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The Adoption of Voluntary Environmental Management Programs in Mexico: First Movers as Institutional Entrepreneurs

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ABSTRACT. This article analyzes the adoption of voluntary environmental management programs by firms operating in Mexico. Mexican firms can obtain national certification (Clean Industry) and/or international certification (ISO 14001). Based on institutional entrepreneurship theory, we posit that the role played by first movers as institutional entrepreneurs is crucial if these programs are to become established with sufficient strength and appeal. This understanding is especially important in an environment where more than one program can be adopted. We tested several hypotheses on the behaviors of 1328 facilities operating in Mexico, half of which (664) had certified environmental management programs. Of the 664 certified facilities, 217 were classified as early adopters. Three variables predicted the likelihood of a facility being an early adopter: (1) connected to international market, (2) in the maquila sector, and (3) linked to an industry association that offers free resources.

KEY WORDS: Mexico, institutional entrepreneurship, institutional theory, voluntary environmental management programs, certified management standards, ISO 14001

Introduction

Mexico has made good progress toward protecting the natural environment over the last decade, but there are still pending environmental issues to be addressed. One of the main concerns is that environmental regulations related to issues such as water pollution, toxic waste management, deforestation, and ecosystem destruction are not properly enforced (Restrepo, 2004). Voluntary environmental management programs might help firms establish their own environmental management systems, and ensure their compliance with regulations, when lack of enforcement is attributed to the lack of economic resources (Medina-Ross, 2005).

This study seeks to understand the factors that initially drive firms operating in Mexico to adopt new voluntary programs for environmental stewardship. Specifically, we analyze the factors motivating the adoption of two voluntary environmental management programs: (1) a nationally certified voluntary agreement, which is the Mexican Clean Industry certification promoted by the Federal Attorney for Environmental Protection (PROFEPA), one of Mexico's environmental agencies, and (2) an internationally certified management standard, ISO 14001, that is promoted by the International Organization for Standardization, a private organization.

Our analysis of adoption is based on the new insights of institutional theory that concern institutional entrepreneurship. We examine how different institutional entrepreneurs emerge and help competing programs diffuse and become institutions in the Mexican business context. Our hypotheses are based on DiMaggio's (1988) ''interest and agency'' arguments in institutional theory, Suchman's (1995) arguments about manipulative environments and the role of institutional entrepreneurs, and ''institutional mechanisms'' that Eisenstadt (1980) says influence

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the ways in which entrepreneurs shape the institutional order. We analyze how first movers behave as institutional entrepreneurs facilitating the emergence of two similar institutions – ISO 14001 and Clean Industry – both of which are aimed at enhancing companies' environmental performance.

Our empirical findings provide evidence that the mechanisms described by Eisenstadt (1980) do play a role in the emergence of institutional entrepreneurs. In regards to the adoption of voluntary environmental management programs by firms in Mexico, we find that first movers do act like institutional entrepreneurs. Firms with more "free" resources, and that have developed broad markets, are more likely to behave as institutional entrepreneurs.

Extending institutional theory

How do competing organizational institutions emerge? How do relatively similar management programs survive, become institutionalized, and co-exist in the same institutional field? Research on the emergence of new institutions has so far focused on the adoption of a single program (e.g., either public or private). Interdependencies between two or more programs are left, to the detriment of theory, unexamined (Ingram and Silverman, 2002). These studies, which are based on institutional theory, identify the different forces motivating companies to adopt programs and processes that lead to their institutionalization.

Our study takes this research a step further. We posit that if a new program is to establish itself with sufficient strength and appeal to become institutionalized, institutional entrepreneurs are required. These institutional entrepreneurs take a leadership role in legitimizing the issues with which they are concerned within their organizational field (DiMaggio, 1988).

One of the new institutions to enhance corporate environmental performance that has emerged over the past decade is the voluntary environmental management program. In recent years, a myriad of voluntary certifications have been designed and put into practice. Some programs are intended to be applied on a global scale, while others are intended to apply only to firms operating in a single country. Furthermore, some programs are designed by the public sector, such as governmental environmental agencies, while others are developed by private agencies, such as the International Organization for Standardization (ISO), the organization that issues the ISO management standards.

Several studies analyze the circumstances surrounding the adoption of some of these programs, such as the international environmental standard ISO 14001 (e.g., Delmas and Montiel, 2009; Jirillo et al., 2003; Kollman and Prakash, 2002), and national voluntary programs, such as the Environmental Protection Agency's 33/50 Program (Rivera and de Leon, 2004). However, little is known about the mechanisms motivating firms to behave as first movers and adopt these programs before others, thereby helping them become institutionalized. Identifying and understanding these mechanisms is especially important in business contexts where firms have two or more options for standardization, both of which have similar objectives.

Institutions for environmental quality in Mexico

During the last decade, and due partially to globalization, environmental issues became a priority on the Mexican public policy agenda. In 1993, the North American Free Trade Agreement (NAFTA) was signed and ratified. One year later, Mexico joined the Organization for Economic Cooperation and Development (OECD). This new business reality helped prompt Mexico to start considering new approaches for improving environmental awareness and performance among public and private organizations. Some new initiatives involve voluntary environmental management programs with a third party certification system.

The case of voluntary environmental management programs in Mexico provides a unique setting to analyze how different institutional entrepreneurs emerge. Mexican firms face a peculiar situation when it comes to adopting these programs. They can choose between two very similar programs: ISO 14001 and Clean Industry. Firms can certify with one of them, both, or neither. Firms need to determine which certification will benefit them the most, and this decision is dependent on their characteristics, scope, and geographical projection.

Firms acting as institutional entrepreneurs not only certify early, they also play an active role in the diffusion process. For instance, in the case of ISO 14001, firms in some industry sectors, such as the automotive sector (i.e., the Big Three Automakers: Ford, General Motors, and Chrysler), require that their suppliers certify compliance with the standard. The so-called ''Big Three'' requirement has received considerable attention from business scholars and the media (Bansal and Bogner, 2002; Christmann and Taylor, 2001; Handfield et al., 2005; Jiang and Bansal, 2003; King et al., 2005; Melnyk et al., 2003; Sabatini, 2000; Sissell, 1997; Thornton, 2000; Wilson, 1998). Similarly, early ''Clean Industry'' certifiers proactively promote certification among their suppliers and other business partners.

The clean industry certification

In anticipation of the NAFTA agreement, the Mexican federal government, through PROFEPA, its agency for environmental compliance, established the National Environmental Audit Program (Programa Nacional de AuditorÌa Ambiental). Beginning 1992, firms could volunteer to participate in this program and certify their facilities. PROFEPA auditors conduct an environmental audit of firm operations and those found to be in compliance with all national environmental regulations receive a Clean Industry certification. In 1997, PROFEPA awarded the first 115 Clean Industry certifications to industry leaders. By 2004, 1395 facilities throughout the country had been awarded this certification.

The ISO 14001 certification

Voluntary environmental management programs also have emerged in the international arena. In 1993, for instance, the European Union published the Environmental Management and Audit Scheme (EMAS) to certify organizations that establish an Environmental Management System (EMS) in accordance with certain guidelines. In 1996, the International Standardization Organization (ISO) presented its own voluntary environmental standard for EMS certification, ISO 14001. An EMS is one of the tools that helps companies implement their corporate environmental policies. After implementing an EMS, a company may apply for a third party audit to certify that the system is in compliance with ISO 14001 guidelines. The ISO 14001 standard requires that firms establish a documented system for identifying environmental regulations applicable to the firm. It also requires a commitment to be in compliance with all relevant environmental regulations and establishing corrective measures when inconsistencies with regulations are detected. By 2004, 421 facilities operating in Mexico had certified their EMS with the ISO 14001 standard (WorldPreferred, 2004).

A 1997 World Bank survey analyzed the effects of regulation, plant-level management policies, and other factors on the environmental compliance of Mexican manufacturers. The survey found that plants instituting ISO 14001-type internal management procedures exhibited superior environmental performance (Dasgupta et al., 2000).

Clean Industry and ISO 14001 share common objectives. They promote environmental performance improvements among businesses and certify them. The critical difference is that Clean Industry is focused on meeting the specific standards established by Mexican environmental legislation, while ISO 14001 looks at the development of environmental management systems (EMS) that minimize environmental damage and foster continual improvement in performance.

Theory and hypotheses

Mexican companies are provided two environmental management certification options: ISO 14001 and Clean Industry. As the two self-regulatory arrangements are similar, and each option incurs significant expenses, firms are likely to opt for one or the other, and thereby prevent the take off of one program and its subsequent institutionalization in favor of the other. This has been found to happen under conditions in which increasing returns and network effects occur (Arthur 1989; David 1985). In such a situation, the value of joining a network increases as the number of members of the network increases.

However, in the case presented by voluntary environmental regulation in Mexico, network

effects are minimal because the adoption of one standard does not preclude adoption of the other. Thus, the focus of this study is determining the presence of any common attributes among the types of firms that are first movers in certifying their environmental management practices, and that differentiate the first movers from firms that are not, rather than ISO 14001 versus Clean Industry certification.

Who are institutional entrepreneurs?

Who are these first movers? We suggest that the answer lies in the mechanisms fostering institutional entrepreneurship among actors. Traditionally, institutional theory provides satisfactory answers to questions about why firms are similar, but it has been less successful explaining why firms differ. Institutional entrepreneurship provides one explanation.

Institutional entrepreneurs are defined as actors that have social skills (Perkmann and Spicer, 2007), i. is, they have the ability to motivate cooperation among other actors by providing them with common meanings and identities (Fligstein, 1997). Institutional entrepreneurs possess not only social skills, they must also have an interest in particular institutional arrangements and the ability to leverage resources to create new institutions or transform existing ones (Maguire et al., 2004). As noted by DiMaggio (1988, p. 14), institutional entrepreneurs are central to institutional processes because "new institutions arise when organized actors with sufficient resources (institutional entrepreneurs) see in them an opportunity to realize interests that they value highly." These institutional entrepreneurs lead efforts to identify political opportunities, frame issues and problems, and mobilize constituencies by infusing new beliefs, norms, and values into social structures (Rao et al., 2000; Zilber, 2007).

The concept of institutional entrepreneurship is important because it focuses attention on the manner in which interested actors work to influence their institutional contexts through such strategies as providing technical and market leadership, lobbying for regulatory change, and taking discursive action (Lawrence and Suddaby, 2006). The task of the institutional entrepreneur is to create or promote the construction of an environment that facilitates the achievement of organizational objectives (DiMaggio, 1988; Suchman, 1995). At the same time, they are also "constructing an organization out of a diverse set of legitimated practices" (Powell, 1991).

Previous research studies have identified that several actors can function as institutional entrepreneurs. In an analysis of the development of the Chinese Environmental Protection System, the state was identified as the primary institutional entrepreneur, even though other actors outside the government domain contributed to the process in later stages (Child et al., 2007). Wijen and Ansari (2007) define the concept of collective institutional entrepreneurship as the process of overcoming barriers to collective action and achieving sustained collaboration among numerous dispersed actors to create new institutions.

Regarding voluntary environmental management programs in Mexico, we posit that institutional entrepreneurs are not only those actors that initially designed the program (e.g., the Mexican governmental agency), but also the set of actors that became the first movers and adopted the programs, thus enhancing the institutionalization process. Choosing between the two environmental management programs is not just a move to gain legitimacy as traditional institutional theory predicts. Instead, institutional entrepreneurs choose an environmental management program strategically because doing so enables them to identify the technical or competitive advantages they gain by becoming first movers in the adoption of one or the other of the programs (Tolbert and Zucker, 1983). Therefore, the role of institutional entrepreneurs in Mexico (where two similar institutions try to emerge) is particularly crucial if both programs are to take off and become institutions.

Mechanisms influencing the emergence of institutional entrepreneurs

Institutionalization of new programs is expensive and requires high levels of both interest and resources (DiMaggio, 1988). In a hypothetical regulatory environment where only one voluntary program for environmental management is available, we would expect firms to gain legitimacy by adopting the

program and conforming to its guidelines. However, Suchman (1995) argues that in some circumstances, this "conformity" strategy will not suffice. We posit that one such circumstance is created by the duality of the voluntary programs for environmental management that Mexican industry faces. In order for both programs to succeed and become institutions, innovators must intervene preemptively in the cultural environment to develop bases of support for their distinctive needs (Suchman, 1995). These innovators, or institutional entrepreneurs, will select or attempt to manipulate their voluntary regulatory environments by choosing one (in our case, ISO 14001 or Clean Industry) or both.

The adoption of one of these voluntary regulatory programs is a means for firms to achieve organizational objectives. For example, a Mexican firm engaged in business transactions with the Mexican government (i.e., doing business with any of its governmental agencies) is likely to adopt the Clean Industry program as its means of securing future business transactions with the government, while a multinational firm operating in Mexico and exporting products will probably adopt the international ISO 14001 program. If either of these programs are to succeed to the point where they can become institutionalized, institutional entrepreneurs who move first in adopting these voluntary programs provide subsequent adopters with legitimacy in the Mexican business environment.

Building on the arguments of Eisenstadt (1980), we assert that the emergence of institutional entrepreneurs depends on three mechanisms that impact the ability of such entrepreneurs to restructure the institutional order: (1) the availability of free resources, (2) the development of broad markets, and (3) the ability to envision alternative conceptions of order (Eisenstadt, 1980, p. 850). Figure 1 summarizes our main hypotheses.

Availability of free resources

The first mechanism influencing the ability of institutional entrepreneurs to shape institutional order is "the degree of availability of 'free' resources or activities not entirely embedded in ascriptive units, such as families, communities, and guilds" (Eisenstadt, 1980, p. 850). These free resources serve as the basis for the structuring of new institutional centers, hierarchies, and collectives, which enable institutional entrepreneurs to pursue their interests. Institutional entrepreneurs use their freedom from the obligations owed to ascriptive units to create new cultural meanings, and are likely to do so when they enjoy "autonomous symbolic definitions." That is to say, they have the ability to develop new meanings without the constraints of families, guilds, or other ascriptive units.

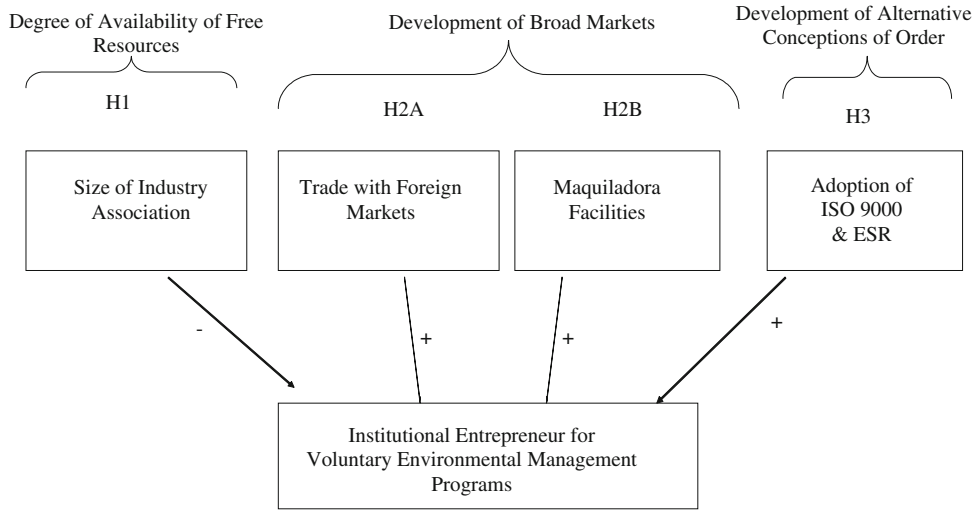

Figure 1. Mechanisms influencing the emergence of institutional entrepreneurs.

Traditionally, Mexican industry has been highly organized into either compulsory associations (industry, trade, and service chambers) or voluntary associations (Schneider, 2002). These associations have played a key role both in negotiating with the government on industry policies and encouraging best practices among their members. The Mexican Chemical Industry Association, for e.g., is forcing its members to adopt a plan for ''Integral Responsibility'' based on the quality standard ISO 9002 (Acutt et al., 2004). We expect that the degree to which firms can avail themselves of available free resources will depend on the characteristics of these associations.

Mexican industry associations can be classified according to two criteria: (1) the availability of these resources to members, and (2) the number of members by industry (Tirado, 2006). Tirado's (2006) definition of resources includes all types of resources – economic, symbolic, social, intellectual, political, and so on. He observes that in the Mexican business environment, the size of the company is a good indicator of resource availability. However, the availability of resources does not address the ''freeness'' of these resources. Considering the second criteria, Mexican industry associations can be divided in two types: ''private club'' industry associations (which have a limited number of members) and the ''auditorium'' industry associations (which have a large number of members) (Tirado, 2006).

Private club industry associations, according to Tirado (2006), are able to serve their members efficiently because they have the conditions and resources to make decisions and protect members. Membership to a private club industry association is limited to an elite group of large companies. These large companies are the movers and shakers of Mexican industry. Through their associations, their voices are heard by the government.

Conversely, auditorium industry associations have a larger number of members. Members of auditorium industry associations are heterogeneous in size; they may include some large companies but they are typically composed of micro-businesses. As a result, auditorium industry associations are more difficult to manage and their members have fewer political, social, and other resources available for institutional innovation.

We expect that those firms belonging to smaller industry associations have more economic, intellectual, and political resources that can be deployed to develop initiatives of institutional entrepreneurship, such as the promotion of voluntary environmental management programs. On the other hand, small firms belonging to large industry associations are more focused on survival issues and have fewer resources at their disposal for activities associated with institutional entrepreneurship. Thus, both the size of the different members, and the size of the industry association itself, will likely have a direct impact on the availability of free resources. Therefore:

Hypothesis 1: Large elite firms belonging to small industry associations, compared to the many smaller firms belonging to larger industry associations, are more likely to have the free resources at their disposal needed to act as institutional entrepreneurs and adopt new programs for environmental management.

Development of broad (international) markets

The second mechanism facilitating the emergence of institutional entrepreneurs involves broad markets, such as foreign markets that cut across ascriptive units (Eisenstadt, 1980). We identify Eisenstadt's ''broad markets'' as international markets. These markets provide greater resources for recombining and adopting the elements necessary for restructuring an institutional order. A firm with international ties, i.e., a firm exporting its products or services, will be exposed to new ways of doing business and thus have a greater propensity to become an institutional entrepreneur and adopt new environmental management standards.

International ties that cut across ascriptive units embedded in a local culture operate in a manner similar to that of the weak ties identified by Granovetter (1973). The strength of ties at the interpersonal level, according to Granovetter (1973), is derived from a combination of the duration, emotional intensity, intimacy, and reciprocal services that characterize the tie. He concludes that weak ties are indispensable to individuals' opportunities and to their integration into several communities. Similarly, we state that firms with international ties cut across the strong ties of local ascriptive units and expose them to new ideas and concepts through their weak ties to business partners, suppliers, and customers in international markets. Specifically, cross-cutting ties

to broad markets enhance the firm's ability to generate new ideas, such as those related to voluntary environmental regulation.

It is essential to remember that 100% of Mexican-owned firms are family firms, so the ascriptive unit of the family, its needs and norms, heavily influence business activity (Shleifer and Vishny, 1997). Even large Mexican-owned multinationals are essentially family firms with control in the hands of family members. Although many of these companies are listed on the New York Stock Exchange, their dual class stock structure means that only preferred shares, rather than common stock with voting rights, are listed. If a Mexican firm establishes ties with countries where voluntary environmental regulation is common, the firm will be exposed to new attitudes and methods of environmental management. These ties (i.e., weak ties) will increase the likelihood that the firm will become an institutional entrepreneur by moving early to adopt voluntary environmental management programs. Therefore:

Hypothesis 2A: Firms that trade (export or import) in foreign markets, compared to firms that operate solely in a domestic market, are more likely to become institutional entrepreneurs and adopt new programs for environmental management.

The Mexican business environment, especially the border region, relies heavily on the *maquiladora* industry. A *maquiladora* is a subsidiary plant of a foreign company that operates with imported raw materials and exports all its production to the country of origin. These facilities are usually exempt from tax obligations in the country where they are located. *Maquiladoras*, according to PROFEPA, tend to comply with Mexican environmental regulations at a higher rate than non-*maquiladoras*. The main reason for this higher rate of compliance is that NAFTA and the environmental concerns of the United States subject them to greater scrutiny and inspections from authorities.

Returning to Granovetter's (1973) weak ties argument, *maquiladoras* may be seen as facilities with a greater number of national and international ties than domestic facilities. These ties are likely to help *maquiladoras* cut across ascriptive units and generate such new ideas as becoming an institutional entrepreneur for voluntary environmental management programs. Moreover, because of the contact with foreign markets resulting from their international activity, *maquiladoras* might also be receptive to adopt new ideas and practices promoted by the international business community, e.g., ISO 14001. Therefore:

Hypothesis 2B: *Maquiladoras,* compared to non-*maquiladoras,* are more likely to become institutional entrepreneurs and adopt new programs for environmental management.

Development of alternative conceptions of order

A third mechanism that helps facilitate the rise of institutional entrepreneurs relates to "the development of alternative conceptions of social, political, or cultural order which differ from the existing one, not only in the sense of the reversal of existing arrangements but also in the possibility of going beyond them" (Eisenstadt, 1980, p. 850). Alternative conceptions of order stimulate innovation and the development of new standards or the application of existing standards in new ways.

In the case of programs for environmental management, we posit that prior experience with other progressive management practices might plant the seeds for an alternative conception of order so that firms become innovators and adopt new programs in different contexts. For instance, in Mexico, some firms have already joined voluntary programs promoting social responsibility and quality management. These programs are now institutionalized in the Mexican business environment.

One of these voluntary programs is the Socially Responsible Enterprise, or *Empresa Socialmente Responsable* (ESR), program. The ESR program is an initiative launched in 1997 by the Mexican Center for Philanthropy (CEMEFI). CEMEFI is a private, non-profit organization that promotes social responsibility initiatives in Mexico. It developed the ESR certification to recognize companies for the development, implementation, evaluation, and improvement of socially responsible practices. By 2004, 61 firms operating in Mexico had received ESR certification.

A second, relevant institution is the international ISO 9000 standard for quality management. By 2004, 3391 facilities operating in Mexico had their

quality management system ISO 9000 certified (ISO, 2007). We expect to find a relationship between firms that adopted institutions such as ISO 9000 and ESR and those that adopt new programs for environmental management such as ISO 14001 and Clean Industry. Successful experience with the process of adopting other innovative programs might enhance a firm's ability to certify under ISO 14001 and Clean Industry. ESR was formed in the 1990s, a time when environmental issues became one of the most mentioned social issues in the management field (Carroll, 1999). Companies with a tradition for socially responsible practices might have a higher likelihood of incorporating the environmental aspects of Corporate Social Responsibility (CSR) into their management practices. Therefore:

Hypothesis 3: Firms that have developed alternative conceptions of order (i.e., adopted similar programs such as ISO 9000 for quality management or ESR for corporate social responsibility), compared to firms that have not subscribed to these programs, are more likely to become institutional entrepreneurs and adopt new programs for environmental management.

Empirical analysis

The sample

In order to test these hypotheses, we created a single database that consists of the 421 Mexican facilities with ISO 14001 certification as of July 2004, and the 1395 Mexican facilities with Clean Industry certification as of the same date. The list of ISO 14001 certified facilities was collected from WorldPreferred database on ISO 14001 certified facilities (WorldPreferred, 2004). The list of Clean Industry certified facilities is publicly available on PROFEPA's website (PROFEPA, 2006). We matched the ISO 14001 database with the Clean Industry certification list of facilities to determine which facilities had adopted both programs. The matching process indicated that 55 facilities had adopted both programs.

We added information provided by the Mexican Enterprise Information System or SIEM (2006), which is compiled by the Mexican Ministry of Economics to promote Mexican commerce. The data include geographic location, sector, scope of market, gross sales, equity, imports and exports, and status as a government supplier. This SIEM database is constantly updated to add new entrants, and to remove plants that have exited the market. The data in SIEM are not time-specific. They do not include, for instance, information on when plants provided their data to SIEM or indicate whether the information has ever been changed (Blackman, 2007).

We obtained this additional information from other databases, including Mexico's *Maquila* Online Directory (SII, 2004), Hoover's Online Database (Hoover's, 2006), and the QSU ISO 9000 Registry (QSU, 2006). We removed companies from our database whose information regarding key variables under study were not available from these sources, or did not meet our time period criterion. At this point in the development of our database, the database contained 664 of the 1816 facilities located in Mexico with either ISO 14001 or Clean Industry certification, or both. Table I summarizes the different variable definitions and their sources.

Next, we developed a control group of facilities with characteristics similar to those of the certified facilities, but that had not certified under either program. We selected a group of facilities from the SIEM database in the same industry sector – 2-digit CMAP codes (Mexican Classification of Production Activities) – and of similar size (number of employees). Our criteria are consistent with other studies. Previous studies, especially those in finance research, use such criteria to select control groups as industry matching only (Ahn and Denis, 2004; Dittmar and Shivdasani, 2003), industry and size (Mikkelson and Parth, 2003), or operational performance (Daley et al., 1997). After matching by industry and size, our final database contained information for 1328 facilities in Mexico, half of which (664) had certified environmental management programs.

Estimated model and dependent variable: multinomial logit

Since our purpose is to determine which mechanisms are motivating firms to behave as institutional entrepreneurs, we differentiated between institutional

TABLE I

Definitions and sources of variables

	Definition	Source
Dependent variable		
Institutional entrepreneur	Categorical variable (= 0: non-adopters), (= 1: late adopters), (= 2 institutional entrepreneurs)[a]	WorldPreferred ISO 14001 database and PROFEPA's Clean Industry Registry
Independent variables		
Industry association	Number of industry association members (log transformed)	Mexican Confederation of Industry Associations
Maquila	Facility is a 'maquiladora'	Mexico's Maquila Online Directory
Exports	Facility exports abroad	Mexican Enterprise Information System (SIEM) database
Imports	Facility imports raw materials/ products	Mexican Enterprise Information System (SIEM) database
ISO 9000	Facility has the quality ISO 9000 standard	QSU ISO 9000 Database
ESR	Company participates in the ESR program (Socially Responsible Enterprise program)	Centro Mexicano para la Filantropía
Control variables		
Government client	Facility sells products/services to the Mexican government	Mexican Enterprise Information System (SIEM) database
Facility size	Number of employees (log transformed)	Mexican Enterprise Information System (SIEM) database
Industry effects	2-Digit CMAP Industry Classification Codes dummies	Mexican Enterprise Information System (SIEM) database

[a]Only results between institutional entrepreneurs (= 2) and Late Adopters (= 1) are reported in the regression results (Table III).

entrepreneurs and followers by using time of adoption. We used a multinomial logistic model that includes a dependent variable representing three types of firms: institutional entrepreneurs (early adopters), followers (late adopters), and non-adopters.

We created the categorical dependent variable ''Institutional Entrepreneur,'' which differentiates among early adopters (institutional entrepreneurs), late adopters (followers), and non-adopters. Since both standards are relatively new (first certifications were awarded during 1996–1997), a good representation of institutional entrepreneurs were those facilities that adopted the standard during the first 3 years. Of the 664 certified facilities, 217 of them, approximately one-third of the adopting facilities, met the ''institutional entrepreneur'' (or ''early adopter'') definition.

In summary, of the 1328 companies in the research database, 217 were classified as institutional entrepreneurs, 447 were followers, and 664 were non-adopters.

In order to assure that our results were valid, we ran additional regression models using a different threshold for institutional entrepreneurs. We more narrowly defined ''institutional entrepreneurs'' as those facilities certified at the first Clean Industry award ceremony in 1997 and during the first 2 years ISO 14001. The results were consistent with our first threshold.

The multinomial logit model was derived from a theory of probabilistic choice in economics (McFadden, 1974). This logistic model enables us to estimate the likelihood that a given firm will adopt a program as an early or late participant. Using one group as the

baseline, multinomial logit manages the non-independence of the three groups by estimating the models for all outcomes simultaneously.

Independent variables

Availability of free resources: In order to account for the degree of available free resources, we generated the variable "Industry Association," which corresponds to the natural log of the number of members in the industry association of each particular facility. This information was obtained from the Mexican Confederation of Industry Associations.

Development of broad markets: The information necessary for testing Hypothesis 2A, which concerns the development of broad markets related to the Export–Import characteristics of a particular firm. We created two variables "Exports" and "Imports," based on information contained in the SIEM database. In order to test Hypothesis 2B, we generated the variable "*Maquila*" by determining whether a particular facility is a "*maquiladora*". This information is available from Mexico's Online *Maquila* Directory.

Development of alternative conceptions of order: Hypothesis 3, which concerns the development of alternative conceptions of order, was tested by creating two variables: "ESR" and "ISO 9000." The "ESR" variable identifies whether the company to which each facility belongs has joined the ESR program. The "ISO 9000" variable identifies whether the company previously adopted the ISO 9000 quality management program. This information was gathered from the Whosregistered.com ISO 9000 Registry.

Control variables

Besides the independent variables, we also incorporated different measures to control for alternative explanations as to why firms might certify their facilities with ISO 14001 or Clean Industry. Important competing hypotheses include being a government client, size effects, and industry effects.

Government client: The variable "Government Client" was created to control for the effect that selling products or services to the Mexican government might have on the decision to adopt a voluntary environmental management program. This information is available from the SIEM database.

Size effects: The variable "Facility Size" was created to control for the size of the facility by using the natural logarithm of number of employees. This information was also collected from the SIEM database.

Industry effects: We control for the different industry sectors to remove the effect that a particular industry might have on adopting an environmental management program. We include industry dummies for 2-digit CMAP codes for eight of the nine industry sectors in our sample that had adopted either of the two environmental management programs: textile manufacturing, paper manufacturing, chemical manufacturing, glass and ceramics-related activities, metal-machinery manufacturing, miscellaneous manufacturing, financial services, and repair-wholesale services. We omitted the dummy variable for food manufacturing, the ninth industry, to avoid over-determination issues.

Table II summarizes the descriptive statistics and correlations for the different explanatory and control variables.

Results

Table III displays the results of the multinomial logistic regression for adopting either of the two environmental management programs. Since our intent is to determine the mechanisms that explain why some firms become institutional entrepreneurs, we report only one of the three regression outputs that the multinomial logit generates: the one that compares institutional entrepreneurs (early adopters) with late adopters, respectively. We do not report regression models that compare institutional entrepreneurs with non-adopters, or late adopters with non-adopters. Models 1, 2, and 3 in Table III only compare institutional entrepreneurs with late adopters.

Hypothesis 1 states that firms with available free resources are more likely to become institutional entrepreneurs. The degree of available resources measure indicates that facilities belonging to smaller industry associations, compared to those belonging to large industry associations, are more likely to become institutional entrepreneurs. The results in Table III show that members of small industry associations, which tend to be large elite firms, probably enjoy more of the free resources essential to innovation. This enables them to become

TABLE II

Descriptive statistics and correlations

	Variable	Mean	Std. dev.	1	2	3	4	5	6	7	8
1	Institutional entrepreneur	0.66	0.75	1							
2	Industry association	4.10	1.02	−0.03	1						
3	Maquila	0.15	0.36	0.13	0.14	1					
4	Exports	0.61	0.48	0.16	0.05	0.30	1				
5	Imports	0.67	0.55	0.15	−0.01	0.24	0.65	1			
6	ISO 9000	0.12	0.32	0.30	0.02	0.09	0.12	0.16	1		
7	ESR	0.01	0.10	0.05	−0.02	−0.02	−0.00	−0.01	0.00	1	
8	Government client	0.18	0.38	0.06	−0.15	−0.12	0.20	0.18	0.04	0.07	1
9	Facility size	4.95	2.04	0.03	0.05	0.25	0.34	0.27	0.06	0.01	−0.04

$n = 1328$; $|\text{coefficients}| > 0.07$ are significant at $p < 0.01$.

TABLE III

Multinomial logit for environmental management programs (ISO 14001 and Clean Industry)

Model	1	2	3
Dependent variable		Late adopters	
Reference group		Institutional entrepreneurs	
Industry association	0.24** (0.09)	0.22** (0.08)	0.22* (0.08)
Maquila	−0.64** (0.23)		
Exports		−0.41* (0.21)	
Imports			−0.43* (0.21)
ISO 9000	0.05 (0.20)	0.06 (0.20)	0.07 (0.20)
ESR	−0.08 (0.22)	0.08 (0.22)	0.07 (0.22)
Government client	−0.09^{+}(0.04)	−0.09^{+} (0.05)	−0.09* (0.04)
Facility size	1.15^{+}(0.64)	1.25^{+} (0.64)	1.26* (0.64)
Textile manufacturing	−0.63 (0.53)	−0.59 (0.53)	−0.50 (0.53)
Paper manufacturing	−0.58** (0.22)	−0.51* (0.22)	−0.47* (0.22)
Chemical manufacturing	−0.14 (0.42)	−0.08 (0.42)	−0.04 (0.42)
Glass/ceramics manufacturing	−0.79^{+} (0.45)	−0.68 (0.45)	−0.69 (0.45)
Metal/Machinery manufacturing	−0.36 (0.32)	−0.38 (0.32)	−0.40 (0.32)
Miscellaneous manufacturing	0.23 (0.59)	0.13 (0.60)	0.13 (0.60)
Financial services	0.93 (0.78)	0.88 (0.78)	0.87 (0.78)
Repair services	−0.59 (0.64)	−0.56 (0.64)	−0.57 (0.64)
Constant	0.41 (0.43)	0.62 (0.43)	0.68 (0.43)
Observations	1328	1328	1328
Log-likelihood	−1220.07	−1220.33	−1222.64
% Correctly classified	62.8	63.9	63.2

Standard errors are in parentheses, $^{+}$significant at 10%, *significant at 5%, **significant at 1%.

institutional entrepreneurs and move first in the adoption of new programs, ahead of those without free resources ($p < 0.01$ in Models 1 and 2 and $p < 0.05$ in Model 3). These results support Hypothesis 1.

Hypotheses 2A and 2B state that those firms that have developed broad markets have a higher propensity to become institutional entrepreneurs. Since these firms might have experience in other markets, they might be more proactive in adopting new

programs in their Mexican operations. The results in Table III indicate that *Maquiladoras* are more likely to be institutional entrepreneurs than non-Maquiladoras ($p < 0.01$ in Model 1), supporting Hypothesis 2A.

Hypothesis 2B is also supported. Facilities that export and import – thus having broad markets for their products and services – are more likely to become institutional entrepreneurs.

Hypothesis 3, which relates to the development of alternative conceptions of order, is not supported by our results. The results in Table III do not indicate that adoption of standards for corporate social responsibility (SRE) or quality management (ISO 9000) are factors determining whether firms become institutional entrepreneurs.

No significant results are found regarding the three control variables (government client, facility size, and industry) except for the control variable for facility size (logarithm of number of employees) in Models 1 through 3 and two of the industry dummies. Previous research on the early adoption of ISO 14001 in the United States found facility size to be one of the main explanatory variables (King and Lenox, 2001). In the case of Mexican facilities, we find similar results, although the significance is only at the 10% level. In terms of industry differences, facilities in the paper manufacturing industry were more likely to be institutional entrepreneurs than food manufacturing industries, the reference group.

In summary, we find support for two of the three mechanisms identified by Eisenstadt (1980) as generators of institutional entrepreneurs. Mexican facilities that first adopted ISO 14001 or Clean Industry voluntary environmental management programs had broad markets and access to more free resources. Facilities with these two characteristics are more likely to play an active role in the institutionalization of new voluntary certified environmental management programs than facilities without these characteristics.

Discussion and conclusion

This study provides insight on how new voluntary environmental management programs became institutionalized within the Mexican business context. Given the very serious environmental problems in Mexico, the need for corporate environmental management is vital. Most quantitative analyses on the adoption of voluntary environmental management programs analyze firms in developed economies. Moreover, these studies only analyze adoption patterns and do not explore differences between early and late adopters.

This study is novel because it aims to understand differences between early adopters and late adopters. We posited that in emerging economies such as Mexico, early adopters play a critical role in the diffusion of these programs by behaving as institutional entrepreneurs. Their role helps the initial penetration, and subsequent diffusion, of programs that will improve firm environmental performance.

The pro-action of institutional entrepreneurs becomes especially relevant to catalyze the adoption of voluntary environmental management programs in regions where government agencies might lack the resources to implement or enforce an effective environmental management policy. These programs help firms establish their own environmental management systems and self-monitor their compliance with applicable regulations. Henceforth, understanding how these programs start to diffuse in regions with a regulatory enforcement deficit is essential.

The study contributes to institutional theory by developing theory related to the emergence of institutional entrepreneurs for environmental management in Mexico. Using a model of institutional entrepreneurship as a basis, this is the first study to analyze the establishment of similar institutions for environmental management within a Mexican context.

Institutional mechanisms that identify first movers as institutional entrepreneurs help to explain the emergence of two similar programs for environmental management in a particular business environment. We found partial support for Eisenstadt's theory regarding the mechanisms that facilitate the emergence of institutional entrepreneurs. The results indicate that the availability of free resources and the development of broad markets are vital to the emergence of institutional entrepreneurs.

This study represents a new benchmark for secondary data analysis in emerging market countries. Research of firm-level phenomena has historically been extremely difficult. The lack of secondary data sources made primary data collection, either through case studies or surveys, essential. However, the evolution of the Internet has made it possible to construct

sophisticated data sets based entirely on secondary sources at the firm level for these countries.

Once environmental performance information is made publicly available by the Mexican environmental agency, researchers should analyze the differences in environmental performance between facilities that have not yet adopted any of the standards and facilities that have adopted ISO 14001, Clean Industry, or both.

The Mexican environmental agency made it mandatory that companies report their 2004 releases and emissions by July 2005 through the *Registro de Emisiones y Transferencia de Contaminantes* (RETC) (an equivalent to the U. S. Toxic Releases Inventory). A preliminary 2004 environmental performance report was released in August 2006. The RETC database did not become available to the public until 2008. A user-friendly full version of RETC is anticipated in 2009. Researchers should analyze not only the environmental performance differences between institutional entrepreneurs and the rest of adopting facilities, but also the differences between adopting and non-adopting facilities.

This study has several limitations. Business in Mexico is not entirely representative of business globally. In addition, the specific measures of variables, such as ISO 9000 and ESR as indicators of alternative conceptions of order, are not the only indicators for operationalizing their respective concepts. Further research should be conducted using other possible measures before discarding the possibility that alternative conceptions of order might play a role in the emergence of institutional entrepreneurs.

This study opens up a number of avenues for future research.

First, although some of the mechanisms that facilitate institutional entrepreneurship have been identified, other factors and institutions may also be relevant. Further empirical study is needed to uncover the factors leading to institutional entrepreneurship for other kinds of institutions.

Second, theoretical study involving the development of a model of institutional entrepreneurship needs to advance. We relied on institutional theory. The entrepreneurship and innovation literatures could also be helpful in understanding the conditions, resources, and capabilities that foster the emergence of institutional entrepreneurs.

Third, qualitative research is also necessary. The use of secondary data sources fails to examine the processes by which institutional entrepreneurs exercise influence. The mechanisms and strategies identified by Fligstein (1997) are suggestive, but they need to be subjected to empirical verification. Interviews with organizational actors engaged in making decisions about the creation or adoption of specific programs would be particularly insightful for theory building.

Finally, additional research is needed to evaluate the competitive and environmental impacts of institutional entrepreneurship.

Our results have interesting implications for managers. This study helps them understand under what circumstances they might undertake activities related to institutional entrepreneurship in terms of moving first to adopt voluntary schemes of environmental regulation. Specifically, the availability of free resources and participation in broad markets are vital to the emergence of institutional entrepreneurs.

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