Policy Sci (2007) 40:265–285
DOI 10.1007/s11077-007-9045-8

Export processing zones and corporate environmental performance in emerging economies: The case of the oil, gas, and chemical sectors of Trinidad and Tobago

Kalim U. Shah · Jorge E. Rivera

Published online: 25 October 2007

Abstract Export processing zones (EPZs) are increasingly being established to promote economic growth in developing countries. However, they remain controversial and are often criticized for being associated with a "race to the bottom" characterized by the easing of labor and environmental standards. This paper investigates whether the decision to locate facilities inside these zones is associated with higher corporate environmental performance. Findings indicate that facilities operating in Trinidad and Tobago's EPZs are more likely to show higher corporate environmental performance than those outside. Additionally, firms in state-managed zones appear to show higher corporate environmental performance than those located in privately managed zones. Enhanced institutional pressures from regulators, local communities, and fellow tenant firms may explain these differences. These results suggest that environmental policy makers and environmentalists can take advantage of already established EPZs to promote enclave enhanced institutional pressures associated with superior corporate environmental performance.

Keywords Export processing zones · Corporate environmental performance · Developing countries · Institutional theory · Race to the bottom

The creation of export processing zones (EPZs), that offer improved infrastructure and/or tax incentives to investors, has become a popular instrument of economic development policy seeking to promote increased industrialization and trade (ILO 2003; Jayanthakumaran 2003). Yet, as globalization increases the competition to attract foreign investment, critics suggest that countries are forced to engage in a "race to the bottom"

K. U. Shah
Department of Environmental Science and Policy, George Mason University, David King Hall, Fairfax, VA 22030, USA
e-mail: kshah2@gmu.edu

J. E. Rivera (✉)
Department of Strategic Management and Public Policy, The George Washington University, Funger Hall 615, 2201 G Street, NW Washington, DC 20052, USA
e-mail: jrivera@gwu.edu

that turns EPZs into "sweat-shop islands" where local environmental and labor regulations are relaxed or ignored (Jauch 2002; ILO 2003). The extant scholarly literature has extensively examined labor conditions in EPZ firms but has paid less attention to their environmental protection practices (Cling et al. 2005).

This study aims to help fill this gap in the literature by examining the corporate environmental performance of oil, gas, and chemical firms located in Trinidad and Tobago, a rapidly industrializing developing country. In particular, we are interested in determining whether facilities operating inside EPZs are correlated with higher corporate environmental performance than those outside. We also seek to explore whether public or private EPZ management is associated with higher corporate environmental performance. The rest of the manuscript is organized as follows: First, we discuss EPZs as instruments of economic development policies. Second, we describe Trinidad and Tobago's context and EPZ development. Third, we examine different perspectives on the relationship between EPZs and environmental protection. Fourth, we describe the methodology and report the results. Finally, in the last two sections of the paper we discuss findings and conclusions.

Export processing zones and economic development policy

Estimates by the International Labor Organization (ILO) suggest that the number of EPZs has expanded significantly from about 79 located in 25 countries in 1975 to 5,174 hosted in more 110 countries in 2003 (ILO 2007). More than 50% of the EPZs are located in Mexico and Central America. Yet, EPZs in Asia have significantly more employees. The World EPZ Association listed high income/developed countries as having 33% of the world's EPZs, middle income/emerging economies as having 44% of the world's EPZs and low income/underdeveloped countries as having 23% of the world's EPZs in 2000 (Haywood 2000). Worldwide, about 43 million people were employed by EPZs in 2002 of which approximately 30 million were in China, 7 million in the rest of Asia, and 2 million in Central America and Mexico (ILO 2003, 2007).

In general, EPZs are described as *"geographically or juridically bounded areas in which [different levels of] free trade, including duty-free import of intermediate goods, is permitted provided that all [or most] goods produced within the zone are exported"* (Johansson and Nilsson 1997). Depending on the country, they are also called special economic zones, industrial free trade zones, zone franche, maquiladoras, free ports, and industrial districts among other names, but they all fit the general description of EPZs noted above (Jayanthakumaran 2003; Sargent and Matthews 2001; ILO 2003).

Firms investing in EPZs receive important subsidies by host governments in the form of income and sales tax-exemptions, duty-free imports and exports, free repatriation of profits, provision of enhanced infrastructure and public services, and in many cases exemptions from local labor and other social protection regulations (Cling et al. 2005; ILO 2003; Jayanthakumaran 2003; Sargent and Matthews 2001). Of course, specific levels of tax benefits, free-trade, and the proportion of exports required vary across countries (Jayanthakumaran 2003).

These subsidies, incentives, and exemptions have made EPZs a controversial development policy instrument because it is not clear whether countries receive net benefits from their promotion (Jauch 2002; Cling et al. 2005; ILO 2003). Proponents of the "race to the bottom" thesis posit that to remain internationally competitive to attract foreign investors, poor countries are forced to continuously relax the stringency of their social and

environmental protection regulations both inside and outside EPZs (Esty 1996; Porter 1999; Wheeler 2001). Thus, according to this perspective, multinational firms scour the globe demanding to exercise the very lowest environmental and social protection standards (Hawken 1993; Korten 1995).

Some empirical studies suggest that EPZs have attracted foreign investment, increased export earnings, and generated jobs (Johansson and Nilsson 1997; Sargent and Matthews 2001). Yet, other more recent empirical studies also find that firms inside EPZs predominantly offer low-skilled jobs with wages that are not significantly different from the salaries paid at equivalent firms outside EPZs (Cling et al. 2005; ILO 2003; Jayanthakumaran 2003). Additionally, critics point out that because of weak/absent enforcement of labor regulations, harsher working conditions are predominant at EPZs; with lower job security, longer working hours, intense demands for higher productivity, and stronger opposition to unions (ILO 2003; Jauch 2002; Cling et al. 2005).

Remarkably, despite the increasing interest in examining EPZs' contribution to the well-being of developing countries, scholars have paid relatively little attention to the environmental protection practices of firms located inside EPZs (Chen 2006; O'Rourke 2004, Garcia-Johnson 2000). While some case study information exists regarding the corporate environmental performance of firms operating in EPZs, very little cross-sectional empirical work has examined this issue (Chen 2006; Geng and Cote 2003; Cabral and Dahab 1998; Subrahmanya 2005). This lack of cross-sectional empirical evidence poses a fundamental gap for any overall estimation of the adequacy of EPZs as a development policy instrument.

Trinidad and Tobago

Trinidad and Tobago is an independent unitary island state in the southern Caribbean. It is rich in oil and gas resources and is one of five countries in the Latin American region (the others are Mexico, Venezuela, Columbia and Ecuador) where hydrocarbon production is the main economic activity (Inter American Development Bank 1998). Trinidad and Tobago's main trading partners are the United States (US), Canada, the United Kingdom (UK), Brazil, Germany and the rest of the Caribbean. US investments in energy related projects in 2002 were nearly $1.5 billion (World Bank 2003).

The islands maintain approximately 47% of intact forests but this is changing at a rapid rate with industrial expansion and urban sprawl (Environmental Management Authority 2004). Unlike the majority of Caribbean countries where tourism is the foremost industry, because of the significant development of oil and natural gas reserves in Trinidad and the relatively cheap cost of energy, the country has become a major regional center for manufacturing, industrial processing, finance and investment. The low energy costs have been a decisive comparative advantage which has attracted significant foreign direct investment in petrochemicals, agro chemicals and fertilizers, iron and steel and downstream manufacturing. The main environmental challenges include freshwater and marine pollution, watershed degradation, air pollution from factory stacks and manufacturing particulates and waste disposal including solid and hazardous wastes from industry. The economic sectors identified as main sources of pollution are manufacturing related to the processing of raw materials, intermediate and final products from various commodities including ammonia, methanol, chlorine, urea, paint, petroleum hydrocarbons, glass, clay, asphalt, cement, iron and steel (Environmental Management Authority 2000).

The Environmental Management Authority (EMA) is the main regulator gaining its authority through the *Environmental Management Act of 1995*. The EMA is charged with the ultimate responsibility for formulating environmental policy, standards and regulations, approving environmental permits, conducting environmental monitoring and reporting and penalizing environmental culprits for violations and non-compliance. The EMA also serves as the Government's main advisor on environmental matters. At a broad level, other responsible agencies include the Ministry of Environment, the Factories Inspectorate and statutory authorities like the Bureau of Standards. In 2000, an Environmental Commission was appointed as a special court of law for adjudication on environmental matters.

As in many other developing countries, these environmental regulations suffer from poor implementation and enforcement because of the lack of sufficient resources at the EMA, lack of research, uncoordinated agency efforts, corruption, and/or lack of political will by government officials (Ramlogan and Persadie 2004). Simultaneously however, Trinidad and Tobago has seen tremendous growth in public environmental awareness, attributable to increased media attention to environmental issues, increased NGO activity, and enhanced environmental education programs (Ramlogan and Persadie 2004).

Major industrial sectors—Oil and gas, chemicals

In Trinidad and Tobago, the oil and gas sector includes those firms involved in upstream oil and gas production as well as exploration and downstream processing and manufacturing. The chemical sector includes those firms whose production is dependent on large inputs of cheap energy from oil and gas feedstock. These sectors have been identified as the most environmentally problematic in the country, but at the same time are considered the most important contributors to the economy accounting for 50% of the GDP (Environmental Management Authority 2000; Solid Waste Management Company of Trinidad and Tobago 2000; Central Bank of Trinidad and Tobago 1999). There is now increased emphasis on natural gas production and downstream petrochemical and processing investments. Natural gas feedstock has made Trinidad and Tobago a leading world producer of chemicals such as methanol, ammonia, fertilizers and liquefied natural gas.[1]

These sectors are largely concentrated with most production volume coming from multinational and state owned firms. Small and medium enterprises dominate downstream production and manufacturing. Multinationals from the US, Canada, the UK, Germany and Australia as well as firms headquartered in South America, East Asia, and other European countries all operate in Trinidad and Tobago. Government policy now focuses intensely on developing downstream industry and encouraging local business to play a more active role. Oil production is predicted to decline over the next 30 years, but natural gas reserves (the 6th largest in the Western hemisphere) are only just beginning to be exploited (Torres 1999).

Export Processing Zones (EPZs) development in Trinidad and Tobago

In Trinidad and Tobago EPZs have historically been referred to as industrial parks, but in this paper we use the term export processing zones (EPZs) given its widespread use in the

[1] In 2006 the US imported 16% of its natural gas, 73% of which was imported from Trinidad and Tobago (Ministry of Energy of Trinidad and Tobago 2007).

scholarly literature (Jayanthakumaran 2003). The first planned state run EPZs were developed in the 1970s in attempts to develop a local downstream oil industry. It was envisioned that entrepreneurs and investors would take the opportunities to move into manufacturing and processing of plastics and other chemicals building on the low costs of energy and petroleum. With a slowing of oil production in the early 1980's EPZ development in Trinidad and Tobago, both by the state and private developers, diminished. In the early 1990s with renewed fervor in the global oil markets, discovery of new oil and gas deposits in the country, and increased foreign investment there was a resurgence of industrial activity and increasing need for EPZs to accommodate new foreign and local operators.

Today there are 43 EPZs in Trinidad and Tobago, 18 managed by the state and the other 25 managed by the private sector (Evolving Technologies and Industrial Development Company Limited 2006). The majority of EPZs are small in scale ranging from a few firms to as many as fifty. Three large state run EPZs are devoted mainly to oil and gas sector firms. State EPZs are managed by two authorities: the Evolving Technologies and Industrial Development Company Limited which is in charge of the majority of EPZs and tasked to develop the small and medium enterprises and manufacturing sectors, and the National Energy Corporation responsible for managing the development of oil and gas firms and related EPZs.

No beyond compliance environmental protection practices are required from firms in any EPZs (Trinidad and Tobago Town and Country Planning Act 1981). Yet, state-managed EPZs' contracts require firms to allow entry to regulators and include notice that violations of environmental laws will be met with penalties including non-renewal of leasing rights and legal action. Privately managed EPZs' landlord-tenant contracts do not explicitly set these conditions but require tenants to adhere to all environmental regulations including planning and town and country permissions (Trinidad and Tobago Town and Country Planning Act 1981).

Export processing zones and environmental protection

Some researchers suggest that when EPZs adopt environmental management principles of eco-efficiency and industrial ecology, firms inside EPZs may actually produce less negative environmental effects than equivalent firms operating outside (Morioka et al. 2003; Goldman 2006). The proximity of firms inside EPZs can facilitate the application of these principles through information sharing, and provision of coordinated and centralized pollution prevention and management services and expertise (Kim and Gallent 1997; Yamawaki 2002; Wood 1990; Tinsley 2002).

Eco-efficiency is the more efficient use of materials and energy in order to reduce economic costs and environmental impacts (Hart 1995). It is achieved by using new technology, using fewer inputs per unit of product such as energy and water, recycling more and reducing toxic emissions (Hart 1995). Industrial ecology is the shifting of industrial process from open loop systems, in which resource and capital investments move through the system to become waste, to a closed loop system where wastes become inputs for new processes (Hart 1995).

Critics, on the other hand, suggest that EPZs can lead to heightened negative environmental impacts associated with the deliberate concentration of factories and facilities in one designated area (Gregory and Kunreuther 1990; Xumei 2002; ILO 2003; Jauch 2002; Cling et al. 2005). With the high concentration of facilities, environmental impacts can be

intense and accumulative. Depending on the types of facilities, environmental problems may include air and water pollution, accumulation of solid/hazardous wastes, noise/radiation, soil contamination, and chemical and fuel spills among others (Sikdar et al. 2002). So while incorporation of eco-efficiency and industrial ecology principles is widely considered a pragmatic approach to EPZ development, improved pollution prevention efficiency per unit of output does not necessarily lead to overall lower pollution levels, particularly in the case of large increases of total annual production typical of EPZs in developing countries. There may also be environmental problems not associated with particular industrial tenants but rather with the existence of the EPZ estate itself. These problems can include habitat and biodiversity loss, depletion of water resources, and landscape disturbances. The growth of industrial estates is also frequently accompanied by unplanned population migrations that can cause public health problems, additional environmental stress, and social dislocation.

Institutional theory and environmental performance in EPZs

We believe that sociology's neo-institutional theory can provide important insights into the relationship between corporate environmental performance and location in EPZs because of the different institutional pressures experienced by firms located inside these zones. Neo-institutional theory addresses why organizations behave homogenously, often adopting very similar structures, strategies and processes. It highlights the fact that not everything that happens in an organization is necessarily driven by conscious self-interest maximization motives (Powell and DiMaggio 1991; Granovetter 1985; Meyer and Rowan 1977; Scott 1995). This perspective proposes that firms' choices/practices may be the result of social construction processes in which taken-for-granted external norms, values, and traditions influence the creation and implementation of legitimate strategies (Powell and DiMaggio 1991). Organizations are therefore legitimacy-seeking and susceptible to social influence (Meyer and Rowan 1977; Scott 1995; Suchman 1995). Legitimate businesses are those whose actions are seen as, or presumed to be, "desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman 1995: 574). Conformity to social expectations contributes to organizational success and survival and it is often rewarded by increased resources and firm survival (DiMaggio and Powell 1983, Oliver 1991; Suchman 1995). Organizational structures and strategies become institutionalized over time when activities tend to be enduring, socially accepted, resistant to change and not directly reliant on rewards or monitoring for their persistence (Oliver 1991).

Sociology's neo-institutional scholars have particularly focused on explaining the external context pressures—isomorphic pressures—that motivate organizations to adopt similar strategies and structures (Powell and DiMaggio 1991; Granovetter 1985; Meyer and Rowan 1977). DiMaggio and Powell (1983) proposed a seminal typology of three isomorphic pressures or forces—coercive, normative, and mimetic—that emphasize the roles of the nation-state, professions, and social expectations in shaping institutionalized forms and strategies. Coercive pressures, typically exerted by governments, command companies to follow specific practices by relying on legal sanctions or threats (DiMaggio and Powell 1983). To these kinds of isomorphic pressures belong legal regulations, standards and legal requirements.

Normative pressures arise from values and norms of conduct promoted by professional networks, industry associations, community groups, and academic institutions. Normative

pressures usually exert influence on organizations by relying on peer pressures and embarrassment of non-compliers (Hoffman 1997). Professional and trade associations are a vehicle for the definition and promulgation of normative rules about firm behavior. Such mechanisms create a pool of almost interchangeable individuals who occupy similar positions across a range of companies and possess a similarity of orientation and disposition that can override variations in tradition and control that otherwise shape organizational behavior (Hoffman 1997).

Mimetic pressures are demands that firms face to appear legitimate and competitive by imitating the behavior of other companies in their industry (DiMaggio and Powell 1983; Scott 1995). This mimetic tendency is derived from uncertainty and ambiguity in the external environment such as when market and regulatory trends are scantily understood. In such cases firms tend to copy the strategies and structure of competitors that are perceived to be more legitimate and profitable (Suchman 1995).

In Trinidad and Tobago, as in other developing countries, coercive institutional pressures to comply with environmental regulations can be considered weak since facility oversight is not regularly performed by environmental authorities (O'Rourke 2004; Ramlogan and Persadie 2004; Rivera 2004). This may be because environmental agencies traditionally suffer from an endemic lack of political, technical, administrative, and financial resources. Yet, regulatory pressures may be higher in specific locations such as EPZs because, given their limited local resources, regulators seek to focus their attention on areas with the greatest concentration of industrial activity (Blackman et al. 2006; Rivera 2004).

Additionally, given their higher visibility and presumed larger resources, EPZ facilities may confront enhanced environmental protection expectations and scrutiny from local communities and environmental groups that attract more attention from the media and monitoring from government agencies (Hoffman 1997; Pargal and Mani 2000). Increased normative and mimetic pressures to show higher environmental performance may also emanate from neighboring firms since a single company with poor environmental protection practices can tarnish the green reputation of an entire EPZ (King and Lenox 2000; Delmas and Keller 2005). Thus, we suggest that firms located inside EPZs may show higher environmental performance than firms located outside. The previous arguments suggest the following hypothesis:

Hypothesis 1 Firms located in EPZs are more likely to have higher corporate environmental performance ratings than those located outside.

The institutional pressures described above may be more intense in state-managed EPZs than in privately-managed zones. State-managed EPZs tend to be larger than private EPZs and thus attract more attention from different external groups (ILO 2003). Environmental protection oversight by government agencies may also be easier in EPZs established and owned by the government. Even in the absence of actual government monitoring and penalties, the perception of easier access for environmental inspectors has been shown to be associated with improved corporate environmental management practices (Khanna and Damon 1999; Cashore and Vertinsky 2000). Additionally, in state-managed EPZs, governments tend to be more involved in the promotion of cluster industries and public-private collaboration that may facilitate the diffusion of proactive environmental practices (ILO 2003).

Institutional pressures may also emanate from neighboring and competitor firms within EPZs. Dirtier firms may feel normative pressures to improve their environmental protection practices from fellow industrial tenants since their own green image is affected by

neighboring firms with poor environmental performance (Hoffman 1997; King and Lenox 2000; Arora and Cason 1995). Such pressures may be more intense in state-managed EPZs than in privately managed zones. State EPZs tend to emphasize the promotion of cluster industries that synergistically feed off each other and also take a more active role in promoting interfirm collaborations on issues like environmental management. On the other hand, privately-managed EPZs are more likely to focus on real estate development, rent collection, and service provision and less likely to be concerned about economic development, promoting synergistic interfirm relationships or monitoring the environmental activities of their tenants. The previous arguments suggest the following hypothesis:

Hypothesis 2 Firms located in state EPZs are more likely to have higher corporate environmental performance ratings than those located in private EPZs.

Research methodology

Sample selection

The population of interest in the study included firms in the chemical and oil-and-gas industries according to the Central Statistical Office of Trinidad and Tobago (2004). The chemical industry includes paints and varnishes, pharmaceuticals, soaps and detergents, adhesives and waxes, industrial gases, pigments and inks, pesticides, cement, glass and glass products, plastic products, clay products, asbestos products, and plastic packaging. Oil and gas industries includes oil and natural gas exploration and production, refineries, bulk raw material manufacturers, industrial waste treatment facilities, structural fabricators, transportation of oil and gas, petrochemicals including downstream manufacturers, natural asphalt, and asphalt products (Central Statistical Office of Trinidad and Tobago 2004)

A comprehensive list of the population of firms in these sectors was compiled using the latest Business Establishment survey published in Trinidad and Tobago's Central Statistical Office Digest (2003). There were 539 oil and gas firms and 195 chemical firms listed, giving a total of 734 companies of initial interest. Firms with less than 10 employees and those not directly involved in actual manufacturing operations and processing were omitted. A sample frame of 290 firms was selected comprising 192 oil and gas industry firms and 98 chemicals industry firms.

The representativeness of the respondent group was verified by *t*-tests conducted between respondent and non-respondent firms along known dimensions such as age and size. No significant difference was found in the mean age or size of firms (*t*-probability < 0.001). Potential survey respondents' self-selection bias was also tested by comparing the corporate environmental performance ratings of early survey responders to late survey responders (as a proxy for non responders). Late responders were those responding to the survey after the third and final call back request (Christmann 2000). Results of *t*-tests indicated no significant difference in environmental performance ($p < 0.001$).

Data collection

Two questionnaires were developed to collect data following Dillman's Total Design Methods to maximize response rates (Dillman 1978). The survey was implemented

through face-to-face interviews between August and December 2005. One questionnaire was administered to top managers to obtain information about firms' basic characteristics (e.g., size, location, industry association membership, etc). Another questionnaire was administered to external stakeholders to assess firms' environmental performance (see explanation of how these stakeholders were selected in the description of the dependent variable measure that follows).

Statistical analysis techniques

Two ordinary least squares regression models were estimated to account for whether environmental performance was (1) related to firm location inside or outside of EPZs and (2) related to firm location in private or state owned EPZs. The generalized form of the regressions was as follows:

$$Y = \alpha + \beta X + \gamma Z + e$$

where Y = Corporate environmental performance rating; X = Independent variables (EPZ location, EPZ ownership); Z = Control variables (Size, industry sector, industry association membership, export orientation, foreign joint venture, state joint venture, urban community); e = error term.

The selection of control variables was based on the most prevalent causal variables included in previous studies of corporate environmental performance (Christmann 2004; Russo and Harrison 2005).

Dependent variable measure

The environmental performance of each firm was determined using external stakeholder ratings. We used a scale originally developed by Banerjee (2002) to measure corporate environmentalism.[2]Banerjee's scale assesses four areas of environmental performance: (1) internal environmental orientation, (2) external environmental orientation, (3) corporate strategic focus and (4) functional strategic focus. A total of 16 items across these four areas comprise the environmental performance rating (see Table 1). Each item uses a seven point Likert type scale where one equals "strongly disagree" and seven equals "strongly agree." Perceptual scale measures such as these are considered appropriate in situations where chemical/physical indicator measures, for example levels of emissions and pollutant, are either nonexistent or inaccessible (Sharma and Vredenburg 1998; Christmann 2000). This is a common predicament in most developing countries (Rivera and de Leon 2005).

Three stakeholders—one from each of the following sectors: (1) local community, (2) government, and (3) its supply chain-rated the environmental performance of each firm. To identify these stakeholders, each firm in the sample was asked to name organizations or

[2] Banerjee's scale was constructed to measure corporate environmentalism levels of Canadian oil and gas sector firms and was administered to firm managers (Banerjee 2002). As such, to administer it to external stakeholders, simple wording changes were necessary. For example item two of our scale says "*Firm has a clear policy statement urging environmental awareness in every area." whereas Banerjee's* scale item said "*Your firm has a clear policy statement urging environmental awareness in every area."*

Table 1 Corporate environmental performance rating scale*

Question items	Factor loading
Environmental orientation: Internal	
1. The firm makes a concerted effort to make every employee understand the importance of environmental preservation.	0.35
2. The firm has a clear policy statement urging environmental awareness in every area.	0.82
3. Environmental preservation is a high priority activity in the firm.	0.84
4. Preserving the environment is a central corporate value in the firm.	0.79
Environmental orientation: External	
5. The financial well being of the firm does not depend on the state of the natural environment.	0.75
6. The firm has a responsibility to preserve the environment.	0.79
7. Environmental preservation is vital to the firm's survival.	0.76
8. The firm's responsibility to its customers, stockholders, and employees is more important than its responsibility towards environmental preservation.	0.72
Environmental strategic focus: Corporate	
9. The firm has integrated environmental issues into its strategic planning process.	0.85
10. In the firm, "quality" includes reducing the environmental impact.	0.83
11. The firm links environmental objectives with other corporate goals.	0.81
12. The firm is engaged in developing products and processes that minimize environmental impact.	0.82
Environmental strategic focus: Functional	
13. Environmental issues are always considered when new products are developed or new services offered.	0.83
14. The firm emphasizes the environmental aspects of its products and services in advertising.	0.85
15. The firm's marketing strategies for products and services have been influenced by environmental concerns.	0.87
16. In the firm, product-market decisions are always influenced by environmental concerns.	0.79
Crombach's alpha: 0.94	

* Adapted from Banerjee (2002). Each item uses a 7 point Likert type scale where 1 equals "strongly disagree" and 7 equals "strongly agree"

groups that can affect or are affected by the firm's environmental management practices (see Table 2). The overall percentage environmental performance for each firm is obtained by calculating the average for the stakeholder ratings from the Banerjee scale. To estimate each stakeholder rating, the Likert scores for all 16 items included in the scale are tallied up, then they are divided by the maximum possible score and multiplied by 100 to yield a percentage rating.

Scale validity was determined using factor analysis with varimax rotation which confirmed the uni-dimensionality of the scale (see Table 1). A Cronbach's alpha equal to 0.94 also indicated good internal reliability for the scale.

Table 2 Firms' stakeholders interviewed*

Community and civil society stakeholder group

Arts for Education (3)
Asa Wright Nature Center (5)
Brasso Seco Residents Association
Caribbean Conservation Association (4)
Caribbean Natural Resources Institute (5)
Caribbean Forest Conservation Association (8)
Caribbean News Media (5)
Caroni Bird Sanctuary (4)
Center for Environment and Resource Studies (5)
Central Environmental Youth Group (1)
Citizens for the Environment (4)
Couva Business Association (1)
Couva Village Council (1)
Debe Residents Association (2)
Association of Professional Engineers (7)
Environment Tobago (1)
Fishermen and Friends of the Sea (10)
Friends for Conservation (1)
La Brea Residents Action Group (1)
Lange Park Residents Association (1)
Mayaro Environmental Watch Group (2)
Nariva Swamp Action Group (1)
Natureseekers (4)
Orchard Gardens Residents Association (2)
Point Lisas Community Center (3)
Pointe-a-Pierre Environmental Movement (2)
Port-of-Spain Businessman's Association (1)
Princes Town Residents Association (1)
San Raphael Village Council (2)
Sea Scouts Association (1)
South Point Environmental Group (6)
Southern Farmers Cooperative (1)
Sugar Cane Farmers Association (1)
Talparo Village Residents Association (1)
Tamana Residents Association (1)
The Cropper Foundation (7)
Teachers for Environmental Awareness (1)
Trinidad and Tobago Agricultural Society (6)
Tropical Re-Leaf Foundation (1)
Trust for Sustainable Livelihoods (6)
University of the West Indies Biological Society (8)
Wildlife Trust (3)
Youth in Action (2)

Supply chain stakeholders group

BP Trinidad and Tobago (3)
Caribbean Industrial Research Institute (7)
Caribbean Safety Products (5)
Caribbean Steel Mills (6)
Clico Insurance Limited (3)
Eco Engineering (7)
Engineering Institute of Trinidad and Tobago (4)
EnviroCare Limited (5)
Environment First Consultants (4)
EPAS Consultants (6)
Exxon Mobil Inter Americas (2)
First Citizens Bank (2)
General Earthmovers Limited (4)
Green Engineering Ltd. (4)
Hess Petroleum (1)
Institute of Marine Affairs (4)
Labor and Waterfront Workers Trade Union (3)
National Oil Workers Trade Union (4)
National Petroleum Marketing Company (4)
Neal and Massy Energy Services (2)
Oil Mop Services (3)
Petroleum Company of Trinidad and Tobago (4)
Phoenix Park Group (3)
Plipdeco (4)
Port Authority (3)
Sagicor Insurance Limited (2)
Sasha Cosmetics (6)
Sol Petroleum (1)
Solid Waste Management Company (3)
Trinidad and Tobago Electricity Commission (3)
Trinidad and Tobago Petroleum Limited (3)
Trinidad Bulk Distributors (4)
Tropecol Limited (4)
Tropical Shipping (1)
Unit Trust Corporation of Trinidad and Tobago (3)
University of the West Indies, Faculty of Engineering (2)
University of Trinidad and Tobago (3)
Valero Oil (1)

Table 2 continued

Government stakeholders group	
Environmental Management Authority	Chaguanas Borough Council (2)
Pollution Prevention and Control Department (16)	Health Inspectorate – North (5)
Strategic Environmental Assessment Department (6)	Ministry of Labor
Complaints and Investigations Department (14)	Office of Health and Safety (6)
Ministry of Energy and Energy Industries	Factories Inspectorate (10)
Business Development Division (7)	City of Port-of-Spain (4)
Environmental Division (14)	Industrial Development Corporation (2)
Refining Division (3)	Small Business Development Company (5)
Trinidad and Tobago Bureau of Standards (11)	National Insurance Board (1)
Chemicals Inspectorate (4)	Ministry of Agriculture and Marine Affairs (9)
City of San Fernando Public Health Office (5)	Ministry of Works and Transport (8)

* Values in parentheses indicate the number of interviews done with each stakeholder

Independent variable measures

EPZ location

Coded as a dummy variable equal to one if the firm facilities were located inside of an EPZ and zero otherwise. State *EPZ:* Coded as a dichotomous variable equal to one if the firm was located in a state-managed EPZ and zero for those located in a private EPZ or outside EPZs. *Private EPZ:* Coded as a dummy variable equal to one if the firm was located in a privately-managed EPZ and zero for those located in a state EPZ or outside EPZs.

Control variable measures

Firm size

Was measured as the natural logarithm of the number of firm employees. According to standard OLS regression practice, the natural logarithm was used to normalize firm size (Greene 2000). *Industry sector:* Coded as a dummy variable equal to one for oil and gas firms and zero for chemical firms. *Industry association membership*: Coded as a dummy variable equal to one if a firm is a member of an industry association and zero if it is not. *Joint venture with foreign partners*: Recorded as the percentage of firm shares held by foreign interests. *Joint venture with State partners:* Recorded as the percentage of firm shares held by the state or state interests. *Foreign market dependence:* Recorded as the percentage of sales or services done in North America, Europe, and Japan in the last fiscal year. *Urban Community:* was proxied using a dummy variable equal to one if the firm was within a 2 mile radius of an urban community and zero otherwise.

Results and findings

Descriptive results

The response rate to the survey was 45.2% resulting in a final sample of 131 firms. In this final sample 62.6% of the respondents were from the Oil and Gas sector and 37.4% from

the Chemical industry. Regarding location, 57.3% of firms in the final sample were in EPZs. Of the firms located in EPZs, 53.3% were located in state run EPZs and 46.7% in privately managed ones. Frequency distributions, crosstabulations, and comparison of means by EPZ location are presented on Table 3. As expected, this table provides initial evidence to suggest that location inside EPZs is significantly associated with higher corporate environmental performance and higher average foreign market dependence. Additionally, regarding potential self-selection bias into EPZs based on other firm characteristics, results from Table 3 do not indicate significant differences between EPZ and non-EPZ firms in terms of industry type, industry association membership, foreign joint ventures, state joint ventures, community type, and size.

Regression results

Results of the OLS regression analysis are displayed in Table 4. Model 1 results indicate support for Hypothesis 1's argument that firms located inside of EPZs are more likely to show higher corporate environmental performance ($p < 0.1$). Similarly, findings from Model 2 suggest support for Hypothesis 2's arguments that firms located in state-managed EPZs are more likely to show higher corporate environmental performance than those located in privately managed EPZs ($p < 0.001$). Model 1 also indicates higher levels of environmental performance for larger firms ($p < 0.001$); as well as firms who are members of industry associations ($p < 0.1$) and firms that are more dependent on foreign markets ($p < 0.001$).

Heteroskedasticity was tested for by using residual versus fitted values plots, the Cook-Weisberg test and White's general test. Both tests using fitted values turned up insignificant ($p > 0.05$) for both models confirming lack of heteroskedasticity. Because some of the bivariate correlation coefficients suggested potential multicollinearty problems, we estimated condition indices and variance inflation factors. These additional tests indicated lack of serious multicollinearity problems (Belsley et al. 1980). No influential outlier observations were identified through the use of hat matrix and studentized residuals diagnostic tests (Belsley et al. 1980).

Discussion of results

EPZ Location

Model 1 results suggesting that firms located inside of EPZs are more likely to be correlated with higher corporate environmental performance are consistent with the argument that firms within EPZs are more likely to experience enhanced institutional pressures from regulators and community and environmental activists to show enhanced environmental performance (Pargal and Mani 2000; Carmin et al. 2003). Firms located inside EPZs may also experience interfirm pressure to avoid becoming an environmental nuisance or to cause unwarranted environmental incidents that could draw the attention of regulators and the public and reduce the legitimacy and standing of all the EPZ tenants. This source of interfirm normative pressures is less prevalent outside of EPZs where firms are located on their own premises.

Additionally, with the sharing of EPZ amenities such as specialized infrastructure including roads, water and energy supplies, telecommunications services, and security

Table 3 Frequency distributions, crosstabulations, and comparison of means by EPZ location

	Total sample		In EPZ		Outside EPZ	
Variable	*N*	Percent	*N*	Percent	*N*	Percent
Corporate environmental performance (Percentage score: zero = worst, 100 = best)						
0–20	1	0.76	1	1.33	0	0.00
>20–40	20	15.27	9	12.00	11	19.64
>40–60	64	48.85	31	41.33	33	58.93
>60–80	42	32.06	32	42.67	10	17.86
>80–100	4	3.05	2	2.67	2	3.57
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (4) = 10.25			
			χ^2-prob[a]: 0.036*			
Mean (Std. Dev.)	54.17 (13.38)		56.1 (13.5)		51.6 (13.2)	
			t = 1.878	t-prob[b] = 0.063^		
Size (# employees)						
0–50	31	23.66	16	21.33	15	26.79
51–100	35	26.72	23	30.67	12	21.43
101–150	20	15.27	11	14.67	9	16.07
151–200	20	15.27	13	17.33	7	12.50
>200	25	19.08	12	16.00	13	23.21
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (4) = 2.83			
			χ^2-prob[a]: 0.586			
Mean (Std. Dev.)	138.10 (119.68)		138.9 (127.8)		137.0 (107.8)	
			t = −0.09	t-prob[b] = 0.931		
Industry sector						
Oil and Gas	81	61.83	50	66.67	31	55.36
Chemicals	50	38.17	25	33.33	25	44.64
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (1) = 1.74			
			χ^2-prob[a]: 0.187			
Urban community						
Urban	40	30.53	21	28.00	19	33.93
Rural	91	69.47	54	72.00	37	66.07
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (1) = 0.531			
			χ^2-prob[a]: 0.466			

Table 3 continued

Variable	Total sample		In EPZ		Outside EPZ	
	N	Percent	*N*	Percent	*N*	Percent
Market export dependence (% foreign sales)						
0–25	102	77.86	54	72.00	48	85.71
26–50	11	8.40	8	10.67	3	5.36
51–75	4	3.05	2	2.67	2	3.57
76–100	14	10.69	11	14.67	3	5.36
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (3) = 4.537			
			χ^2-prob[a]: 0.209			
Mean (Std. Dev.)	19.47 (30.83)		23.87 (35.01)		13.57 (25.06)	
			$t = -1.87$ t-prob[b] = 0.064^			
Association membership						
Yes	97	74.05	56	74.67	41	73.21
No	34	25.95	19	25.33	15	26.79
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (1) = 0.035			
			χ^2-prob[a]: 0.851			
Foreign joint venture (% Foreign owned)						
None	83	63.36	49	65.33	34	60.71
1-25	15	11.45	9	12.00	6	10.72
26-50	15	11.45	10	13.33	5	8.93
51-75	12	9.16	5	6.67	7	12.50
76-100	6	4.58	2	2.67	4	7.14
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (1) = 4.517			
			χ^2-prob[a]: 0.478			
Mean (Std. Dev.)	16.62 (26.42)		14.95 (24.54)		18.84 (28.98)	
			$t = 0.83$ t-prob[b] = 0.408			
State joint venture (% State owned)						
None	112	85.50	65	86.67	47	83.93
1–25	7	5.34	2	2.67	5	8.93
26–50	4	3.05	2	2.67	2	3.57
50–75	8	6.11	6	8.00	2	3.57
Total	131	100.00	75	100.00	56	100.00
			Pearson's chi sq. (1) = 3.496			
			χ^2-prob[a]: 0.321			
Mean (Std. Dev.)	5.96 (16.25)		6.07 (17.07)		5.77 (15.07)	
			$t = -0.10$ t-prob[b] = 0.917			

^ Prob < 0.10; * prob < 0.05; ** prob < 0.01; *** prob < 0.001

[a] χ^2-prob: test H_o: no association between the row variable and column variable

[b] t-prob: test H_o: No significantly different means

Table 4 Corporate environmental performance and firm characteristics, OLS regression models

	Model 1 (Reference group: Firms outside EPZs)	Model 2 (Reference group: Firms inside private EPZs)
Constant	26.156*** (6.37)	29.762*** (6.64)
Location inside EPZs	3.518^ (1.76)	1.024 (0.43)
Location outside EPZs	3.938*** (3.64)	9.224*** (3.25)
State EPZ	0.069 (0.03)	3.212** (3.01)
Log Size [a]	5.210*	0.314 (0.15)
Industry sector [b]	(2.25)	3.763^ (1.66)
Association membership	0.129*** (3.79)	0.092** (2.67)
Foreign market dependence	0.067 (1.74)	0.082* (2.19)
Foreign joint venture	0.001 (0.03)	−0.002 (−0.04)
State joint venture	2.023 (0.95)	1.510 (0.74)
Urban community		
N	131	131
F-value	9.380	10.170
R^2	0.381	0.431
Adj.-R^2	0.340	0.388

t-values in parentheses

[a,b] Control variables

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; ^ $p < 0.1$

there is more collaboration and information sharing among firms (Reisdorph 1991). At the lower end, firms' interaction may extend to informal meetings while at the higher end this interaction may take the form of structured and required periodic tenant meetings and discussions with the landlords. Such collaboration and information sharing may also extend to topics of environmental management and related sharing of information about practices and techniques. This enhanced interaction may allow poor environmental performers to learn from proactive environmental firms (Zucker 1977).

EPZ management

Similarly, Model 2 findings indicating that firms located in state-managed EPZs are more likely to show higher corporate environmental performance than those located elsewhere may be explained in part by a greater intensity of coercive institutional pressure by government regulators on firms located within state-managed EPZs.

We indeed observed in the field that firms in state-managed parks appeared to receive more oversight than firms located elsewhere (Badri et al. 1995). While administering our survey, we encountered mobile monitoring units from Trinidad's Environmental Management Authority in some state-managed EPZs but not in any privately managed zones. Firms in the state-managed EPZs also voiced their willingness to be environmentally proactive in attempts to impress government authorities which in turn would create better relations and some degree of regulatory flexibility. In contrast, facilities in privately managed EPZs appeared to suffer from lapses in monitoring because of legal constraints. While the environmental agency has the authority to monitor environmental media to

establish whether there are violations of pollution laws, they require special court permissions and police escorts to enter private premises to take samples.

Compared to privately-managed EPZs, state-managed ones also appear to encourage higher levels of co-operation by tenants and government agencies. This enhanced cooperation may also foster more transparency between regulators and firms, leading to the sharing of ideas, technology, and expertise which can in turn promote environmental performance improvements (Alperowicz 2005).

Environmental performance and control variables

The results of Model 1 also indicated three findings previously suggested in the literature. First, it appears that larger firms in Trinidad and Tobago are more likely to show higher environmental performance ($p < 0.001$). This finding is expected since larger firms enjoy greater resources and economies of scale that allow them to sustain higher levels of environmental research and development intensities (King and Lenox 2000; Dasgupta et al. 2000; Rivera 2002).

Second, Model 1 indicates that firms that are members of industry associations show higher environmental performance than non-members ($p < 0.05$). Previous studies concur since industry associations are more likely to promote normative institutional pressures on firms to improve their environmental protection practices (Delmas 2001; King and Lenox 2000; Rivera 2002; Hoffman 1999).

Third, Model 1 also indicates that when firms are more dependent on sales to foreign industrialized markets they are more likely to show higher environmental performance ($p < 0.001$). This is consistent with extant research suggesting that to be able to export to the US, Europe, and Japan, firms are required to raise their environmental standards to meet the stricter regulations of importer countries, even when local environmental regulations are lower (Christmann 2000; Dowell et al. 2000).

Conclusions

This study contributes to the business and public policy literature by providing initial evidence about the correlation between location in export promoting zones and corporate environmental performance. EPZs have become a key instrument of economic development policy in developing countries seeking to gain advantages from the growing integration of the global economy. Yet, EPZs remain controversial and often are associated with a "race to the bottom" because their net contribution to countries' well-being is still not clear (ILO 2003; Cling·et al. 2005). Most critics point out that EPZs offer "sweatshop" labor conditions despite the significant tax and infrastructure incentives offered by developing countries seeking to attract high-tech jobs (ILO 2003). Surprisingly, despite the interest in evaluating EPZs' net contribution to countries' well-being, the scholarly literature has paid relatively little attention to the environmental protection effects of EPZs.

Our cross-sectional study of Trinidad and Tobago's industrial parks (as EPZs are known there) suggest that firms located inside of EPZs are correlated with higher environmental performance than those located outside such parks. We also found that firms located in state-managed EPZs are associated with higher environmental performance than those located in privately managed EPZs. These results suggest that even in a country where environmental protection receives relatively low priority, environmental policy makers and

environmentalists can take advantage of already established EPZs to promote enclave enhanced institutional pressures associated with superior corporate environmental performance. In Trinidad and Tobago, the presence of stronger coercive institutional pressures from government regulators and normative institutional pressures from other tenant firms inside of EPZs appears to be associated with superior corporate environmental protection practices. Also, institutional pressures emanating from the community stakeholders directed to more visible firms located inside EPZs seem to reinforce the tendency to show higher corporate environmental performance by these firms.

The importance of these institutional pressures is perhaps further illustrated by how firms in Trinidad and Tobago's state-managed EPZs appear to show higher environmental performance than those located elsewhere. Coercive institutional pressures exerted by government regulators are magnified in state-managed EPZs where contractual relations between landlord and tenant firms make access to facilities easier and thus expedite environmental monitoring. Furthermore, the more intensely structured cooperative atmosphere generated in the state run parks, where there are regular tenant meetings and mandatory joint park management and advisory teams, provides additional institutional pressures on poor performers to improve their environmental management practices. The enhanced cooperation experienced in Trinidad and Tobago's state-managed EPZs may also ease environmental management knowledge sharing and diffusion.

It is important, to emphasize important limitations of our study. First, our findings are from a specific cross-sectional snapshot of Trinidad and Tobago's pollution intensive firms—oil, gas, and chemical—precluding any conclusions about the causality of the correlations identified. Future research needs to collect longitudinal data to analyze the dynamic and causal direction of the link between corporate environmental performance and EPZ location and type. Second, the paper's focus on Trinidad and Tobago's oil, gas, and chemical industries precludes generalizations to other industries and countries. Additional research is necessary to examine if the correlations identified are also present in different countries and industries. Yet, our initial evidence suggests that other developing countries sharing similar contexts and policies with Trinidad and Tobago may also be able to create enclave institutional conditions associated with enhanced corporate environmental performance inside EPZs. Third, the corporate environmental performance data used in our analysis is based on the assessment of multiple external stakeholders introducing potential subjective biases. While our multi-stakeholder approach can help to reduce the inherent bias of these assessments, future research needs to use more objective measures of corporate environmental performance such as pollution emissions.

Finally, it is important to stress that our study adds empirical data to the small body of work on environmental performance of firms in smaller economies in the developing world. Current emphasis on large developing countries such as China, India, and Mexico may be of less relevance to the unique economic and environmental vulnerabilities of smaller industrializing economies that have much to lose in terms of environmental quality if this challenge is not taken up by business and environmental policy scholars.

References

Alperowicz, N. (2005). European chemical parks band together. *Chemical Week, 167*, 33.

Arora, S., & Cason, T. (1995). An experiment in voluntary environmental regulation: Participation in EPAs 33/50 program. *Journal of Environmental Economics and Management, 28*, 271–286.

Badri, A., Davis, D., & Davis, D. (1995). Decision support for the location of firms in industrial sites. *International Journal of Operations and Production, 15*, 50.

Banerjee, S. B. (2002). Corporate environmentalism: The construct and its measurement. *Journal of Business Research, 55*, 177–191.
Blackman, A., Lyon, T., & Sisto, N. (2006). Voluntary environmental agreements when regulatory capacity is weak. *Comparative Economic Studies, 48*, 682–702.
Belsley D. A., Kuh E., & Welsch R. E. (1980). *Regression diagnostics: Identifying influential data and sources of collinearity*. New York: Wiley and Sons.
Cabral, R., & Dahab, S. S. (1998). Science parks in developing countries: The case of BIORIO in Brazil. *International Journal of Technology Management, 16*, 8.
Carmin, J., Darnall, N., & Mil-Jomens, J. (2003). Stakeholder involvement in the design of US voluntary environmental programs: Does sponsorship matter? *Policy Studies Journal, 31*, 527–543.
Cashore, B., & Vertinsky, I. (2000). Policy networks and firm behaviors: Governance systems and firm responses to external demands for sustainable forest management. *Policy Sciences, 33*, 1–30.
Central Bank of Trinidad, Tobago. (1999). *Handbook of key economic statistics for Trinidad and Tobago*. Port of Spain: Central Bank of Trinidad and Tobago.
Central Statistical Office of Trinidad, Tobago. (2003). *2003 Statistical digest*. Port-of-Spain: Ministry of Finance.
Central Statistical Office of Trinidad and Tobago. (2004). *Annual statistical digest*. Port of Spain: Central Statistical Office of Trinidad and Tobago.
Chen, C. (2006). The investigation for the establishment of science parks: The case of Taiwan. *Journal of the American Academy of Business, 8*, 62.
Christmann, P. (2000). Effects of "best practices" of environmental management on cost advantage: The role of complementary assets. *Academy of Management Journal, 43*, 663–680.
Christmann, P. (2004). Multinational companies and the natural environment: determinants of global environmental policy standardization. *Academy of Management Journal, 47*, 747–760.
Cling, J., Razafindrakoto, M., & Roubaud, F. (2005). Export processing zones in Madagascar: A success story under threat? *World Development, 33*, 785–803.
Dasgupta, S., Hettige, S. H., & Wheeler, D. (2000). What improves environmental compliance? Evidence from Mexican industry. *Journal of Environmental Economics and Management, 39*, 39–66.
Delmas, M. A. (2001). Stakeholders and competitive advantage: The case of ISO14-001. *Production and Operations Management, 10*, 343–358.
Delmas, M., & Keller, A. (2005). Strategic free riding in voluntary programs: The case of the US EPA wastewise program. *Policy Sciences, 38*, 91–106.
Dillman, D. A. (1978). *Mail and telephone surveys: The total design method*. New York: John Wiley.
DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Reviews, 48*, 147–160.
Dowell, D., Hart, S., & Yeung, B. (2000). Do corporate global environmental standards create or destroy market value? *Management Science, 8*, 1059.
Environmental Management Authority. (2000). *Draft national strategy of Trinidad and Tobago for the control of air pollution from anthropocentric sources*. Port of Spain: Environmental Management Authority.
Environmental Management Authority. (2004). *State of the environment report: Report of an assessment of the northern range of Trinidad and Tobago*. Port of Spain: Environmental Management Authority.
Esty, D. (1996). Revitalizing environmental federalism. *Michigan Law Review, 95*, 570–653.
Evolving Technologies, Development Company Limited. (2006). *ETeck News.* Port-of-Spain: Evolving Technologies and Development Company Limited.
Garcia-Johnson, R. (2000). *Exporting environmentalism: U.S. multinational chemical corporations in Brazil and Mexico*. Cambridge: MIT Press.
Geng, Y., & Cote, R. (2003). Environmental management systems at the industrial park level in China. *Environmental Management, 31*, 6.
Goldman, A. J. (2006). Optimal facility-location. *Journal of Research of the National Institute of Standards and Technology,* 111, 97–101.
Government of Trinidad and Tobago. (1981). *Trinidad and Tobago Town and Country Planning Act of 1981*. Government of Trinidad and Tobago Publications.
Granovetter, M. (1985). Economic action, social structure, and embeddedness. *American Journal of Sociology, 91*, 481–510.
Greene, W. H. (2000). *Econometric analysis* (4th ed). New Jersey: Prentice-Hall, Inc.
Gregory, R., & Kunreuther, H. (1990). Successful siting incentives. *Civil Engineering, 60*, 43.
Hart, S. (1995). A natural resource based view of the firm. *Academy of Management Review, 20*, 986–1014.
Hawken P. (1993). *The ecology of commerce*. New York: Harper Collins Publishers.

Haywood, R. (2000). Free zones in a modern world. Presentation of the World Economic Processing Zones Association, CFATF Meeting, Aruba, October 2000.
Hoffman, A. J. (1997). *From Heresy to Dogma: An institutional history of corporate environmentalism*. San Francisco: New Lexington Press.
Hoffman, A. (1999). Institutional evolution and change: Environmentalism and the U.S. chemical industry. *Academy of Management Journal, 42*, 351–371.
Interamerican Development Bank. (1998). *Socio-economic report*: *Trinidad and Tobago*. Washington D.C.: Interamerican Development Bank.
International Labor Organization (ILO). (2003). *Employment and social policy in respect of Export Processing Zones (EPZs) international labor office, governing body, committee on employment and social policy*. Geneva: ILO.
International Labor Organization (ILO). (2007). *Export processing zones statistics*, International Labor Organization, Geneva: ILO. Available at: http://www.ilo.org./public/english/dialogue/sector/themes/epz/stats.htm. Accessed on February 7, 2007.
Jauch, H. (2002). Export processing zones and the quest for sustainable development: A Southern African perspective. *Environment and Urbanization, 14*, 101–113.
Jayanthakumaran, K. (2003). Benefit–cost appraisals of export processing zones: A Survey of the literature. *Development Policy Review, 21*, 51–65.
Johansson, H., & Nilsson, L. (1997). Export processing zones as catalysts. *World Development, 25*, 2115–2128.
Khanna, M., & Damon, L. (1999). EPA's voluntary 33/50 program: Impact on toxic releases and economic performance of firms. *Journal of Environmental Economics and Management, 38*, 1–28.
Kim, K. S., & Gallent, N. (1997). Industrial park development and planning in South Korea. *Regional Studies, 31*, 424.
King, A., & Lennox, M. J. (2000). Industry self-regulation without sanctions: The chemical industry's responsible care program. *Academy of Management Journal, 43*, 698–716.
Korten, D. (1995). *When corporations rule the world*. West Harfort: Kumarian Press, Inc.
Meyer, J., & Rowan, B. (1977). Institutional organizations: formal structure as myth and ceremony. *American Journal of Sociology, 80*, 340–363.
Ministry of Energy of Trinidad and Tobago. (2007). *Energy Statistics*, Government of Trinidad and Tobago. Available at: http://www.energy.gov.tt. Accessed on February 10, 2007.
Morioka, T., Yoshida, N., & Yamamoto, Y. (2003). Cycle closing product chain management with appropriate production site metabolism towards zero emission in an industrial machinery corporation. *Clean Technology and Environmental Policy, 6*, 7–17.
Oliver, C. (1991). Strategic responses to institutional processes. *Academy of Management Review, 16*, 145–179.
O'Rourke, D. (2004). *Community driven regulation: Balancing development and the environment in Vietnam*. The MIT Press.
Pargal, S., & Mani, M. (2000). Citizen activism, environmental regulation and the location of industrial parks: Evidence from India. *Economic Development and Cultural Change, 18*, 829–847.
Porter, G. (1999). Trade competition and pollution standards: "Race to the bottom" or "stuck at the bottom"? *The Journal of Environment and Development, 8*, 133–151.
Powell, W., & DiMaggio, P. (1991). *The new institutionalism in organizational analysis*. Chicago: University of Chicago Press.
Ramlogan, R., & Persadie, N. (2004). *Developing environmental law and policy in Trinidad and Tobago*. Port of Spain: Lexicon Publishers.
Reisdorph, D. H. (1991). Industrial parks as an economic development asset. *Economic Development Review, 9*, 29.
Rivera, J. (2002). Assessing a voluntary environmental initiative in the developing world: The Costa Rican certification for sustainable tourism. *Policy Sciences 35*, 333–360.
Rivera, J. (2004). Institutional pressures and voluntary environmental behavior in developing countries: Evidence from the Costa Rican hotel industry. *Society and Natural Resources, 17*:779–797.
Rivera, J., & de Leon, P. (2005). Chief executive officers and voluntary environmental performance: Costa Rica's certification for sustainable tourism. *Policy Sciences, 38*, 107–127.
Russo, M. V., & Harrison, N. S. (2005). Organizational design and environmental performance: Clues from the electronics industry. *Academy of Management Journal,* 48, 582–593.
Sargent, J., & Matthews, L. (2001). Combining export processing zones and regional free trade agreements: Lessons from the Mexican experience. *World Development,* 29, 1739–1752.
Scott, R. W. (1995). *Institutions and organizations*. Thousand Oaks: Sage Publications.

Sharma, S., & Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal,* 19, 729–753.
Sikdar, P. K., Mondal, S., Saha, L., & Banerjee, S. (2002). Environmental impact assessment of a proposed info-tech complex in East Calcutta wetlands. *Environmentalist,* 22, 241.
Solid Waste Management Company of Trinidad and Tobago. (2000). *Annual Report 2000*. Government of Trinidad and Tobago Press.
Subrahmanya, M. H. B. (2005). Small-scale industries in India in the globalization era: Performance and prospects. *International Journal of Management and Enterprise Development, 2*, 1.
Suchman, M. (1995). Managing legitimacy: Strategic and institutional approaches. *Academy of Management Review, 20*, 571–610.
Tinsley, S. (2002). EMS models for business strategy development. *Business Strategy and the Environment, 11*, 376–390.
Torres, I. E. (1999). The mineral industry of Trinidad and Tobago. In *Country Report: U.S. Geological Service*: 25.
Wheeler, D. (2001). Racing to the bottom? Foreign investment and air pollution in developing countries. *Journal of Environment and Development, 10*, 225–245.
Wood, A. R. (1990). How to meet the needs of corporations in locating new facilities. *Economic Development Review, 8*, 55.
World Bank. (2003). *World development indicators*. Washington, D.C.: World Bank Publications.
Xumei, B. (2002). Industrial relocation in Asia: A sound environmental management strategy? *Environment, 44*, 5.
Yamawaki, H. (2002). The evolution and structure of industrial clusters in Japan. *Small Business Economics, 18*, 121.
Zucker, L. (1977). The role of institutionalization in cultural persistence. *American Sociological Review, 42*, 726–743.