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**EXPORT PROCESSING ZONES AND CORPORATE ENVIRONMENTAL PERFORMANCE  
IN EMERGING ECONOMIES :  
THE CASE OF THE OIL, GAS AND CHEMICAL SECTORS OF TRINIDAD AND TOBAGO**

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

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

**Abstract.** Export processing zones 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. This paper investigates whether the decision to locate facilities inside these zones is associated with higher corporate environmental performance. Findings indicated that facilities operating in Trinidad and Tobago's export processing zones 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. For policy makers, these results suggest that export processing zones may be used to create enclave institutional pressures correlated with higher corporate environmental responsibility.

**Keywords:**

Export processing zones, corporate environmental performance, developing countries, institutional theory, and race to the bottom.

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

## **1. Introduction**

As globalization opens markets and increases trade, many parts of the developing world are experiencing unprecedented rates of industrialization that according to critics generates a “race to the bottom” (Porter, 1999; Wheeler, 2001). Creation of export processing zones (EPZs) has become a popular instrument of economic development policies seeking to promote this transition to industrialization through foreign investment and technology transfers (ILO 2003; Jayanthakumaran, 2003). Critics suggest that EPZs require costly infrastructure investments and tax subsidies to create “sweat-shop islands” where local social and environmental protection regulations are ignored (Jauch, 2002, ILO, 2003). The extant scholarly literature has extensively examined labor conditions in EPZs’ firms but has paid little attention to their environmental protection practices.

This study aims to contribute to 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 more likely to show 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. This paper is organized as follows: First, we discuss EPZs as

instruments of economic growth policies. Second, we describe Trinidad and Tobago's context and EPZ development. Following, we elaborate on the relationship between EPZs and environmental protection. The methodology and results are described in sections six and seven. Finally, in the last two sections of the paper we discuss the findings and develop conclusions.

## **2. Export Processing Zones and economic growth policy**

Estimates by the International Labor Organization (ILO) suggest that the number of EPZs has significantly expanded from about 79 located in 25 countries in 1975 to 5,174 hosted in more 110 countries in 2003 (ILO, 2007). More than 50 percent of the EPZs are located in Central America and Mexico but EPZs in Asia have significantly more employees. Worldwide, about 42 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*” (Jahansson 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). 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 scholarly literature (Jayanthakumaran, 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 proportion of exports required vary across countries (Jayanthakumaran, 2003).

These subsidies, incentives, and exemptions have made EPZs a controversial policy instrument because it is not clear whether countries receive net benefits from their promotion (Jauch, 2002; Cling, 2005; ILO 2003). Most recent empirical studies suggest that EPZs have attracted foreign investment, increased export earnings, and generated jobs (Cling, et al, 2005; ILO 2003; Jayanthakumaran, 2003; 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 (ILO 2003; Cling, 2005; Johansson and Nilson, 1997). Additionally, critics also 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, 2005; Sergent and Matthews, 2001).

Remarkably, despite the increasing interest in examining EPZs's contribution to the well-being of developing countries, scholars have paid 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.

### **3. 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<sup>1</sup> where hydrocarbon production is the main economic activity (Inter American Development Bank, 1998). Trinidad and Tobago's main trading partners are the USA, Canada, UK, Brazil, Germany and the rest of the Caribbean. U.S. investments in energy related projects in 2002 were nearly \$1.5 billion (World Bank, 2003).

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<sup>1</sup> The others are Mexico, Venezuela, Colombia and Ecuador.

The islands' maintain approximately 47 percent of intact forests but this is changing at a rapid rate with industrial expansion and urban sprawl (Environmental Management Authority, 2004). 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. 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*, but 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.

Like 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).

### ***3.1 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 and exploration and downstream processing and manufacturing and the chemical sector includes those firms whose production is dependent on large inputs of cheap energy from oil and gas feedstock as well as other chemical manufacturing. 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 (EMA, 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.<sup>2</sup>

The sectors are largely concentrated with most production volume coming from multinational and state owned firms. Small and medium enterprises dominate

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<sup>2</sup> In 2006 the US imported 16% of its natural gas, 73% of which was imported from Trinidad and Tobago (STCIC, 2005).

downstream production and manufacturing. U.S., Canada, Britain, Germany and Australia multinationals as well as firms headquartered in South America, East Asia, and Europe 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).

### **3.2 *Export Processing Zones (EPZs) development in Trinidad and Tobago***

The first planned state run EPZs were developed in the 1970's 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, both by the state and private developers, diminished. In the early 1990's with renewed fervor in the global oil markets, discovery of new oil and gas deposits, 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 some 43 EPZs, 18 managed by the state and the other 25 managed by the private sector (Evolving Technologies and 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 environmental beyond compliance 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 nonrenewal 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, town and country and environmental permissions (Trinidad and Tobago Town and Country Planning Act, 1981).

#### **4. Export Processing Zones and environmental protection**

Critics suggest that EPZs lead to heightened negative environmental impacts associated with the deliberate concentration of factories and facilities in one designated area (Gregory and Kunreuther, 1990; Bai, 2002; ILO, 2003; Jauch, 2002; Cling, 2005). These environmental impacts come about through the day-to-day operations of the industrial park's tenants. 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). 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. Growth of industrial estates is also frequently accompanied by unplanned population migrations that can cause public health problems, additional environmental stress, and social dislocation. Characteristically, in developing countries most EPZs are planned and operated with little concern for their environmental impacts and thus are more likely to produce greater environmental damage (Sikdar et al, 2002).

More recently, however, and largely because of the evolving role of the traditional industrial park, researchers suggest that when EPZs adopt industrial management principles of eco-efficiency and industrial ecology tenants may actually produce lower negative environmental effects than those of equivalent facilities operating outside EPZs (Morioka et al, 2003; Goldman, 2006). This may be because of reduced usage of input materials and energy, less pollution and less waste generated. Furthermore, the proximity of facilities inside EPZs can create advantages through provision of coordinated and centralized pollution prevention and management services (Kim and Gallent, 1997; Yamawaki, 2002; Wood, 1990; Tinsley, 2001).

## **5. Institutional theory and environmental performance in EPZs**

We believe that 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 highlights the fact that not everything that happens in an organization is necessarily intended and that not all outcomes are the result of a conscious decision process (Scott, 1995). It proposes that firms' choices/practices may be the result of social construction processes in which taken-for-granted external pressures influence the creation and implementation of the strategies that come to attain a sense of legitimacy.

Neo-institutional scholars have particularly focused on explaining the pressures that motivate organizations to become more alike. DiMaggio and Powell (1983, 1991) proposed a seminal typology of isomorphic forces that emphasize the roles of the nation-state, professions, and social expectations in shaping institutional forms. Coercive pressures typically exerted by governments, command companies to follow specific practices by relying on legal sanctions or threats (DiMaggio and Powell, 1983). 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). Mimetic pressures are demands that firms face to appear legitimate and competitive by imitating the behavior of the most

profitable and respected companies in their industry (DiMaggio and Powell, 1983).

In Trinidad and Tobago, as in other developing countries, institutional pressures to comply with environmental regulations can be considered weak since facility oversight is not regularly performed by environmental authorities (O'Rourke, 2003; Ramlogan and Persadie, 2004; Rivera, 2002) 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 and Sisto, 2005; Rivera, 2004). Additionally, given their higher visibility and presumed larger resources, EPZ facilities 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 institutional pressures described above may be more intense in state-managed EPZs than in privately-managed zones. State-managed EPZ 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 seeking to attract technology transfers tend to be more involved in the promotion of cluster industries and public-private collaboration that facilitates the diffusion of proactive environmental practices (ILO, 2003). The previous arguments therefore suggest the following hypothesis:

*Hypothesis 1: Firms located in export processing zones are more likely to have higher corporate environmental performance ratings than those located outside.*

*Hypothesis 2: Firms located in state export processing zones are more likely to have higher corporate environmental performance ratings than those located in private export processing zones.*

## **6. Research Methodology**

## **6.1 Sample selection**

The population of interest in the study was comprised of firms in the local sectors coded by the Central Statistical Office of Trinidad and Tobago as (a) Oil and Gas,<sup>3</sup> and (b) Chemicals and Non Metallic Industries (hereafter called the chemical industry). 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. Chemicals and non metallic industries includes industrial gases, paints and varnishes, pharmaceuticals, soaps and detergents, adhesives and waxes, pigments and inks, pesticides, cement, glass and glass products, plastic products, clay products, asbestos products, and plastic packaging.

A comprehensive list of the population of firms in these sectors was compiled using the latest Business Establishment survey published by 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 operations and processing

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<sup>3</sup> The Oil and Gas sectors also include mining but these facilities were excluded from population universe.

were omitted. A final sample frame of 231 firms was selected comprising 192 oil and gas industry firms and 98 chemicals industry firms.<sup>4</sup>

The representativeness of the respondent group was verified by t-tests conducted between respondent and nonrespondent 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). Self selection bias was tested by comparing the corporate environmental performance ratings of early survey responders to late survey responders (as a proxy for non responders) as suggested by Christmann (2000). Results of ttests indicated no significant difference in environmental performance (p<0.001).

## **6.2 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 between August and December 2005. One questionnaire was administered to top managers to collect information about basic firm characteristics (e.g. size, location, industry association membership, etc). Another questionnaire was administered to external stakeholders (see explanation of how they were selected in the Dependent Variable Measure on the next page). Requests for interviews were made up to three

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<sup>4</sup> Using power analysis (Cohen et al, 1983), it was concluded that a sample of at least 139 observations was necessary to have an 80% chance of rejecting a false null hypothesis at a 95% confidence level, assuming a "medium" effect size ( $r = 0.3$ ).

times over a six week period as necessary. Each firm survey was conducted in face to face interviews.

### **6.3 *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:

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

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 area location)

e = error term

### **6.4 *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.<sup>5</sup> This Likert type rating 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 question items across these four areas comprise the environmental performance rating (see Table 1). 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).

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Insert Table 1 about here  
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Three different stakeholders rated the environmental performance of each firm. To identify these stakeholders, each firm in the sample was asked to name one of its main stakeholders from each of the following sectors: (1) local community, (2) government, and (3) its supply chain (see Table 2). The overall percentage environmental performance

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<sup>5</sup> Banerjee's scale was constructed to measure corporate environmentalism levels of Canadian oil and gas sector firms, and was administered to firm management (Banerjee, 2002). As such, to administer it to external stakeholders simple wording changes were necessary. For example item 2 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.*"

score for each firm is obtained by calculating the average for the three stakeholder ratings.<sup>6</sup>

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Insert Table 2 about here  
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To ensure the validity and reliability of the overall scale, factor analysis and Cronbach's alpha were calculated. Scale validity was determined using factor analysis with varimax rotation which confirmed the uni-dimensionality of the scale. A Cronbach's alpha equal to 0.94 also indicated acceptable internal-consistency reliability for the scale.

### **6.5 *Independent variable measures***

*EPZ location:* Coded as a dummy variable equal to 1 if the firm facilities were located inside of an industrial park and 0 otherwise. *State EPZ:* Coded as a dichotomous variable equal to one if the firm was located in a state-managed EPZ and zero otherwise. *Private EPZ:* Coded as a dummy variable equal to one if the firm was located in a privately-managed EPZ and zero otherwise.

### **6.6 *Control variable measures***

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<sup>6</sup> The likert scores for all 16 items included in the scale are tallied up for each of the three stakeholders, and then they are divided by the maximum possible score and multiplied by 100 to yield a percentage rating.

*Firm Size*: Recorded as the natural logarithm of the number of firm employees. *Industry sector*: Coded as a dummy variable equal to 1 for oil and gas firms and 0 for chemical firms. *Industry association membership*: Coded as a dummy variable equal to 1 if a firm is a member of an industry association and 0 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. *Community type*: Coded as a dummy variable equal to 1 if the firm was within a 2 mile radius of an urban community and 0 otherwise.

## **7. Results and Findings**

### **7.1 Descriptive results**

The response rate to the survey was 56.7% 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. Correlation values, means, and standard deviations are reported in Table 3. The correlation matrix results provide preliminary evidence indicating that corporate environmental performance is positively correlated to location in EPZs ( $p < 0.1$ ). More specifically, it suggests that location in a state-managed industrial

park is positively associated with higher environmental performance ( $p < 0.001$ ). Conversely, location of the firm in a private industrial park appears to be negatively correlated with higher environmental performance ( $p < 0.001$ ). Other variables that appear to be positively correlated with higher environmental performance are foreign market dependence ( $p < 0.001$ ), joint ventures with foreign partners ( $p < 0.05$ ), joint ventures with state partners ( $p < 0.01$ ), industry association membership ( $p < 0.001$ ), and size of the firm ( $p < 0.001$ ).

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Insert Table 3 about here  
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## 7.2 *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 ( $p < 0.001$ ).

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Insert Table 4 about here  
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Heteroskedasticity was ruled out by using residual versus fitted values plots, the Cook-Weisberg test and White's general test. To check for multicollinearity correlation coefficients, condition indices, and variance inflation factors were calculated and did not indicate potential problems. No influential outlier observations were identified through the use of hat matrix and studentized residuals diagnostic tests (Belsley, Kuh and Welsh, 1980).

## **8. Discussion of results**

### **8.1 *EPZ location***

Model 1 results suggesting that firms located inside of EPZs are more likely to show higher corporate environmental performance are consistent with the argument that firms within EPZs are more visible than those outside. More visible EPZ firms are more likely to experience pressures from regulators, community and environmental activists to show enhanced environmental performance (Pargal and Mani, 2000; Carmin et al, 2003). Firms located inside EPZs may also experience inter-firm 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

industrial park tenants. This source of interfirm institutional pressure is less prevalent outside of EPZs where firms are located in their own premises.

Additionally, with the sharing of EPZ amenities such as specialized infrastructure including roads, water and energy supplies, telecommunications services, and security there is more interaction among firms (Reisdorph, 1991). At the lower end, this 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 interaction may also extend to topics of environmental management and related sharing of information about practices and techniques. This interaction may allow poor environmental performers to learn from proactive environmental firms (Zucker, 1987).

## **8.2 *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, compared to firms located in private EPZ and other non-EPZ locations.

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; Tremblay, 2006).

### **8.3 *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 are more visible to government regulators, the media, and activists. Larger firms

may also 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, Hettige and Wheeler, 2000; Rivera, 2002).

Second, Model 1 indicates that firms who 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 U.S., 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 (Christman, 2000; Dowell, Hart, and Yeung, 2000).

## **9. Conclusions**

This study contributes to the business and public policy literature by providing initial evidence about the relationship 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 "sweat-shop" 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 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 more likely to show higher environmental performance than those located outside such parks. We also found that firms located in state managed EPZs show 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, export processing zones may be used to create enclave institutional pressures correlated with higher corporate environmental responsibility. 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 motivate firms to adopt enhanced 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 industrial parks 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 that our findings are from a specific cross-sectional snapshot of Trinidad and Tobago's pollution intensive facilities –oil, gas, and chemical–precluding any conclusions about the causality of the relationships identified and generalizations to other industries and countries. 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.

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 environmental vulnerabilities and economic situations 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.

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**TABLE 1. Corporate environmental performance rating scale\***

*Environmental Orientation: Internal*

1. The firm makes a concerted effort to make every employee understand the importance of environmental preservation.
2. The firm has a clear policy statement urging environmental awareness in every area.
3. Environmental preservation is a high priority activity in the firm.
4. Preserving the environment is a central corporate value in the firm

*Environmental Orientation: External*

5. The financial well being of the firm does not depend on the state of the natural environment.
6. The firm has a responsibility to preserve the environment.
7. Environmental preservation is vital to the firm's survival.
8. The firm's responsibility to its customers, stockholders and employees is more important than its responsibility towards environmental preservation.

*Environmental Strategic Focus: Corporate*

9. The firm has integrated environmental issues into its strategic planning process.
  10. In the firm, "quality" includes reducing the environmental impact.
  11. The firm links environmental objectives with other corporate goals.
  12. The firm is engaged in developing products and processes that minimize environmental impact.
  13. Environmental issues are always considered when new products developed or new services
-

offered.

*Environmental Strategic Focus: Functional*

14. The firm emphasizes the environmental aspects of its products and services in advertising.

15. The firm's development and marketing strategies for new products and services have been influenced by environmental concerns.

16. In the firm, product-market decisions are always influenced by environmental concerns.

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

**TABLE 2. Example of External Stakeholders**

<p><b>Local Community Stakeholders:</b> Environmental NGOs, Community based interest groups, Activists, Media environmental reporters, Resident associations. (N=46)</p> <ol style="list-style-type: none"><li>1. Fishermen and Friends of the Sea</li><li>2. Caribbean Forest Conservation Association</li><li>3. Caribbean Conservation Association</li><li>4. Point Lisas Community Center</li><li>5. Lange Park Residents Association</li><li>6. Southern Farmers Cooperative</li><li>7. Environment Tobago</li><li>8. Natureseekers</li><li>9. University of the West Indies Biological Society</li><li>10. The Cropper Foundation</li></ol>
<p><b>Governmental Stakeholders:</b> Ministries, Statutory bodies, Research Institutes, Government consultants. (N=19)</p> <p>Environmental Management Authority</p> <ol style="list-style-type: none"><li>1. - Pollution Prevention and Control Department</li><li>2. - Strategic Environmental Assessment Department</li><li>3. - Complaints and Investigations Department</li></ol> <p>Ministry of Energy and Energy Industries</p> <ol style="list-style-type: none"><li>4. - Business Development Division</li></ol>

5. - Environmental Division
6. - Refining Division
7. Ministry of Labor and Manpower Resources
8. Trinidad and Tobago Bureau of Standards
9. Chemicals Inspectorate
10. City of San Fernando Public Health Office

**Supply Chain Stakeholders:** Customers, Business partners, Suppliers, Environmental consultants. (N=41)

1. Caribbean Industrial Research Institute
2. National Petroleum Marketing Company
3. Trinidad Bulk Distributors
4. Institute of Marine Affairs
5. University of the West Indies, Faculty of Engineering
6. Exxon Mobil Inter-Americas
7. Petroleum Company of Trinidad and Tobago
8. Caribbean Steel Mills
9. BP Trinidad and Tobago
10. Solid Waste Management Company Limited

**TABLE 3. Correlation values and descriptive statistics**

		1	2	3	4	5	6	7	8	9	10	11
1	Environmental performance	1.00										
2	EPZ location	0.16^	1.00									
3	State EPZ	-0.31***	0.52***	1.00								
4	Private EPZ	0.47***	0.57***	-0.40***	1.00							
5	Foreign market dependence	0.46***	0.16^	-0.24**	0.41***	1.00						
6	Joint venture foreign partners	0.22*	-0.07	-0.02	-0.05	0.17*	1.00					
7	Joint venture with local state	0.16^	0.01	-0.08	0.09	0.27**	0.29***	1.00				
8	Indust.assoc. membership	0.33***	0.02	-0.23**	0.24**	0.16^	0.10	0.06	1.00			
9	Community type (urban)	0.14	-0.06	-0.13	0.06	0.04	0.06	0.01	0.09	1.00		
10	Log Size	0.44***	-0.01	-0.30***	0.27**	0.28**	0.09	0.02	0.29***	0.15^	1.00	
11	Industry sector	0.20*	0.12	-0.02	0.14^	0.18*	0.14	-0.02	0.18*	0.11	0.26**	1.00
	MEAN	54.17	N/A	N/A	N/A	19.46	16.61	5.93	N/A	N/A	4.53	N/A
	STD. DEV.	13.50	N/A	N/A	N/A	31.45	26.49	16.18	N/A	N/A	0.98	N/A

^=P<0.10      \*=P<0.05      \*\*=P<0.01      \*\*\*=P<0.001

**TABLE 4. Corporate environmental performance and firm characteristics, OLS regression models**

	Model 1 Firm Characteristics	Model 2 Firm Characteristics
Constant	26.156*** (6.37)	30.787***(6.37)
EPZ location	3.159^ (1.76)	
State EPZ		8.200*** (3.42)
Private EPZ		-1.024 (-0.43)
Log Size <sup>a</sup>	3.938*** (3.64)	3.212** (3.01)
Industry sector <sup>b</sup>	0.069 (0.03)	0.314 (0.15)
Association membership	5.210* (2.25)	3.763^ (1.66)
Foreign market dependence	0.129*** (3.79)	0.092** (2.67)
Foreign joint venture	0.067 (1.74)	0.082^ (2.19)
State joint venture	0.001 (0.03)	-0.002 (-0.04)
Community type	2.023 (0.95)	1.510 (0.74)
N	131	131
F-value	9.380	10.170
R2	0.381	0.431
Adj.-R2	0.340	0.388
		t-test, state EPZ-Private EPZ coefficients: (4.58)***

t-values in parentheses.

<sup>a, b</sup> Control variables

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