

THE POLITICAL ECOLOGY OF ORGANIZATIONS

Toward a Framework for Analyzing Business-Environment Relationships

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The authors propose a framework to analyze the terrain of political relationships and actions in which environmental strategies and practices are embedded. The framework constitutes the political ecology of organizations. The concept of an organizational field is proposed as the optimal level for the analysis of business-environment relationships. Central to the framework is an anatomy of power (a mapping of the structuring of power relations). The framework is applied to the automobile industry. Initially, the influential approach of double dividends is analyzed from the perspective of political ecology. The main theoretical elements of the framework are subsequently introduced by using empirical examples of experiments with alternative cars (lightweight electric vehicles) and modes of transportation (car sharing) drawn from the Western European context. Through the use of the framework, one can identify the pressure points that are capable of fundamentally transforming the automobile system and, more generally, other macro systems of production and consumption.

Recognition that environmental issues are shaped by political economic factors is not new, but many contemporary organizational theorists tend to neglect political economy and focus on narrower contexts in which the greening of organizations might occur. We argue that political economic factors are central to understanding organizational greening and propose an anatomy of power to facilitate analysis. One needs to comprehend the ways that external political leverage drives and frames managerial rationalities and influences the ways that the ecological dimension may be integrated into organizational practices. Environmental management can be seen as another form of organizational control, which is shaped intra- and interorganizationally by both power and knowledge (Foucault, 1977). As a determinant of environmental strategies, regulatory systems are not just given to business but result from political disputation between organizations in the governmental and private sectors. Organizational actors, and other agencies such as advocacy groups, are often able to alter existing circuits of power and influence the design of the regulatory framework and the selection of technological innovations (Clegg, 1989).

In this article, we explore the macro context in which political economic factors determine the willingness of companies to develop environmental strategies. We

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take as our focus the recent influential approach of “double dividends” or “win-win” scenarios (Porter, 1991; Porter & van der Linde, 1995a, 1995b). Firms that achieve a double dividend enhance resource productivity—or corporate environmental performance—and hence economic competitiveness. The search for motives for the development of business-environment strategies is a crucial part of the quest for more sustainable systems of production and consumption. Finding hidden opportunities for organizations to profit from environmental strategies is an appealing theme for both businesses and academic communities. For the latter, finding profit in environmental strategies motivates studies about the economic limits of the resource productivity of manufacturing systems, as well as a focus on the regulatory framework promoting innovation.

Although regulation is considered a central variable in the double dividend approach, the main focus is on environmental strategies at the firm level. As our analysis will demonstrate, the study of business-environment relationships requires an organizational analysis at the field level (DiMaggio & Powell, 1983) rather than one that focuses either on the regulatory frameworks or on the firm. Our focus is on the terrain of political and strategic actions in which the environmental strategies and practices are embedded, constituting what we term the *political ecology of organizations*. The adoption of a political ecology perspective in the context of organizational studies borrows from sociology. According to Escobar (1996), “Political ecology studies the relationships between society and nature in contexts of power—particularly from the perspective of political economy” (p. 325). In its address of political ecology issues, this article draws from both (neo)institutional and power perspectives in organization studies.¹ We adopt an institutional-power approach and propose a political ecology of organizations that is embedded within the structuring of relations between the state, organizations, other agencies, and civil society (Clegg, 1989; Giddens, 1984).

The framework is applied to the study of the economic sector most emblematic of modern times and of the polluting consequences of modernity: the automobile industry (Womack, Jones, & Roos, 1990). According to Nieuwenhuis and Wells (1997), “The automotive sector is a key case study on whether international and collaborative action can create the mechanisms by which ecology can inform and underpin global restructuring” (p. 70). During recent decades, the industry has responded to government regulation by adopting a mixed strategy. It invested in cleaner technologies for the manufacture and use of cars but resisted both environmental regulation and the adoption of more radical solutions, such as a shift away from the internal combustion engine and the all-steel car body.

Today, achieving a zero emission vehicle is possible only with pure electric power trains—a technology that has been available to the auto industry since its early days (Cronk, 1995). The automobile industry historically has claimed that electric vehicle technology is not economically competitive and has succeeded in influencing governments to postpone zero emission regulations. However, technology studies and market trials, such as the ones researched by the Strategic Niche Management project,² have shown that the main problems in introducing electric vehicles into the market are not technical. Instead, the problems relate to the difficulty of breaking the “lock-in” situation created around the automobile system (Kemp, Schot, & Hoogma, 1998; Schot, Hoogma, & Elzem, 1996).

If “the system” is the barrier to the introduction of cleaner cars and transportation systems, what are the pressure points that can trigger this transformation? We propose that the systematic use of a framework that emphasizes circuits of power (a framework of political ecology) helps identify factors that foster or limit the green-

ing of organizations and industries. We use examples of “alternative” technologies, such as lightweight electric vehicles (LEVs) and hybrid (collective-private) modes of transportation, to present ways in which this political ecology framework can be used. Because radical innovations might be introduced by new entrants in the industry rather than existing players, the examples that we consider represent technological and market experiments conducted by automakers as well as potential new entrants in the industry. The examples that we use are neither organization nor place specific, nor do they relate directly to each other. Rather, they comprise specific instances of the overall factors fostering and/or inhibiting the industry in the development of more ecologically sound automobiles. Therefore, the use of examples to present the elements of the circuits of political ecology allows us to draw some conclusions about the general pathway that the industry is following and suggest some directions for future research in the field.

THE POLITICAL ECONOMY OF REGULATION

Although the debate concerning the limits of double dividend scenarios is still in its early stages, empirical and theoretical evidence already questions the extent to which one can generalize from the win-win scenarios (Howes, Skea, & Whelan, 1997; Jaffe, Peterson, Portney, & Starvins, 1995). Even Michael Porter—the main proponent of double dividends “theory”—has recognized some of the limitations of his approach in later work (Esty & Porter, 1998). Nonetheless, even the most critical analysts recognize that there is room for cost-effective environmental improvements in companies before a trade-off between ecological and economic gains must be reached (Palmer, Oates, & Portney, 1995; Walley & Whitehead, 1994). However, to focus only on the economics of environmental management diverts attention from the context within which the search for double dividends made sense in the first place. Would organizations seek a double dividend if they were able to persuade regulators to act in their interests? Would companies invest in radical technological innovations if they were able to dictate the pace of innovation in their industry? A partial answer to such questions involves a consideration of three interdependent factors of political economy that act as constraints on companies committing themselves to the exploration of win-win situations. These are the characteristics of institutional-power contexts, the nature of competition, and capital mobility.

From the perspective of institutional-power contexts, the major industrialized countries are sophisticated civil societies with a great density of community organizations. Some of these community organizations may have sufficient power resources to be able to influence state policies to constrain the organization of private capital (McCarthy & Wolfson, 1996; Pakulski, 1991). Local legislation, as a restrictive framework, thus acts as a quasi-independent variable regulating business practices. In such contexts, firms that go beyond mere compliance with environmental regulations may achieve competitive advantage, as Porter and van der Linde (1995b) proposed.

In other circumstances, such as those of developing nations, the capacities of the state to legislate may be considerably less. National elites are likely to constitute substantial stakeholders in comprador investments. In these contexts, local state managers, mindful of their interest in and need for foreign capital, are less likely to legislate for environmental protection. Recent investments in new automobile plants in Brazil provide a compelling example. Proposals from foreign automakers to install new assembly plants received overwhelming support from the ruling Bra-

zilian political parties. From 1995 onward, state premiers competed with each other to offer subsidies, trying to attract automobile manufacturers to their states (“Corrida Atrás da Máquina,” 1995).

Roodman (1998) demonstrates that subsidizing activities that harm the environment can also have a detrimental economic effect in the long term; despite this, the alleged economic benefits of these investments were the leading factors in the accumulation of wide public support. We should consider the context within which these investments were being proposed. In 1995, Brazil had about 150,000 kilometers of paved roads (Anfavea, 1995)—a relatively small amount for a country 8.5 million square kilometers in area. The annual production of cars, trucks, and buses was projected to increase from 1.2 million in 1994 to 2.5 million by 2000 (Anfavea, 1995).³ However, similar to other developing economies, Brazil has significant deficits in public transport and an extremely limited capacity to invest in road infrastructure. For these reasons, Brazil’s traffic congestion and pollution can only be expected to worsen when these newly installed factories eventually reach full capacity and double the size of the automotive market in the country. Although the new investments in automobile manufacturing might be industrially feasible, they clearly underestimate the economic and environmental costs of the necessary extensions of urban development and roads.

Considering the context in which these investments were defined, it is not difficult to identify the capacity of global automobile companies to influence national environmental policies that eventually affect their interests. The dependency of local governments on international investors simply diminishes their autonomy to regulate organizational action. In terms of national investments, oligopolistic situations emerge around industrial coalitions as a common strategy adopted by the main players in the industry. In such a context, competition is far from being “perfect” according to the assumptions of neoclassical economic theory.

The mobility of capital is another factor that can limit the search for double dividends. In complex and sophisticated civil societies, organizing and representing interests against the social costs that accompany capitalist reproduction of private profits is not always easy. In places where institutions that protect civil rights or the natural environment are less developed, and where the state is highly dependent on foreign investment, the situation can be even worse. Free to disassociate themselves from the actual functioning of their capital in various forms of property, capitalists roam the world of investment opportunities in ways that citizens and consumers, rooted in communities, cannot. Because global financial markets are largely beyond the control of national or international authorities, ecological threats, which are always experienced spatially, are not adequately dealt with (Soros, 1998). Capitalists are physically separated from the capital that they control, and although capital can be redirected to more attractive contexts, the externalities that it generates cannot (Korten, 1998).

Political economy plays an important role in companies’ decisions to integrate environmental strategies into business practices. The common practice of business has always been to secure economic dividends first. In specific contexts, political economy factors might influence firms to search for the “second dividend” for the natural environment only when more traditional possibilities have been exhausted. Similar to the transfer of basic manufacturing plants around the globe in search of cheap labor, it can be expected that some businesses will tend to look for contexts in which the responsibility for the internalization of environmental costs can be avoided. In conditions of global competition, the allocation of capital may depend

on localized political contracts embedded in particular institutional-power frameworks.

External pressures such as legislation, public opinion, and industrial competition can force companies to internalize some environmental costs. But it is imperative that we make a realistic assessment of who the key actors are and which resource powers are available to them, as well as the conditions that allow for those resources to be effective (Callon, 1980). It is necessary to consider how the determinants of organizational greening are embedded within a political economy of regulation that shapes the organizational field—the context in which technical, economic, social and political actions, and agents interact. We consider that environmental responsibility is unlikely to flow from the assumptions centered on economic or managerial frameworks. Instead, we need frameworks that are more explicitly political—a political ecology of organizations.

FRAMING THE POLITICAL ECOLOGY OF ORGANIZATIONS

Episodic power relations occur when agents get others to do something that they would not otherwise do. These episodes are what we ordinarily think of as the result of resource dependency power—the exercise of abilities founded on resources whose possession creates dependencies for others lacking these resources but dependent on them (Pfeffer & Salancik, 1978). However, we need to add the concern with “issues” and “nonissues,” raised by Bachrach and Baratz (1970) in political science, to the resource dependency view. Sometimes power is not apparent in action in stopping agents from doing things. Sometimes it does not have to be exercised. Social construction, either by implicit or explicit control of the tacit agenda of what is a legitimate issue, already constrains what can and will be considered in an organizational field. Issues only ever achieve definition within a specific organizational field. When issues that previously have not been taken seriously are championed and are thus forced on to the agenda, they may be capable of delegitimizing and transforming an existing field by raising new items, participants, or locales for consideration. Bachrach and Baratz (1970) used the example of the civil rights movement of African Americans in U.S. cities, mobilizing against segregation and for voter registration in the 1950s and 1960s, as a case in point. Similarly, business-environment relationships can be seen in terms of social issues being introduced to the agenda. When changes occur in these relations, the underlying structures of episodic power are changed.

New actors, issues, participants, and agendas can transform the legitimacy of circuits of power. Legitimization occurs through the stabilization of what Lockwood (1964) termed social integration and system integration. For Lockwood (1964), “The problem of social integration focuses attention upon the orderly or conflictful relationships between the actors, [whereas] the problem of system integration focuses on the orderly or conflictful relationships between the parts of a social system” (p. 245). Whereas conflicts between actors may be visible in explicit power episodes, contradictions between parts of the overall system may not. However, out of such conflicts and contradictions, new issues may emerge. Hence, it is through the transformation of both social integration and system integration that the institutionalization of environmental practices in organizational fields will be secured. The former occurs through the impact of new actors, the latter through the management of new contradictions. Thus, we may think of social integration and system integration as different phases in the circuitry of power.⁴

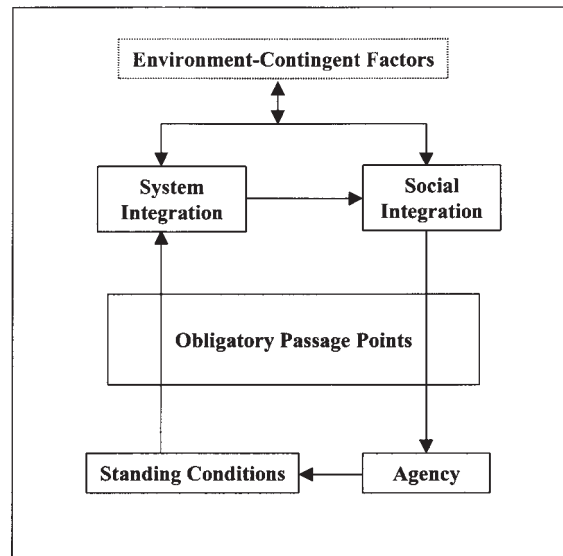


FIGURE 1: Circuits of Political Ecology

A framework for the analysis of this transformation can help one see the way that circuits of power are dynamic and, as such, have to be constantly reconfigured to remain the same. This article extends the general circuits of power proposed by Clegg (1989) to the analysis of relationships between organizations and nature. Hence, the political ecology of organizations addresses ecological practices as a contingent, contested, and indeterminate terrain of political and strategic actions, located both within and around organizations. Figure 1 presents the basic components of the circuits of political ecology framework for the study of organizational fields. The elements of the framework are discussed using examples of alternative automobiles and transport systems in Western Europe.

Despite the fact that the main concepts in the political ecology framework are presented separately, the strength of the framework is in the way that it allows for systematic consideration of all the appropriate variables. Therefore, this didactic strategy of presenting the elements in subsections should not be confounded with the complexity of real-life multiple and overlapping influences.

Environment-Contingent Factors

Many forces induce or inhibit the adoption of environmental strategies by firms within a specific organizational field. Increasingly stringent regulations; legal liabilities and enforcement; consumer demand for cleaner processes and products; the influence of related businesses, interest groups, and agencies; and competitive requirements may all be such forces. We term these *environment-contingent factors* or *eco factors*. Eco factors can indirectly transform what people do in and between organizations, not through particular instances of the exercise of power but in ways that operate more subtly on the contexts within which power is embedded.

As we have seen, automakers rarely will accept the need for regulatory measures in the industry without extensive negotiations. Nonetheless, regulatory measures have often been the main determinant of environmental progress in the auto indus-

try. At the expense of resistance among and disputes between automakers, the oil industry, and the government, substantial improvements have been achieved in internal combustion engine (ICE) technology. At the end of the 20th century, ICE-powered cars are much cleaner than they were two decades ago, but the automobile industry has also succeeded in influencing governments to reduce the pace of introduction of zero emission regulations.

We can foresee that ever-increasing traffic problems in big cities may be expected to exert pressure on public administrators to reduce the dominance of the automobile as a means of transportation. The current wave of environmentalism differs substantially from that of the 1970s, when the main driving force was the risk of scarcity and consequent increase in the price of petrol. Hence, it is possible that at the millennium, the factors are better aligned to trigger radical innovations in the industry (Cronk, 1995). However, even if one cannot foresee the future significance of specific eco factors, their importance as triggers within the framework sensitizes one to the most probable sources of innovation and resistance that are likely to occur.

Whether the transformation of current patterns of production and consumption in the automobile industry will occur as a response to environmental regulations, consumer demand, or the forces of competition is a matter for further research. For the purposes of this article, the nature of the specific eco factor is not as significant as understanding its importance as a central element triggering the circuits of political ecology. The transformation of practices inside an organizational field will occur only when episodic power, triggered by eco factors, has an impact on the circuits of political ecology, redefining its elements. Therefore, the framework is not specifically predictive; rather, it produces a cognitive map within which interpretation of a complex reality can be structured.

System Integration

Normally, the use of the word *system* relates to the interdependence between parts. System integration extends this understanding to the “technological means of control over the physical environment, the social environment and the skills associated with these means” (Lockwood, 1964, p. 251). Thus, it refers to the ways in which innovations may empower or disempower the relative capacities of the different agents within an organizational field. Environmental innovation may be a response to the pressure imposed by related businesses, from industrial competition, or from new regulatory requirements. When changes in system integration occur, they change not only technical task but also the relations between agents in organizational fields. That there exists a new technology alone is an insufficient criterion for changing system integration. Innovation in both social and technical relations is required. It is necessary to analyze how such innovations can empower or disempower existing social relations within the institutional-power context where organizations are embedded.

The importance of this concept for the case of automobiles is straightforward. Automobiles are congruent systems—or systems of systems. They involve intricate processes for the transformation of ideas into physical products. The use of cars requires the congruence of other systems such as refueling stations and expert maintenance firms. The recovery of car parts involves a network of organizations for collection, dismantling, shredding, and recycling. In fact, there is no novelty in revealing that the integration of the automobile system is possibly the most important reason why the industry fails to implement more radical solutions, such as the

lightweight hybrid⁵ vehicle, proposed by Lovins and Lovins (1995). The challenge is to find ways of redefining system integration to incorporate such innovations.

Alternatives for the traditional (ICE, all-steel body) car have been developed in Western Europe. Switzerland, in particular, presents a didactic example of the importance of system integration of a specific organizational field. More than one third of all LEVs in the world can be found on Swiss roads (Lovins, 1995), representing the most advanced context for this alternative technology. In a small town in the southern region of the country, a unique project for the development of markets for LEVs has so far been successful. A dense network of local agencies and organizations at the regional and national levels broadly support the Mendrisio project, which formally started in 1995. The belief that the main problem of current LEV technology was not so much technological weakness but how to reap economies of scale at the level of manufacturing, infrastructure, and the market motivated the Swiss government to partially sponsor the scheme. Subsidies and promotional measures are central for the LEV project, but the experiment is not based on market protection. Competition is fostered among suppliers in order to give consumers a wide range of vehicle options (Harms & Truffer, 1998b).

From the early studies of Callon (1980) to the recent developments in the Mendrisio project, the importance of the system integration of LEVs, as with an ICE economy, is evident. Infrastructure for recharging electric vehicles was thought to be crucial for creating consumer confidence in the system and providing stability. In the Mendrisio project, at a local level, this has been partially achieved: Recharging stations are located in the city center, at the railway station, and at the shopping center. Supporting services were also fundamental variables influencing consumer acceptance of the new vehicle technology. As a result, Harms and Truffer (1998b) point out that LEV users undergo a number of learning processes: Their modal split changes, they drive more cautiously, and they are more conscious about energy use in transportation.

How is it possible that in this small town in Europe, such a transformation has been wrought? There is not even an indigenous clustering of auto technologies in this part of Switzerland. Hence, the will to change was clearly not driven by some underlying technological imperative or industrial competitiveness. Many factors might be adduced, but one thing is certain: Overwhelmingly, such factors will be matters of social integration rather than integration of technology alone. The introduction of the new technology is never just a matter of superiority or finding acceptance in terms of system requirements. There is also the matter of social integration: The complexities of a sociotechnical system need to be accounted for.

Social Integration

Social integration deals with the symbolic sphere and with language and its relations of meaning, as well as the ways in which these define certain types of membership categories in relation to other categories within organizational fields. Social integration overdetermines system integration because it creates meaningfully specific artifacts and technologies in distinct ways. Material things have no meaning in themselves. Existing relations of meaning and membership may facilitate or restrict the reception of change introduced through system integration.

Informal and formal rules *fix* relations of meaning and membership within and between organizations. These relations define who one is and what one does through the ways they are embedded in rituals and routines. Through these, certain things get initiated and certain things get done. Actors in and around organizations

use various means available to them to seek to control resources so as to secure desired or favorable outcomes in terms of these rules. Such outcomes may either reproduce or transform those rules that presently fix current reality.

The development of electric vehicles can empower a different range of technological competencies, resource suppliers, and maintenance skills of related businesses. Some expertise in the existing and well-established industry complexes surrounding the petroleum engine needs to be redefined. Although new techniques of production entail new techniques of discipline, existing forms of power and knowledge do not necessarily fade away. More likely, they will resist innovation. Technological innovation invariably entails the power struggles of the various actors involved in the projects against an overwhelming context of technological investment in ICE-related technology. The threat of the development of electric vehicle technology by new entrants in the industry induced automakers to keep up to date with battery and electric power train technology. For most automobile manufacturers, however, electric vehicle technology has not yet become a market strategy.

Although an electric vehicle is defined precisely by its not being a conventional petroleum-fueled vehicle, the meaning of a conventional car is superimposed or overlain on the possibilities of what an electric vehicle might be by designing electric vehicles as adaptations of standard cars. When automobile manufacturers release electric vehicles for market tests, the majority of the vehicles are conversions of a conventional all-steel car body into an electric powered one. The ICE of a conventional car is removed to provide space for an electric power train.⁶ As a consequence, the performance of these converted cars in terms of range and maximum speed—the meaningful attributes of existing ICEs—is inferior to ICE-powered counterparts. A heavy steel car body significantly increases the storage capacity and power required of the batteries. This low performance of converted electric vehicles has been used strategically by automakers. According to Hart (1997), “Electric-vehicle programs have been used to demonstrate the infeasibility of this technology rather than to lead the industry to a fundamentally cleaner technology” (p. 74). Yet, this lack of feasibility is an effect of the meaningful frame in which efficiency is defined according to the taken-for-granted technology for building body parts and into which electricity has been plugged.

Although technological options may be associated with a wide range of related techniques, emerging technologies such as the electric vehicle also have to be seen as embedded in their social context (Kemp, 1994; Schot et al., 1994). Manufacturers of “alternative cars” normally develop electric vehicles with lightweight bodies but lack expertise in automobile manufacturing and cannot sustain the high investment necessary to achieve economies of scale. The most recent example of such a problem is the Norwegian PIVCO Company. PIVCO was formed by a consortium of some of the largest companies in the country to build a two-seat lightweight electric vehicle called TH!NK. The consortium initially developed the LEV for urban or suburban transportation, aiming at a significant proportion of the market for environmentally friendly transport. The involvement of large companies as owners, suppliers, large pilot users, and R&D partners gave the experiment considerable status and knowledge but not sufficient financial endurance. The initial aim of the company was to manufacture 5,000 vehicles a year by the end of 1998, as Schwartz and Maruo (1998) elaborate. Because of financial problems, the Ford Motor Company bought the consortium in January 1999.

The TH!NK, prototypically buzzing about the streets of the 1994 Lillehammer Winter Olympics, may yet be the precursor of major changes but has not succeeded to this point. The main reason that it failed was an unduly proprietary attitude

toward the technology and a question about the compatibility of a small LEV in a cold and mountainous terrain. With the acquisition of PIVCO, Ford acquired innovation not only in LEV technology but also in colorful, extruded plastic moldings and panels—a major innovation in automobile manufacturing developed by the consortium. Whether the TH!NK technology can survive this takeover is a question for further investigation. The forces that might have integrated it socially, such as in the Mendrisio project, might not be present in an international company such as Ford. The potential of the TH!NK to become an agency is under speculation, one might say.

Agency

Agency refers to the capacity to act significantly. There is a widespread humanist tradition in the social sciences that would seek to reserve this capacity for human actors only. We resist this tendency. For us, significant actors may incorporate machines, microbes, viruses, or animals (see the discussion of *Rattus Norvegicus* in Clegg, 1989, chap. 9); or, they may incorporate organizations. Indeed, if knowledge is embedded in structures and routines rather than people, it has potentially more power over a potentially longer duration. Power is incorporated in knowledge relations that are in turn embedded in the cultures of an organizational field (Schon, 1983). In these cultures, representative organizations are central in seeking to influence the development of environmental strategies. The lobbying role of the European Automobile Manufacturers Association (ACEA) in the decision making of the European Commission is possibly the most evident example in the case of the automobile.

ACEA has been the means by which competition is transformed into coalitions and collaborative schemes—a binding culture of shared knowledge, predicated on power, transmitted as rationality—when the industry as a whole is threatened by external forces (Foucault, 1984; see also Clegg, 1975; Flyvberg, 1998). For instance, the main reason European automakers engaged in R&D partnerships, such as the European Council for Automotive Research and Development⁷ (EUCAR) in 1994, was the competition of Japanese manufactures. EUCAR has one of the eight thematic groups dedicated to the development of electric hybrid vehicles and an ad hoc group for the study of recycling technology. Despite this, “the close link with [the] European Automobile Manufacturers Association suggests that the main focus may be on providing information for lobbying the European Commission and other governmental organizations in a ‘defensive’ role” (Nieuwenhuis & Wells, 1997, p. 63).

Within the European automobile industry, other agencies have emerged around new issues to challenge automobile manufacturers to adopt more environmentally sound cars and transport systems, but in most cases their countervailing power is usually marginal. Nonetheless, grassroots groups have been responsible for the initiation enterprises that have the potential of transforming mobility patterns in specific contexts. The development of car-sharing cooperatives in Switzerland is one of such ventures (Harms & Truffer, 1998a).

A group of people interested in developing more environmentally sound mobility patterns in Switzerland initiated two car-sharing organizations that have experienced exponential growth⁸ in the last few years. From the early stages, when a small cooperative was formed, an extensive number of interest groups, ranging from Greenpeace and the World Wildlife Fund to car importers, have supported and helped the cooperative to consolidate its position as a competitive business enter-

prise. The cooperative itself is becoming an agency, since it is making a difference in that institutional-power context. The company promotes new concepts for the use of cars and types of ownership, influencing current mobility patterns in the southern region of Switzerland. The real environmental gains from the enterprise will require further analysis because, indirectly, the company still promotes some use of conventional cars. Nonetheless, the cooperative company is gradually embedding new knowledge—the coordination of collective use of private cars—into routines in the organizational field. Pooling is becoming “normal,” thus demonstrating a significant impact on consumer preferences.

The Mendrisio project also stresses the centrality of agency in influencing technological and market development. According to Harms and Truffer (1998b), “One of the most important events in the formation of the social network around LEVs was the *Tour de Sol* race” (p. 12). Run from 1985 to 1992, the race was important to the niche formation of more ecologically sustainable patterns of mobility because it promoted technological development, motivation, information exchange, and market support for LEVs. In 1991, the interest of the sponsors and the media declined, mainly because the high technical standards of the cars attracted less attention than had the earlier exotic solar vehicles. However, knowledge about electric cars, and the spirit of the race, had already moved the concept from the minds of a few technicians to a broader practice in the public arena. In the same year, LEV enthusiasts organized a workshop, with the support of the Swiss Energy Office, which eventually sparked the idea that would become the Mendrisio project; an experiment that has the potential to start the expansion of the niche market for electric vehicles.

Agency comes from many directions, bearing many rationalities of power. Often, it is represented as a rationality that negates, that blocks, that stops. For instance, the rationalities embedded in existing structures of system integration are, on the whole, inimical to radical environmental innovations. However, as the examples above demonstrate, in the circuit of social integration, where meanings rather than systems dominate, transformation may be possible. Unlikely agencies, such as a few enthusiasts and event organizers, as well as some exotic vehicles, proved capable of producing a small shift that led to the significant transformation of an organizational field.

Standing Conditions

Whether any particular episode in which power is exercised makes a difference depends on how the organizational field is structured systematically (Giddens, 1984; Weick & Westley, 1996). This “systematicity and structuration” is captured in the framework through the notion of standing conditions. Agency cannot be exercised independently of the context that maintains and stabilizes the access of agents to resources. We borrow the term from experimental natural science, where it refers to the preconditions and controlled environment that are necessary to make an experiment work; without the standing conditions being ensured, the experimental proof will not be forthcoming. Here, we refer to the standing conditions that sustain the stable context within which resource dependence routinely functions as a means for producing particular outcomes. Access to certain resources is routinely required to make things happen, to have an effect. Thus, power normally has a degree of predictability about it—as long as the standing conditions are sustained.

At the level of the overall circuits, a high degree of system integration and social integration makes it difficult to innovate, but organizational fields coupled too loosely are also contexts in which innovations cannot be sustained. What is crucial

is to achieve sufficient control of other agencies without achieving so much control that one creates a field that ceases to continue to learn. Thus, power concerns not only the exercise of capacities; clearly, it also concerns the standing conditions within which these capacities are exercised.

Consider the standing conditions that limit changes in adopting new materials such as aluminum and plastic composites in body parts. Some of the complexity of the organizational field for automobiles arises from the network of related and supporting industries that supply the approximately 20,000 components of a car. One might say that automobile manufacturing has an effect that is amplified across those other sectors that feed in these components. This high degree of interdependency can cause organizational inertia, since automakers' innovations in design and material specification require time and resources for related business to adapt accordingly. Wittenberg (1992) notes that it takes 5 years to produce an original design for a car and that the design may undergo as many as five facelifts over a period of 15 years, resulting in an average life cycle of 20 years.

Although automobile manufacturers can influence the decisions of suppliers and determine the types of technologies to be used, they also depend on the state of the art of supporting technologies, as well as the willingness of related businesses to cooperate with their strategies. Hence, a shift to greener strategies is not something that can be embraced voluntarily; it is not the effect simply of a singular agency, no matter how powerful, or of a singular rationality, no matter how compelling. Moving toward new materials and technologies is a matter not of system integration but of the economic and political interests associated with them. For instance, the entrenched position of the steel industry makes it difficult to move toward lighter materials such as aluminum, plastics, and carbon fiber (Wells, 1998). Steelmakers have the advantage that the automobile industry is firmly adapted to the manufacture of an all-steel car body (Nieuwenhuis & Wells, 1994). Automakers have invested considerably in steel press shops and have developed expertise around steel bodies. Therefore, it cannot be expected that the substitution of lighter materials for steel in car bodies will be achieved without considerable upheaval and disputes; some obligatory passage points need to be redefined.

Obligatory Passage Points

The elements of the framework discussed previously benefit the status quo of the auto industry without demanding a significant deliberate intervention. Social integration, system integration, agency, and standing conditions represent a classification of the main elements of the circuits of power that tend to favor the established political ecology of a specific organizational field—in our examples, the automobile industrialists, most of whom are located beyond the frontiers of the industrial sectors, extending from consumer behavior to public policies. A technological trajectory is associated with current systems of production and consumption, limiting the chances of technologies such as those embodied in lightweight electric vehicles (Kemp, 1994; Kemp et al., 1998). Nonetheless, the current stability of the circuit of political ecology is strategically secured by auto industrialists through the management of the obligatory passage points.

Any innovation will flow through existent passage points, as existing interests secure what is obligatory and what is not, or create new ones. The ways in which power relations are constituted depends on the reproduction of certain obligatory ways of doing things. Formal and informal organizational routines constitute examples, such as the criteria used for choosing pollution control technology and for the

evaluation of corporate environmental performance. At the industry level, Nieuwenhuis and Wells (1997, chap. 4) provide a compelling example of how the obligatory passage points can be fixed through the match between technology and economies of scale for the manufacturing of automobiles (see also Nieuwenhuis & Wells, 1994). The authors explain that the well-known Fordist system of production actually uses the concept of Edward Budd's body-chassis automobile technology. This technology allowed mass production of standardized integral car bodies but at the expenses of very high initial investments in manufacturing technology (ranging from U.S.\$700 to \$1.100 million). The lack of flexibility and the economy of scale imperative in the automobile industry can be attributed to this paradigm of production, because high investments increase both entry and exit costs. The necessity of paying back high investments through the production of high quantities of marketed cars "imprisons" the industry within these technological investments for several years at a time. One might anticipate that any innovation that changed such a technoeconomic obligatory passage point would be avoided by the industry.

As the example shows, some taken-for-granted technological and economic pre-suppositions could be, in reality, self-imposed industrial imperatives. High volumes of sales imposed by technological options within the industry force each manufacturer to try and become a global giant, as recent buyouts and the merger between the American Chrysler and the German Daimler-Benz corporations demonstrate. The chosen industrial paradigm creates an obligatory passage point that keeps small new entrants away—at least for a time. The auto industry response to pressure for more environmentally friendly vehicles has been to improve manufacturing, materials, and fuel technologies. Although evident improvements have been achieved in the last decades, they tend to be of an incremental nature, characterizing an ecological modernization of the industry (Orssatto, 1998). Because the industry has made high investments in the current production concepts, more radical options such as the use of lightweight materials as body parts or the push toward mass production of electric vehicles cannot be expected in the short term.

FINAL CONSIDERATIONS

The incorporation of environmental practices in organizational strategies is not merely an issue of pure economics and competitiveness. The most influential debates have suggested, thus far, that this is the case. Although progressive firms in highly developed economies and regulated states may seek double dividends, there are contextual limits to conceptualizing these strategies at the organizational level. Under these circumstances, it is important to analyze the double dividend approach from a political perspective. In the case of the new entrants to the auto industry in Brazil, it is evident that these companies are basing their strategies on guaranteeing their market share in an emerging market where regulation and competition are compromised from the outset. In such circumstances, the double dividend might not be a high-order organizational strategy.

Understanding the process of greening of industries requires not only the consideration of the context of economic survival and competition, but also, as we stress, the importance of considering the institutional-power framework represented in organizational fields. As specific instances of social design, organizations are embedded in waves of transformation, interactively influencing the social construction of reality (Meyer & Rowan, 1977). For this reason, the surge of greening in organizations cannot be understood solely at an organizational level of analysis. For environmental practices of companies to become an institutionalized exemplar,

episodic environmental gains of focal firms need to affect the organizational field through the transformation of those circuits of political ecology within which particular organizations are constituted.

The anatomy of power is a complex matter. We draw explicitly on a tradition of power analysis that stretches at least back to Machiavelli (Clegg, 1989) and probably to Thucydides (Flyvberg, 1998), one that projects forward through Nietzsche and Foucault to the works of Callon and Latour (Haugaard, 1998). Our anatomy of power constitutes an organizational field as a "dense and dynamic net of omnipresent relations" (Flyvberg, 1998, p. 5). Others, such as Porter and his associates (1991, 1995a, 1995b), see sovereign organizations embarking on win-win strategies in search of double dividends. Yet, despite our differences with Porter, amply exemplified in our argument, we share one aspect: We do believe that power can be positive and not merely a matter of negation and negativity. Nor is it merely a matter of identifying who controls resource dependencies, locating where the centers of power are. It is not simply a matter of power centers, and of power being held by the powerful and not being held by the powerless. Nor is it a matter of the state as a locus of power. Power is not just something that the few possess and the majority are locked out of, in which the many are so subjected to the hegemony of resources controlled by the few that they cannot pierce its workings. These are the errors and illusions of modern theorizing (Clegg, 1989). We have sought to avoid them here.

In this article, power has been studied from a point of departure that ranged over many empirical locales, constituting each of these as a dense and dynamic set of relations rather than as some unitary field. The central question is how the exercise of power is possible. Let us approach this question in reverse. Conceptualizing the exercise of power does not require one to separate power from knowledge or from rationality, as if there were some innate causal essence that is power. Power flows through knowledge; power precedes rationality and proceeds to saturate and imbue it with its rationality. And power is inextricably tied up with the capacity of agencies to make a difference. These agencies may be lightweight electric vehicles competing in an event at which, initially, a few spectators turn up, together with some technicians and enthusiasts. It might be the General Motors Company planning its global strategy and seeking to enroll various Brazilian state governors to its project, as they think that they are enrolling the automaker to theirs. What is important is that analysis should seek to find its way through the circuits in which power moves. Thus, our analytical framework serves merely to unlock the pressure points that are capable of transforming the automobile system. We present an anatomy of power, a kind of mapping of its vital structure, unraveling the circuits through which it flows.

In each of the examples that we have outlined, we have sought to demonstrate the insufficiency of restricting analysis purely to the voluntaristic level of an organization's power to initiate distinct episodes of action in pursuit of its strategy. Other factors outside of the intentional strategy of the focal organizations that are not incorporated within current models of strategy also need to be subjected to power analysis. Using the political ecology framework, we are able to encompass relations of power and bridge levels of analysis from organizational strategy to the political economy. Future research can use the framework presented here to expand the understanding of environment-contingent factors influencing firms to work toward double dividends not only in highly competitive markets and regulated economies but also in "weaker" institutional-power contexts. By using the political ecology framework as a template, the analysis of organizational fields can help one identify whether episodic power gains can effectively influence other elements in

the circuit and provoke the institutionalization of environmentally sounder practices in organizations and industries.

NOTES

1. For a review of institutional theory, see Tolbert and Zucker (1996). Hardy and Clegg (1996) also provide a review of the main approaches concerning power in organizations.

2. The case studies are part of the Strategic Niche Management as a Tool for a Transition to a Sustainable Transport System (SNM) project. The European Commission sponsored the project within the area "Human Dimensions of Environmental Change" of the RTD programme Environment and Change. From 16 case studies developed by the SNM team, the reports of Harms and Truffer (1998b), Simon and Hoogma (1997), Schwartz and Maruo (1998), and Lane (1998) have special importance for this article.

3. Before the currency crisis of 1999 changed market projections and foreign investments in the country.

4. We would argue that the model of levels such as that found in Clegg (1975) and Lukes (1974) is one that is embedded in an older problematic of false consciousness or "hegemony" (see also Levy, 1997). We reject such a perspective for its elitism and theoretical privileging of a neo-Marxist point of view in a way that is never grounded. The complete argument may be found in Clegg (1989).

5. A hybrid vehicle consists of the combination of two power trains—an ICE and one or more electric motors. Using a parallel or serial system, a hybrid car operates by using the power trains (electric and ICE) concurrently or independently.

6. The Peugeot 106 électrique used in the trials of La Rochelle and Coventry is an example of a commercial converted car.

7. EUCAR former members include BMW/Rover, Daimler Benz, Fiat, Ford of Europe, Opel, Porsche, PSA Peugeot-Citroen, Renault, Volkswagen Group, and Volvo.

8. The Swiss car-sharing cooperative ATG has grown from zero members in 1987 to 7,000 members in 1997, and from zero cars in 1987 to 350 cars in 1997. The sister cooperative ShareCom has grown at a similar rate. Today, after the merger of the two organizations, the new company (Mobility) has around 15,000 members (Harms & Truffer, 1998a).

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