example, in response to *Silent Spring*, an editorial argued that "in pest control - as in medicine, law, or international diplomacy - we must weigh risks against benefits . . . Is the survival of

civilization worth a few pounds of fallout?” (Chemical Week, 7/28/62: 5). In response to Love Canal, the journal benignly argued that “Every so often something goes wrong” (Chemical Week, 8/16/78: 5). And in response to Bhopal, an editorial argued that “One accident, bad as this one is, does not negate all the good that modern technology has safely brought to us for many years. . . how many Indians live healthier, longer lives because of the products made at Bhopal?” (Chemical Week, 12/19/84: 3). Industry response to each of these events revealed how environmental concerns remained a challenge to entrenched cognitive institutions regarding the benefits of technology despite their environmental risks. Only through time would it be reasonable to expect that cognitive institutions would change as particular rules or norms become less contested through enduring persistence. Eventually, they would become accepted as the legitimate form of organizational action and ingrained at the cognitive institutional realm.

Organizations and the Natural Environment

This article offers contributions and insights for research into the relationship between organizations and the natural environment. This body of literature has mainly focused on the strategic actions of individual organizations (e.g. Lawrence & Morell, 1995; Shrivastava, 1995; Lober, 1996). For example, Hart advances a “theory of competitive advantage based upon the firm’s relationship to the natural environment” (1995: 986) and Porter & van der Linde argue that “companies must start to recognize the environment as a competitive opportunity” (1995: 114). But this article highlights the benefits of applying existent theories of organizational behavior towards understanding this phenomena.

By applying institutional theory to explaining the evolving conceptions of environmental management, this article examines the cultural and institutional systems of which organizations are a part. It goes beyond assessments of individual action to ask questions about the fundamental sources of those actions. This article’s institutional history shows that individual strategic action is only

possible within the range of available options defined by the organizational field (Scott, 1991). As the field evolves, so does that range of options. Thus, recent analyses of win-win scenarios which describe mutual gains for economic and environmental interests (Schmidheiny, 1992; Porter & van der Linde, 1995; Hart, 1997) only make sense in the post-1988 stage of institutional history. Further analytical study and public policy recommendations can benefit from an adjusted level of analysis that considers social and cultural sources of habitual action and social change.

Future Directions

One issue that was raised in this article but not fully developed was the role of events in driving institutional change. While this research could not prove a causal connection between the events detected and the institutional change that followed, such casual connections can be supported in specific cases. For example, the creation of the EPA in 1970 had a directly identifiable impact on the constituency of the field and the conceptions of environmental management that emerged. In particular, it established a legal framework by which industry could be challenged in the courts. In another example, the increased legal activity of insurance companies in 1988 can be tied to the litigation surrounding the 1984 Bhopal disaster. A 1988 General Accounting Office (GAO) found that “the number of insurers writing pollution insurance, the number of policies written, and the total pollution liability coverage decreased dramatically from a 1984 peak. Simultaneously, the average premium increased as much as 11 times its 1982 level” (US Government Accounting Office, 1988). As a result, lawsuits were filed to contest the norms regarding the definition of environmental incidents and corresponding liability.

But, a question remains as to how events do this. What distinguishes certain events which cause institutional change from others which do not? Is there some way that events can be classified as to their characteristics which enable them to alter the institutional order? Do single events cause change or are event chains responsible for social change? The answers to these questions appears to

lie in the process by which events are socially constructed within the field. In the literature on punctuated evolution, events are not singularly credited with driving periods of revolutionary change. They only create the need for it to occur (Gersick, 1991). Thus, it is important to consider how events are socially constructed through a contest over meaning among players within the organizational field (Hannigan, 1995). Similar events at different points in history can be constructed in different ways such that their resultant impacts vary. For example, the Bhopal disaster of 1984 and the Seveso disaster of 1976 have many similarities. Although the death toll varied significantly between events, each involved the release of a toxic cloud of chemical gas over a populated neighborhood. At the time of the Bhopal disaster, the topical policy focus was corporate disclosure of chemical contaminant information to employees and local communities. Therefore, the result of this incident was the development of several community right-to-know laws, including the Toxics Release Inventory. At the time of the Seveso disaster, the banning of carcinogenic substances such as DDT was the topical focus of environmental regulation in this country. As a result, Seveso served as a catalyst for the banning of dioxin. Clearly, an oil spill in 1979 would have been constructed very differently and have very different institutional implications than a technically comparable oil spill in 1989.

The role of social construction leads to a question of how agency (Child, 1972) fits in the alteration of institutional systems (DiMaggio, 1988). Where past analyses of institutional change have located the source of institutional change with the actions of powerful constituents of the field (Fligstein, 1990; North, 1990; Brint & Karabel, 1991; DiMaggio, 1991), this history depicts a less unilateral model. Change can emerge suddenly and unpredictably, thrusting institutional players into periods of revolution. At these moments, institutional entrepreneurs can be both strategic and opportunistic, taking advantage of the uncertainty in the institutional order they seek to change. These entrepreneurs cannot construct the institutional order, but they can influence its ultimate design through control of the institutional negotiation process that occurs during periods of revolution.

For example, Rachel Carson and Ann Burford Gorsuch figured prominently in the history of chemical industry environmentalism. But, neither could control the institutional outcome of their actions. They were both empowered and limited by the institutional environment in which they emerged. Rachel Carson was not the first to write about the dangers of DDT in *Silent Spring*. Its potentially damaging effects were well documented since World War II. The impact of her writing was made possible by the political dynamics of the institutional order. The *New Yorker* magazine serialized the book, the “Book-of-the-Month” club distributed it, environmental groups and academics supported it and President Kennedy gave it personal attention. The chemical industry could not opt out of the field level negotiation that followed. Similarly, the actions of Ann Burford Gorsuch proved a critical trigger in the shift from the second to third stage in 1982. Yet, the outcome of her action was the opposite of what was intended due to the political backlash that followed. It catalyzed the initiation of an institutional shift, whereby corporations adopted new forms of environmental responsibilities which, just two years before, they were resisting. In effect, she “reinvented the environmental movement by [her] contempt for it” (Keating & Russell, 1992: 33). As these examples show, politics, agency and interests become central aspects of the organizational field (Selznick, 1949).

Further study must also cast a broader net in capturing events of critical importance and understanding the dynamics by which they cause change. By restricting this study’s examination to Chemical Week coverage, it uncovered only events of importance to the chemical industry. It overlooked events that may have had a contributing effect on the overall field. For example, the Santa Barbara oil spill in January 1969 sparked prominent media coverage and public outcry on national scope which prompted the Nixon administration to impose restrictions that still exist today on drilling in environmentally sensitive areas such as the Alaska National Wildlife Refuge (Molotch, 1970). And, the Cuyahoga River fire in June 1969 is credited with capturing national attention and highlighting the need for federal standards on water pollution control (Ophiem, 1993). But while oil spills and river

fires do not relate directly to chemical industry operations and were therefore overlooked, their influence on institutional systems cannot be ignored.

CONCLUSION

A present theme within institutional theory calls for a merging of “old” and new institutional concepts into one coherent theory (Holm, 1995; Kraatz & Zajak, 1996; Greenwood & Hinings, 1996; Hirsch & Lounsbury, 1997). This article contributes to that objective by presenting a view of organizational fields as “arenas of power relations” (Brint & Karabel, 1991: 355) where field level constituents engage in an institutional “war” (White, 1992). Change in this war is the product of a political negotiation process where politics, agency and vested-interests (Selznick, 1949) guide the formation of institutions which will guide organizational behavior. Old-institutional concerns for change, agency, politics and interests can fit consistently with the neo-institutional ideas about inertia and resistance to change. This breaks neo-institutional theory free from the strict notion that social conformity will yield only predictable and isomorphic structures. While this insight is theoretically important for keeping institutional theory vital, its implications for environmental protection are also critical. Environmental problems must be solved through changes in the institutional arrangements that govern industry and social action. As the environmental issue continues to evolve, institutional change holds promise for the development of new institutional forms which have yet to be imagined (Gersick, 1991).

FOOTNOTES

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- ¹ In this study, US chemical manufacturers are not defined strictly as the 2838 companies that fall under SIC Classification 28. Rather, this population was empirically bounded by my choice of data source: namely, companies which represent the readership of Chemical Week.
- ² For example, 1969-1980, -1981, -1982, -1983, -1984, -1985, 1970-1980, -1981, -1982, -1983, -1984, -1985 and so on.
- ³ Articles regarding nuclear power and nuclear wastes were excluded for two reasons. First, the case law data did not include this issue and I sought consistency between sources. Second, I viewed this issue as distinct from the chemical industry environmental issues and therefore outside the focus of this study.
- ⁴ Interestingly, this trend in chemical industry attention to environmental issues is nearly identical to trends in public opinion on environmental issues reported by Dunlap (1991).
- ⁵ It is important to note that these stages should not be viewed as strictly homogenous, but rather depicting dominant trends between shifting points. Likewise, the dates are not intended to be precise, but depict revolutionary periods that vary from the first, rather definitive shift in 1970 to more diffuse shifts between 1981 and 1983 and between 1987 and 1989. However, to delineate the stages, the mean date of each shift was used as the shifting points: 1970, 1982 and 1988.

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APPENDIX A

Preliminary Environmental Event Sample

1960s

- Publication of *Silent Spring*, 1962
- Agent orange protests against Dow Chemical, mid-1960s
- NYC garbage strikes, 1967
- *Torrey Canyon*, oil spill, England, 1967
- Formation of EDF, 1967
- DDT banned, 1968
- Santa Barbara, oil spill, California, 1969
- Cuyahoga River fire, 1969
- Group Against Smog and Pollution (GASP) pushes for CAA, 1969
- Passage of the National Environmental Policy Act, 1969

1970s

- First Earth Day, 1970
- Formation of NRDC, 1970
- President Nixon's "environmental" State-of-the-Union Address, 1970
- Formation of the Council on Environmental Quality, 1970
- Formation of the EPA, December 1970
- Passage of the Clean Air Act, 1970
- Publication of *The Limits to Growth*, 1972
- Passage of the Clean Water Act, 1972
- UN Conference on the Human Environment, Stockholm, 1972
- OPEC Oil Embargo, 1973
- *Argo Merchant*, oil spill, Massachusetts, 1976
- Seveso, Italy, chemical release, 1976
- PCBs banned, 1976
- Key environmental leaders take positions in Carter administration, 1976
- Passages of the Resource Conservation and Recovery Act, 1976
- Passage of the Toxic Substances and Control Act, 1976
- Love Canal, waste dump, New York, 1978
- Amoco *Cadiz*, oil spill, France, 1978
- Formation of Greenpeace U.S.A., 1979
- Three Mile Island nuclear plant failure, 1979
- *Burmah Agate*, oil spill, Texas, 1979

1980s

- Passage of Superfund, 1980
- *Georgia*, oil spill, Louisiana, 1980
- *Olympic Glory*, oil spill, Texas, 1981
- Appointment of Ann Gorsuch Burford to EPA, 1981-1983
- Appointment of James Watt to Interior, 1981-1983
- *Arkas Montz*, oil spill, Louisiana, 1982
- Times Beach, Missouri, waste dump, 1982
- Passage of the RCRA Amendments, 1984
- *Alvenus*, oil spill, Louisiana, 1984
- Bhopal India, chemical release, 1984
- *Puerto Rican*, oil spill, California, 1984
- Detection of the ozone hole, 1985
- Group of Ten publishes *An Environmental Agenda for the Future*, 1985
- Sandoz, Switzerland, chemical release, 1986
- Passage of the Superfund Amendments, 1986
- First SARA Title III Reports due, 1987
- Mobro 4000 garbage barge, 1987
- Montreal Protocol, 1987
- Publication of *Our Common Future*, and the introduction of the term "sustainable development", 1987
- Esso *Puerto Rico*, oil spill, Louisiana, 1988
- UMTB 283, oil spill, Alaska, 1988
- UN Toronto Conference to control global warming, 1988
- Alar controversy, 1989
- Formation of the CERES Principles, 1989
- *Exxon Valdez*, oil spill, Alaska, 1989

1990s

- *Mega Borg*, oil spill, Texas, 1990
- *Jupiter*, oil spill, Michigan, 1990
- Passage of the Clean Air Act Amendments, 1990
- Formation of the CMA Responsible Care Program, 1990
- Formation of the API STEP Program, 1990
- Earth Day, 1990
- Formation of the Business Charter for Sustainable Development, 1991
- Initiation of the 33/50 Program, 1991
- UN Conference on the Global Environment, Rio, 1992
- Formation of the PERI, 1993

APPENDIX B

Regression Analysis for Trends in

Chemical Week Article Volume on Environmental Issues, 1960-1993

Equation for Regression Analysis

$$\text{no. of articles} = a_0 + a_1D_1 + a_2D_2 + a_3D_3 + B_1D_1t + B_2D_2t + B_3D_3t + B_4D_4t + \text{error}$$

where: $D_1 = 1$ when $1962 \text{ (Q1)} \leq t \leq 1970 \text{ (Q4)}$ and $D_1 = 0$ all other times

$D_2 = 1$ when $1971 \text{ (Q1)} \leq t \leq 1982 \text{ (Q4)}$ and $D_2 = 0$ all other times

$D_3 = 1$ when $1983 \text{ (Q3)} \leq t \leq 1988 \text{ (Q4)}$ and $D_3 = 0$ all other times

$D_4 = 1$ when $1989 \text{ (Q1)} \leq t \leq 1993 \text{ (Q4)}$ and $D_4 = 0$ all other times

Results of Regression Analysis

B_1 (standard error)	0.32 (0.03) ***	adjusted R^2	0.9143
B_2 (standard error)	- 0.19 (0.03) ***	N	136
B_3 (standard error)	0.17 (0.08) *	F	206.668 ***
B_4 (standard error)	1.70 (0.1) ***		

($p < 0.05$ *, $p < 0.01$ **, $p < 0.001$ ***)

APPENDIX C

Coding Scheme for Chemical Week Content Analysis, 1960-1993

My objectives in this portion of the study were to identify who was relevant in Chemical Week's environmental coverage and how the environmental issue was framed in that coverage. I coded: (1) the player in the article (whom was the article written about) and (2) the action being taken by the player (what was the article written about.) Specifically, I manually examined each weekly issue of the journal over a two month period in 1993. I first reviewed the article titles in the table of contents, identifying articles about environmental issues and then looking for key topics and words (see below) that would identify the actor and action in the article. If the title of the article identified a specific actor and/or action, it was coded as such. If the title was not sufficiently clear, I conducted a second level search, reviewing the article itself for key topics and words that would allow coding. Of the entire sample of 2,358 articles, roughly seventy-five percent were coded through the title alone, while the remaining articles required a second level search.

To identify and code the articles, I began with a pretested list of key topics and words for possible actors and actions and added to that list if new categories emerged. Each article was coded for only one actor and one action. If two actors were identified, a dominant subject was determined. For example, if an article covered an EPA enforcement action against a particular company, the article's actor was coded as EPA and action was regulatory enforcement. By the end of the study, I identified ten categories of actors and sixteen categories of actions. Actions were further grouped under four separate headings:

Actors: (1) Academics, (2) Community Groups, (3) Customers, (4) Employees, (5) Financial Institutions, (6) Government (including State and Federal Agencies), (7) Industry (including specific companies and trade associations), (8) Insurance Companies, (9) Investors and,

(10) NGO's. Roughly seven percent of the articles were coded as general news items for which no actor could be identified. These were excluded from further analysis in this study.

Actions: Technology (T): (1) Technological Research and Development, (2) Predictions of Technological Development; **Regulation (R):** (3) Discussion of Regulatory Costs, (4) Criticism of Regulatory Programs (either existing or proposed), (5) The Development of New Regulatory Programs, (6) Politics and Political Lobbying; **Enforcement (E):** (7) Regulatory Enforcement, (8) Regulatory Fines, (9) Legal Action in Response to Regulatory Action, (10) Public Protests against Corporate or Government Activity; **Management (M):** (11) Corporate Management of Environmental Affairs (such as staffing decisions, promotions and, organization), (12) Environmental Advertising and Marketing, (13) Public Relations, (14) Corporate Strategy for Dealing with Environmental Issues, (15) Market Opportunities Created by Environmentalism, and (16) General Management Issues.

The task of coding required some degree of specialized knowledge as well as a working vocabulary on environmental issues. For example, some environmental issues in the 1960's were slightly esoteric by today's standards (such as thermal, noise and aesthetic pollution). Further, some acronyms (such as BOD/ Biological Oxygen Demand, NOD/Notice of Deficiency, EIS/Environmental Impact Statement, LCA/Life Cycle Assessment, EDF/Environmental Defense Fund and RCRA/Resource Conservation and Recovery Act) and terms (such as remediation, Superfund and pollution prevention) are specialized to the issue of the environment. My ability to identify and categorize such terms, acronyms, rhetoric and content was greatly enhanced by my previous work experiences in federal environmental enforcement, environmental consulting and corporate environmental compliance.

TABLE 1A
Results of Chemical Week Content Analysis, 1962-1993:
Aggregated by Stage and by Action

ACTION FOCUS	Stage 1 1962-1970	Stage 2 1971-1982	Stage 3 1983-1988	Stage 4 1989-1993
Technology (T)	55% 16.05 (6.02)	33% 24.11 (7.65)	19% 14.76 (2.04)	12% 16.66 (4.32)
Regulation (R)	34% 9.92 (5.12)	41% 29.96 (8.82)	58% 45.05 (7.78)	51% 70.79 (11.67)
Enforcement (E)	7% 2.04 (2.90)	14% 10.23 (4.71)	9% 6.99 (0.84)	9% 12.49 (4.14)
Management (M)	4% 1.16 (2.50)	12% 8.77 (3.20)	14% 10.87 (5.71)	28% 38.86 (17.60)

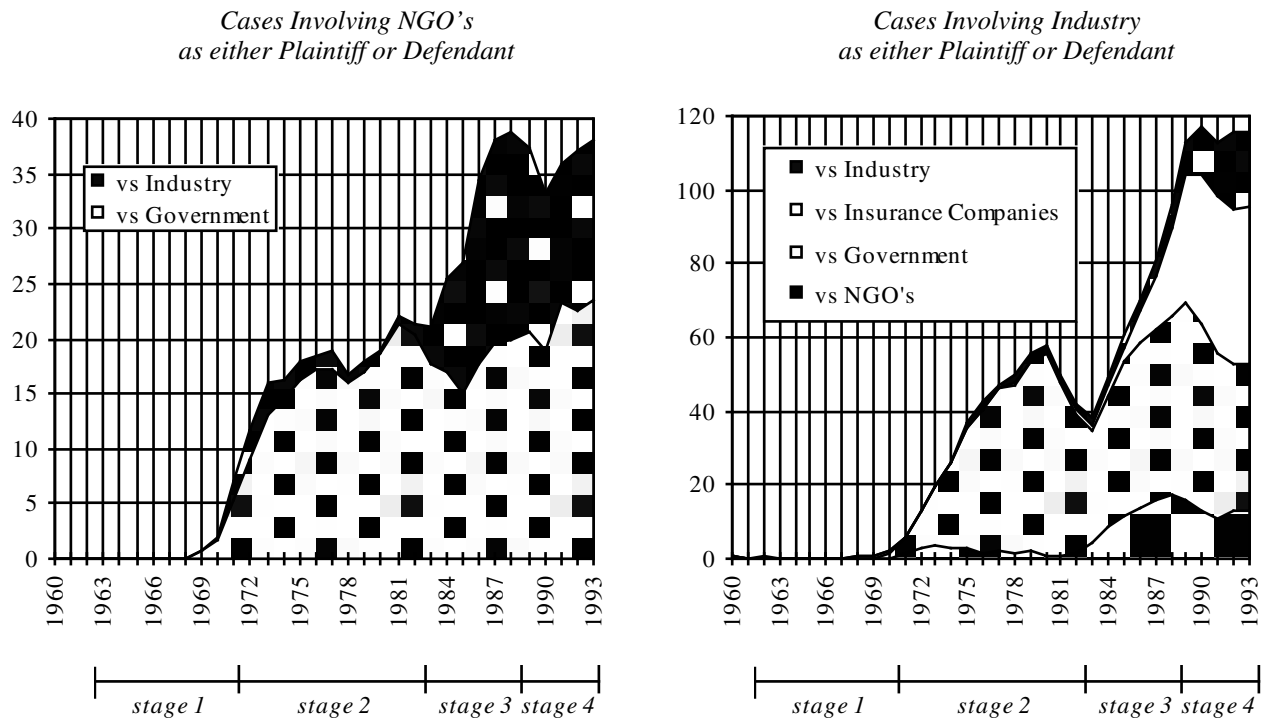
Notes: Percentages per stage and mean articles per year are presented; standard deviations are in parentheses.

TABLE 1B
Results of Chemical Week Content Analysis, 1962-1993:
Aggregated by Stage and by Player and Action

OVERALL PLAYER FOCUS	Stage 1 1962-1970	Stage 2 1971-1982	Stage 3 1983-1988	Stage 4 1989-1993
Industry	56% 16.34 (9.05)	46% 33.6 (11.08)	39% 30.29 (7.27)	50% 69.40 (19.48)
Government	42% 12.25 (6.00)	48% 35.08 (9.70)	54% 41.94 (6.38)	45% 62.46 (13.41)
NGO's	2% 0.58 (2.84)	5% 3.64 (1.93)	6% 4.66 (1.72)	4% 5.56 (1.41)
Other	— —	1% 0.73 (0.65)	1% 0.78 (1.17)	1% 1.39 (0.55)
INDUSTRY SPECIFIC ACTION FOCUS	Stage 1	Stage 2	Stage 3	Stage 4
Technological Development (T)	66% 10.78 (5.30)	43% 14.48 (5.81)	27% 8.17 (2.71)	14% 9.71 (3.20)
Regulatory Costs (R)	7% 1.14 (1.22)	17% 5.71 (3.09)	4% 1.21 (1.35)	8% 5.55 (1.97)
Regulatory Development (R)	3% 0.49 (0.67)	8% 2.69 (2.07)	16% 4.84 (2.08)	10% 6.94 (1.17)
Environmental Strategy (M)	1% 0.16 (0.40)	3% 1.01 (0.86)	16% 4.84 (2.08)	13% 9.02 (1.17)
Management Issues (M)	5% 0.82 (1.49)	10% 3.36 (2.43)	6% 1.81 (2.15)	26% 18.04 (12.82)
Market Opportunity (M)	2% 0.03 (0.65)	6% 2.02 (1.26)	6% 1.82 (1.11)	8% 5.56 (1.86)
Public Relations (M)	7% 1.14 (1.34)	2% 0.67 (0.83)	4% 1.21 (1.41)	10% 6.94 (4.36)
Other	9% 1.47 (1.54)	11% 3.69 (2.43)	21% 6.36 (4.71)	11% 7.63 (4.29)
GOVERNMENT SPECIFIC ACTION FOCUS	Stage 1	Stage 2	Stage 3	Stage 4
Research (T)	6% 0.74 (0.81)	8% 2.81 (2.50)	7% 2.96 (1.90)	5% 3.12 (1.83)
Regulatory Development (R)	47% 5.75 (3.09)	61% 21.39 (6.49)	70% 29.36 (5.24)	67% 41.85 (9.25)
Enforcement (E)	20% 2.45 (2.39)	21% 7.37 (3.63)	11% 4.61 (2.19)	12% 7.49 (3.62)
Other	27% 3.30 (2.79)	10% 3.51 (2.34)	12% 5.04 (3.41)	16% 9.99 (6.55)
NGO SPECIFIC ACTION FOCUS	Stage 1	Stage 2	Stage 3	Stage 4
Research (T)	— —	— —	38% 1.77 (0.69)	56% 3.12 (0.52)
Regulatory Criticism (R)	— —	22% 0.80 (0.48)	12% 0.56 (0.49)	12% 0.67 (0.52)
Politics (R)	45% 0.26 (0.30)	30% 1.09 (0.66)	21% 0.97 (0.79)	— —
Legal Action (E)	50% 0.29 (0.30)	22% 0.80 (0.63)	13% 0.61 (0.49)	11% 0.61 (0.52)
Protests (E)	— —	22% 0.80 (0.48)	13% 0.61 (0.49)	19% 1.06 (0.84)
Other	5% 0.03 (0.06)	4% 0.01 (0.07)	3% 0.14 (0.21)	3% 0.17 (0.16)

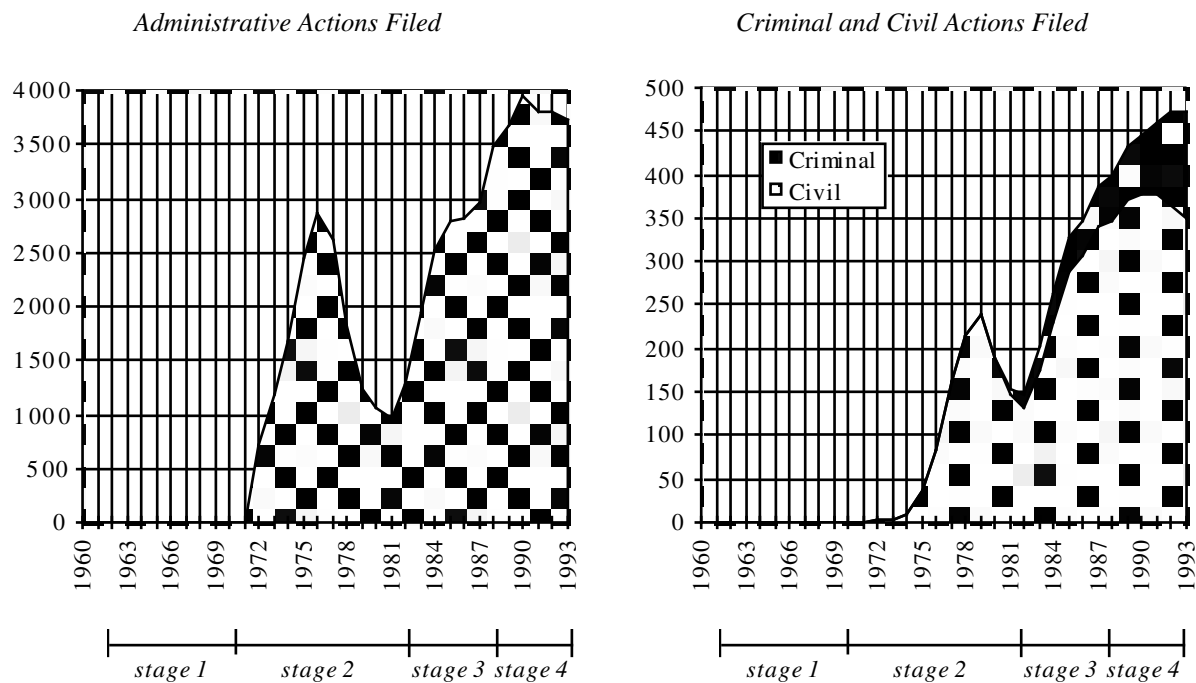
Notes: Percentages per stage and mean articles per year are presented; standard deviations are in parentheses.

FIGURE 1
Environmental Cases Filed in Federal Court, 1960-1993 *



* Three year rolling averages.

FIGURE 3
US EPA Enforcement Activity, 1960-1993 *



* Three year rolling averages.
Source: US EPA (1994)