

Foreign versus local firms: implications for environmental sustainability

Foreign versus
local firms

1739

Received 9 December 2019
Revised 11 March 2020
Accepted 14 March 2020

Sreejith Balasubramanian
*Business School, Middlesex University Dubai, Dubai,
United Arab Emirates, and*
Vinaya Shukla
Business School, Middlesex University, London, UK

Abstract

Purpose – Managing environmental consequences while sustaining economic development necessitate strong commitment and participation of all firms across sectors. However, the environment-related role of foreign and local firms is unclear from previous research. With increasing trade liberalization and entry of foreign firms, this question has become particularly relevant. The purpose of this paper is to contrast the roles and contributions of foreign and local firms from an environmental sustainability perspective.

Design/methodology/approach – Using data collected through a structured survey (395 responses) and semi-structured interviews (19 numbers) from the United Arab Emirates (UAE) construction sector (research setting), the study analyses and understands the hypothesized differences between foreign and local firms on three key environmental sustainability aspects: the extent of environmental practices implementation, the strengths/influences of drivers and barriers affecting the implementation, and the environmental, cost-related, and organizational performance benefits derived.

Findings – Foreign firms were found to implement environmental practices to a greater extent, have a greater internal drive to implement these practices, and face lower barriers to implementation than local ones. Local firms though were found to be not far behind foreign ones with regards to the environmental, cost-related, and organizational performance benefits derived.

Practical implications – Findings from the study are expected to help policymakers and practitioners develop policies/interventions that ensure all firms irrespective of their nature of ownership contribute equitably to environmental sustainability.

Originality/value – This study is arguably the first comprehensive attempt to understand how various environmental sustainability aspects are perceived and performed by local and foreign firms.

Keywords Firm ownership, Environmental practices, Drivers, Barriers, Performance

Paper type Research paper

1. Introduction

The relentless industrial and economic development is causing severe environmental consequences: depletion of natural resources, atmospheric pollution, unpredictable weather patterns, and rising sea levels. Curtailing the negative impacts requires effective environmental management and consequently the commitment and participation of all firms across all sectors. However, not all firms take their environment-related responsibilities seriously (Dasgupta *et al.*, 2001); alternatively, even if they do, they are unable to generate the same level of environmental performance as the others (Reinhardt, 1998). Could a firm's nature of ownership (whether foreign or locally owned) be a factor in its differential commitment/contribution on the environmental front? This question is important given the increased trade liberalization and entry of foreign firms into countries around the world. However, the work done on it is quite limited. The few relevant studies done have also in most cases taken a high level perspective (around “pollution halos” and “pollution havens” or that foreign firms are environmentally superior and inferior respectively to local firms (Eskeland and Harrison, 2003; Brucal, 2017)) and based their investigations on high level data (FDI,



Benchmarking: An International
Journal
Vol. 27 No. 5, 2020
pp. 1739-1768
© Emerald Publishing Limited
1463-5771
DOI 10.1108/BJJ-12-2019-0526

emission level and ISO 14001 certifications). Firm ownership nature's implication for various specific aspects of environmental sustainability are therefore unclear, and which warrants the following investigations (that are also the focus of this work):

- (1) We first need to understand from an environmental practices implementation perspective; whether foreign and local firms differ in (their) extent of implementation (of environmental practices), where it was greater, and the rationale for the difference, with all of this understanding needing to be at an individual practice level as it could be different for each. Policy makers and practitioners could then support the implementation-wise deficient firm ownership category (foreign/local/both) for each practice individually.
- (2) Next, we need to know from a drivers and barriers (to environmental practices' implementation) perspective; whether the strengths/influences of those drivers and barriers differ for foreign and local firms, and if so, the nature and reasons for the difference. The identified weaker drivers and stronger barriers for each firm ownership category (foreign, local) could then be strengthened and weakened respectively so that both firm categories are similarly effective in environment practices implementation.
- (3) Finally, it is important to know from a performance benefits (from environmental practices' implementation) perspective; whether the extent of those benefits (in environmental and economic terms), differ for foreign and local firms, and if so, the reasons for the difference. The performance-benefits-wise-laggard firm ownership category (foreign or local) could then be specifically supported through financial and other incentives including training programs to enable it to bridge the gap.

Such a comprehensive understanding is not available from any previous research. Most studies have limited themselves to specific environmental dimensions and sub-dimensions (for, e.g. environmental practices implementation and firm ownership or environmental drivers and firm ownership and specific ones within each). The few that have investigated the same dimensions and/or sub-dimensions, have in many cases reported conflicting findings.

Therefore, this study aims to understand the firm ownership implications for environmental sustainability. The specific objectives are as follows:

- (1) Assess the extent of implementation of environmental practices among foreign and local firms and to comprehend the reason for the differences (or lack thereof) in the implementation between the two firm ownership categories.
- (2) Assess the strengths/influences of drivers and barriers to the implementation of environmental practices for foreign and local firms and to comprehend the reason for the differences (or lack thereof) in their strength/influence between the two firm ownership categories.
- (3) Understand the extent of the environmental and short- and long-term economic performance benefits of implementing environmental practices for foreign and local firms and to comprehend the reason for the differences (or lack thereof) in the performance benefits between the two firm ownership categories.

The findings of the study are expected to help practitioners and policymakers, and other concerned stakeholders develop informed policies, strategic interventions, and support mechanisms so that all firms, regardless of their ownership, can promote and contribute to their countries' environmental goals to the best of their abilities.

To get a comprehensive and in-depth understanding, we focused on one sector, the construction sector, and in the UAE. This is because, among the sectors, the construction sector is the single largest contributor, responsible for one-third of global carbon emissions, one-third of global resource consumption, 40% of the world's energy consumption, 40% of global waste generated and 25% of the world's total water consumption (Balasubramanian and Shukla, 2017). Further, the construction sector in the UAE carries a healthy mix of foreign and local firms. Moreover, achieving environment sustainability while pursuing urbanisation and economic modernization is central to the UAE government's future development goals/targets, and hence they are leading the region's efforts in environmental sustainability by launching many environmental initiatives (Younis and Sundarakani, 2020).

In the next section, the literature on firm ownership and environmental sustainability is reviewed to highlight gaps, establish the theoretical basis and develop related hypotheses. In section three, we explain the research setting and the methodology used, while the findings are discussed in section four. Finally in section five, we conclude, discuss the study's implications and limitations, and provide suggestions for further work.

2. Literature review and hypothesis development

2.1 Nature of firm ownership and environmental practices implementation

Environmental practices are initiatives by a firm to minimize the negative environmental impacts of its activities (Qi *et al.*, 2010), and which are classified as "external" or "internal" depending on whether external or internal stakeholders are involved (Zhu *et al.*, 2012). Based on the literature including the works of Seuring and Muller (2008), Zhu *et al.* (2012) and Malviya and Kant (2015), these are: External ones: environmental design, environmental purchasing, environmental transportation, environmental construction/manufacturing and end of life environmental practices with more details on sub-practices within each given in Appendix 1; Internal ones: environmental management systems (EMS), environmental training, environmental auditing, cross-functional integration for environmental sustainability and environmental-related R&D.

Next, looking at previous work on nature of firm ownership and environmental practices implementation, most studies (e.g. Luken and Rompaey, 2008) highlight greater implementation at foreign firms. However, some others (e.g. Qi *et al.*, 2011) suggest implementation levels at foreign and local firms to be similar, while some others (e.g. Zhu *et al.*, 2012) found this to depend on the practice; implementation is of a similar level at both firms' for some practices and greater at foreign firms for the others.

Similar implementation level at foreign and local firms could either be because local firms have upgraded (to be on par with foreign firms) or foreign firms have downgraded (relative to local firms); the latter would conform to the population haven hypothesis as per which foreign firms relocate or expand to countries with lower environmental standards so that they can circumvent costly regulations in their home countries and/or exploit lax environmental regulations in the host countries (Dean *et al.*, 2009). Greater implementation at foreign firms on the other hand could be because of their having state-of-the-art technologies, cutting-edge practices (Earnhart *et al.*, 2014), technical knowledge, procedural and managerial know-how and access to proprietary resources (Kim *et al.*, 2016). Foreign firms are also known to lower their costs of implementation by standardizing their environment strategies across countries and realizing global economies of scale (such as via centralized global procurement and sharing of resources) (Christmann and Taylor, 2001). Also, foreign firms vis-à-vis local firms was found to enjoy superior bargaining power over local and foreign suppliers (Liang, 2014; Tatoglu *et al.*, 2014), and from having a global network of suppliers (Zhu and Sarkis, 2004).

Going with the weight of the latter logic we propose the following hypotheses (H1 and H2), with the assumption that these also apply at an individual practice level:

- H1.* Implementation of external environmental practices is greater at foreign firms than local ones.
- H1a.* Implementation of eco-design practices is greater at foreign firms than local ones.
- H1b.* Implementation of environmental purchasing practices is greater at foreign firms than local ones.
- H1c.* Implementation of environmental transportation practices is greater at foreign firms than local ones.
- H1d.* Implementation of environmental manufacturing practices is greater at foreign firms than local ones.
- H1e.* Implementation of end-of-life environmental practices is greater at foreign firms than local ones.
- H2.* Implementation of internal environmental practices is greater at foreign firms than local ones.
- H2a.* Environmental Management Systems (EMS) implementation is greater at foreign firms than local ones.
- H2b.* Environmental training provision is greater at foreign firms than local ones.
- H2c.* Environmental auditing provision is greater at foreign firms than local ones.
- H2d.* Cross-functional integration is greater at foreign firms than local ones.
- H2e.* Environment-related research and development (R&D) is greater at foreign firms than local ones.

2.2 Nature of firm ownership and strengths/influences of environmental drivers

Environmental drivers are pressures/motivations that cause firms to implement environmental practices, and which can originate from outside or within the firm, and consequently referred to as “external” or “internal” drivers respectively (Walker *et al.*, 2008). Each of the drivers are discussed separately below given that their strengths/influences for firms of different ownership types could be different.

Government environmental regulations: Government regulatory pressure is a key environmental driver with penalties being imposed for non-compliance (Chang *et al.*, 2018). With regards to its relative strength/influence for foreign and local firms, very limited evidence is available and which also is inconsistent with each other with both greater (e.g. Aldrugi and Abdo, 2014) and equivalent influence (e.g. Darnall *et al.*, 2010) for foreign firms vis-à-vis local ones being reported.

Government regulations’ strength/influence being equivalent for foreign and local firms could be because of nature of regulations and associated penalties being similar for both sets of firms (King and Shaver, 2001) and which is seen in the Singapore construction sector’s case (Ofori, 1996). On the other hand, the regulations’ greater influence on foreign firms could be because of the greater scrutiny, auditing and prosecution of these firms including on the environmental front than local ones (Child and Tsai, 2005). It could also be because of foreign firms taking government regulations more seriously as it enables them to gain local legitimacy and reduce the liabilities associated with foreignness (Kim *et al.*, 2016); also because they understand that a loss of legitimacy in one country could easily spill over to the others where they operate (Spencer and Gomez, 2011). Agreeing with this logic, we propose the following:

H3a. The strength/influence of government regulations as a driver (for environmental practices implementation) is greater for foreign firms than local ones

Stakeholder (supply chain) pressure: This is a pressure, mostly coercive, such as a threat to cancel purchasing/selling agreements, blacklisting or non-consideration for future projects exerted by one stakeholder firm on another to implement environmental practices (Darnall *et al.*, 2010). Across sectors, only two studies have investigated this, and which report inconsistent findings: stakeholder pressure was found to be lower for foreign firms by Kuada and Hinson (2012) and equivalent for foreign and local firms by Darnall *et al.* (2010).

Intuitively, it can be argued that stakeholder pressure would be lower for foreign firms because their superior technical, procedural, and managerial know-how, state-of-the-art technologies, and cutting-edge practices (Child and Tsai, 2005; Earnhart *et al.*, 2014) enables them to handle the pressure better. The fact that foreign firms play an active role in diffusing environmental practices by putting pressure on their local supply chain counterparts (Earnhart *et al.*, 2014) also supports the notion of local (rather than foreign firms) being more stakeholder pressured. On the other hand, stakeholder pressure could be greater for foreign firms because of their taking the pressure more seriously in order to maintain/build good relations with stakeholders and reduce the liabilities associated with foreignness (Kim *et al.*, 2016; Chen *et al.*, 2016). However, overall, we expect the influence of stakeholder pressure to be greater for local firms than foreign ones. We therefore propose the following:

H3b. The strength/influence of supply chain stakeholder pressure as a driver (for environmental practices implementation) is greater for local firms than foreign ones.

Pressure from non-governmental organizations (NGOs): NGOs, such as environmental agencies, community groups, and industry associations pressure firms to be environmentally responsible through public protests, strikes and calls for boycotts (Qi *et al.*, 2010).

Only two studies appear to have examined non-governmental organization (NGO) pressure to implement environmental practices vis-à-vis firm ownership (Darnall *et al.*, 2010; Aldrugi and Abdo, 2014); neither found any difference in the strength/influence of this pressure for foreign and local firms. However, the broader sustainability and corporate social responsibility literature suggests foreign firms to face more (NGO) pressure. This is because foreign firms' typical multi-country operations makes them more visible and easier to target (Yaziji and Doh, 2009). Also because these firms take NGO pressure more seriously as any associated reputational consequences could spill over to the multiple countries they operate in. Hence, we propose the following:

H3c. The strength/influence of NGO pressure as a driver (for environmental practices implementation) is greater for foreign firms than local ones.

Competitor pressure: This refers to the pressure faced by firms to imitate/mimic the actions of their successful competitors (in this case from an environmental perspective) (Sarkis *et al.*, 2011).

No previous study appears to have investigated the strength/influence of this driver vis-à-vis firm ownership. Yet intuitively, it can be argued that this pressure will be greater for local firms as they have to not only compete with other local firms but also with the foreign ones (having superior environmental knowledge, experience, and technological capabilities).

There is a case for greater competitor pressure on foreign firms as well, especially where many (similarly environmentally advanced) foreign firms are operative. However, given that these (foreign) firms would have been competing with each other in other markets, they can be expected to have gained a better understanding of each other's capabilities and adapted,

with consequent lowering of the perceived competitive pressure. Overall therefore, we propose the following:

H3d. The strength/influence of competitor pressure as a driver (for environmental practices implementation) is greater for local firms than foreign ones.

Environmental commitment: This refers to a firm's voluntary, rational desire to embrace environmental practices that are consistent with the obligations and values of society in which it operates (Hsu *et al.*, 2013). With regards to evidence on foreign and local firms' relative environmental commitment, we came across only one study; this study (Faith *et al.*, 2018) which is set in Nigeria's construction sector reported the environmental commitment of foreign firms to be slightly greater than that of local firms.

As per the broader sustainability and CSR literature, foreign firms' environmental commitment can be expected to be greater because of their typical corporate (headquarters) policy, which mandates high environmental commitment and related standardization at all subsidiary locations (Lyon and Maxwell, 2004). In contrast, a few researchers argue local firms' societal concerns including environment-related to be not far behind foreign ones (Kuada and Hinson, 2012) because they are motivated by philanthropic concerns that place a premium on cultural norms and values of society. Overall though, we go with the previous logic and propose the following:

H3e. Environmental commitment of foreign firms is greater than that of local firms.

Business benefits: Firms are motivated by business benefits, such as cost reduction and reputation/brand image enhancement, when deciding to implement environmental practices (Seuring and Muller, 2008).

Evidence from the generic literature shows the strength/influence of this driver to be greater for foreign firms (Aldrugi and Abdo, 2014). Foreign firms', because of their superior technical and managerial knowhow can be argued to be better placed to derive business benefits from environmental practices; in contrast, local firms, and particularly those in emerging economies, may be unaware/skeptical of these benefits and/or may not have requisite capabilities to realize them. Foreign firms also have a greater depth and breadth of opportunities for realizing benefits. They can generate scale-based efficiencies from their multi-country (with standardized environment strategy) operations (Christmann and Taylor, 2001), and can enhance their worldwide rather than just domestic reputation from pursuing high environmental standards (Child and Tsai, 2005; Zhu *et al.*, 2012). In appreciation of these arguments, we propose the following:

H3f. The strength/influence of business benefits as a driver (for environmental practices' implementation) is greater for foreign firms than local ones

2.3 Nature of firm ownership and strengths/influences of environmental barriers

Environmental barriers are hindrances/challenges that prevent firms from implementing environmental practices, and as for drivers, they can be of "external" or "internal" origin (Walker and Jones, 2012). Each of the barriers and the hypothesized differences in their strengths/influences for firms of different ownership types are discussed below:

Shortage of environmental professionals: Implementation of environmental practices requires professionals with environmental expertise, whose shortage is therefore identified as a barrier (Chan *et al.*, 2018).

The literature revealed no previous study to have investigated the strength/influence of this barrier vis-à-vis firm ownership. However, it can be argued that foreign firms, given their access to more/superior resources have a greater ability to address shortages of environmental professionals through, for example, (1) sourcing professionals from other

locations, (2) sending professionals from the head office to train/certify host country employees, or (3) shifting some environmental activities from local branches (host country) to headquarters (home country). Hence, we propose the following:

H4a. Shortage of environmental professionals is a greater barrier (to environmental practices implementation) for local firms than foreign ones.

Shortage of local environmental/green suppliers: Shortage or non-availability of local environmentally friendly/green suppliers can be a critical environmental barrier in many sectors including construction (Elbarkouky and Abdelazeem, 2013).

Again, no previous study across sectors appears to have investigated the strength/influence of this barrier vis-à-vis firm ownership. Foreign firms, though, can be argued to be relatively better placed. In the absence of local green suppliers, for example, foreign firms can tap into their strong international partnerships with global (green) suppliers. Ling (2005) for example, in the Chinese construction sector's case, reported how foreign firms' strong network of contacts enabled them to find suitable overseas suppliers and with favorable credit terms and delivery schedules (through use of high bargaining power). This would be challenging for local firms. Hence, we propose the following:

H4b. Shortage of local environmental/green suppliers is a greater barrier (to environmental practices implementation) for local firms than foreign ones.

High cost of implementation: Implementing environmental practices is expensive; large investments are needed for example on energy-efficient and less-polluting equipment, on environmental management systems and related certifications, and environmentally friendly (i.e. recycled and non-hazardous) materials (Liu et al., 2012; Dube and Gawande, 2016).

As per the broader literature, this can be argued to be less of a barrier for foreign firms. This is because foreign firms may already have relevant environmental technologies, systems, and resources at their headquarters/parent company which they could share/transfer relatively inexpensively to local subsidiaries (Earnhart et al., 2014; Kim et al., 2016). Foreign firms are also known to lower their costs of implementation by standardizing their environmental strategies across countries and realizing global economies of scale (such as via centralized global procurement and sharing of resources) (Christmann and Taylor, 2001). Local firms, in contrast, will not have any such benefit; environment-related investments for them would therefore be higher and constitute a bigger environmental barrier. Hence, we propose the following:

H4c. High cost of implementation is a greater barrier (to environmental practices implementation) for local firms than foreign ones.

Lack of knowledge and awareness. Implementation of environmental practices requires sound technical and managerial know-how regarding, for example, use of environmental tools and techniques, and environmental management standards and certifications (Liu et al., 2012). Lack of this know-how therefore constitutes a barrier.

The broader sustainability literature suggests lack of environmental knowledge and awareness to be less of a barrier for foreign firms as they possess state-of-the-art technologies, use cutting-edge practices (Earnhart et al., 2014) and have access to related managerial and technical know-how at both headquarters and subsidiaries (Child and Tsai, 2005; Kim et al., 2016). In contrast, knowledge and awareness of environmental practices at local firms, particularly those in emerging economies, is likely to be limited given the recent introduction of these practices there.

A few researchers, however, take a contrary view. They argue that foreign firms have less information on the local business environment, law, culture, customs, and language,

commonly referred to as the “liability of foreignness” (King and Shaver, 2001), and because of which they are comparatively disadvantaged.

Overall though, going with the greater weight of evidence, we propose the following:

H4d. Lack of knowledge and awareness is a greater barrier (to environmental practices implementation) for local firms than foreign ones

2.4 Nature of firm ownership and performance benefits from implementing environmental practices

While the key reason for implementing environmental practices is to improve environmental performance, the economic dimension (both short-term/cost-oriented and long-term/organizational) is also important so that investments in those practices can be justified.

With regards to the extent of those benefits (from environmental practices) for foreign and local firms, this is important to know. First, evidence of comparable level of benefits for local firms (vis-à-vis foreign ones) could give an impetus to them to implement environmental practices. Second, it would enable support mechanisms such as financial support, incentives, tax discounts and training to be targeted at the performance-wise deficient firm ownership category to increase their implementation levels/effectiveness. Below we discuss and hypothesize the nature of firm ownership’s implication for each of the three performance aspects separately.

Environmental performance benefits: The key environmental performance benefits from implementing environmental practices include reductions in air emissions, material usage, energy and water consumption, hazardous material usage, environmental accidents, and waste generation (Hervani *et al.*, 2005; Green *et al.*, 2012; Dubey *et al.*, 2017). With regards to associating the extent of these benefits to foreign and local firms, the generic literature shows a lack of consensus with greater (e.g. Eskeland and Harrison, 2003), lower (e.g. King and Shaver, 2001) and equivalent (e.g. Pargal and Wheeler, 1996) environmental performance benefit for foreign firms vis-à-vis local ones being all reported.

The greater environmental performance benefit for foreign firms could be due to their greater efficiency and effectiveness of implementing environmental practices; this, in turn, could be due to their extensive international experience, state-of-the-art technologies, and strong technical, procedural and managerial know-how. The greater benefit for foreign firms could also be because of the (high) pressure of meeting stringent head office environmental performance targets and reporting requirements. We therefore propose the following:

H5. Environmental performance benefits from environmental practices are greater for foreign firms than local ones

Short-term economic (or cost) performance benefits: The key short-term economic (or cost-related) performance benefits from environmental practices include cost reductions in energy, water and waste management, in material costs, in environmental penalties, and in fines (Chen *et al.*, 2010).

We came across only one study that has investigated these benefits vis-à-vis firm ownership: Kuada and Hinson (2012) which investigated corporate social responsibility practices vis-a-vis firm performance in Ghana and found greater cost reduction for foreign firms than local ones. However, similar to the arguments put forth for environmental performance, better technology and procedural and managerial know-how coupled with stringent monitoring and reporting of economic/cost performance would enable foreign firms to fare better. We therefore propose the following:

H6. Cost performance benefits from environmental practices are greater for foreign firms than local ones.

Long-term economic (or organizational) performance benefits: The long-term economic (or organizational) benefits from environmental practices include increases in sales, sales prices, market share, profits, and return on investments (Vijayvargy *et al.*, 2017; Faith *et al.*, 2018).

We came across only two studies (Faith *et al.*, 2018; Kuada and Hinson, 2012) that have investigated this, with both reporting organizational performance benefits (from environmental practices) to be relatively greater for foreign firms. While in Faith *et al.*'s (2018) case, this was in terms of increase in sales and profit (for foreign firms), in Kuada and Hinson's (2012) case, it was in increase in earnings and improvement in company image terms.

Intuitively, it can be argued that foreign firms may have more experience in leveraging their marketing channels for environment-publicity related gains. They are also more visible to governments, NGOs, consumers, and investors, and could therefore, benefit more, such as in terms of attracting environmentally conscious buyers and institutional investors. Through the backing of their headquarters, foreign firms may also have more financing options available including access to low-interest loans and superior credit and repayment terms from global lenders/ suppliers (which may not be possible for local firms). Therefore, organizational performance benefits from environmental practices can be expected to be greater for foreign firms. Consequently we propose the following:

H7. Organizational performance benefits from environmental practices are greater for foreign firms than local ones.

Figure 1 conceptualizes our research questions and hypotheses.

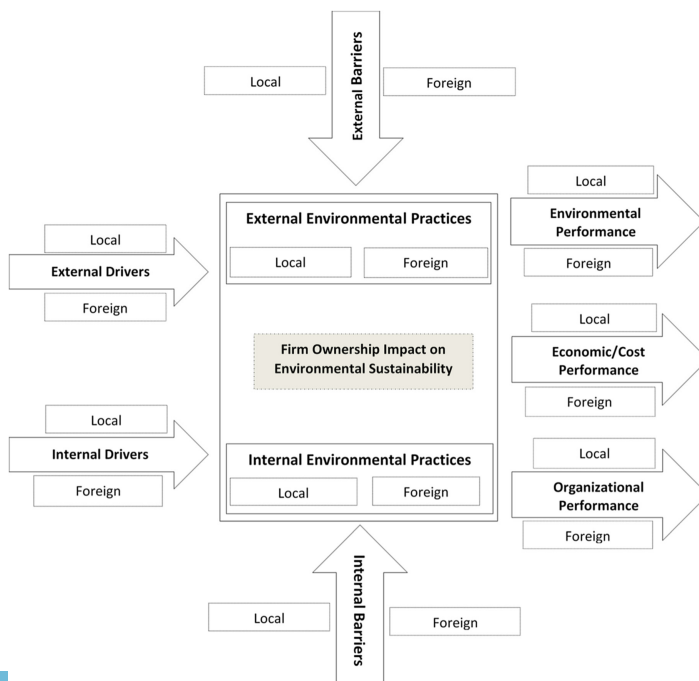


Figure 1. Framework of firm ownership impact on environmental sustainability

3. Research methodology

3.1 Research setting

While the above comprehensive investigation could be based anywhere, choosing a setting with an international outlook (presence of foreign firms), and where environmental practices implementation has shown maturity would be appropriate.

United Arab Emirates's (UAE) construction sector hosts a significant proportion of foreign firms as evident from high foreign direct investment (FDI) inflows: construction accounts for roughly 27% of all greenfield investments in the UAE. It has also grown significantly in the past, and while playing a pivotal role in UAE's transformation to a modernized country, it has also caused severe environmental degradation; it accounts for roughly 75% of all the solid waste generated in UAE (SCAD, 2017) and is the main contributor to UAE's status as one of the most polluting countries in the world in terms of carbon emissions (World Bank Country Report of UAE, 2018). Now, UAE government and construction firms are taking environmental initiatives to make the country one of the most sustainable in the world by 2021 (UAE Vision, 2021; 2018). UAE's construction sector therefore serves as an appropriate and interesting context for the investigation.

3.2 Phase 1 – survey research (quantitative)

3.2.1 Development of the survey instrument. The previous literature was comprehensively reviewed to develop the survey instrument (refer Appendix 1) along the four key dimensions of environmental sustainability (i.e. environmental practice implementation, environmental drivers, environmental barriers, and performance benefits of implementing environmental practices). A five-point Likert scale was used to evaluate the different environmental dimensions/sub-dimensions. To capture firm ownership, we used two classifications (i.e. foreign and local) in the survey. Foreign firms are the ones having their parent firm located in another (mostly developed/industrialized) country and have a majority stake in the host country (UAE) operations (>50%). Local firms are the ones that are established in the UAE and have majority local stake in their operation (>50%). After developing the survey instrument, minor modifications were made to it based on the pre-test and pilot survey.

3.2.2 Sampling and survey administration. A purposive, matched-samples design was used in the study, as it allowed the effects of one variable (in this case, firm ownership) to be studied by controlling for other variables, such as firm size and age. The Zawya database (which we paid to access) and one of the author's personal LinkedIn contacts were utilized to filter respondents through advanced profiling based on firm ownership and employees' designation or role in the firm and other firm characteristics such as firm size and age. The study design not only enabled a reasonable representation of both local and foreign firms in the sample but also control for any extraneous effects of firm size and age by ensuring that they are equally present across the two firm ownership categories.

The survey instrument was administered via email to construction industry professionals in the UAE using Qualtrics, a web-based survey system. A total of 395 complete useable responses were obtained. Developers were excluded from the survey, as there are only a handful of foreign developers in the UAE. For the other stakeholders who participated in the survey (Architects/Consultants, Contractors, and Suppliers), comparable percentages of responses were obtained for both foreign and local firms. The demographic characteristics of the survey participants are presented in Table 1.

3.2.3 Data validation. Before proceeding with hypothesis testing, we checked the data for non-response bias and common-method bias. For non-response bias, the *t*-test revealed no significant difference in the response of early and late participants for each survey items, indicating it was not a problem (Rogelberg and Stanton (2007). With regards to common bias,

	Responses	Percentage	Foreign versus local firms
<i>Firm Ownership</i>			
Local	161	40.8%	
Foreign	234	59.2%	
<i>Total</i>	<i>395</i>	<i>100%</i>	
<i>Stakeholder</i>			
Architect/Consultant	105	26.6%	1749
Contractor	213	53.9%	
Suppliers	77	19.5%	
<i>Total</i>	<i>395</i>	<i>100%</i>	
<i>Respondents experience (in years) in the construction sector</i>			
0-2	7	1.8%	Table 1. Classification of survey respondents
3-5	61	15.4%	
6-10	121	30.6%	
>10	206	52.2%	
<i>Total</i>	<i>395</i>	<i>100.0%</i>	

procedural remedies, as suggested by Podsakoff *et al.* (2003), were undertaken prior to data collection; these included re-assuring respondents about data confidentiality and anonymity to encourage them to respond as honestly as possible, and conducting a pre-test and a pilot test of the survey instrument to improve content and face validity. Post data collection, the common method bias was tested using Harman's single factor test, where all the items are loaded onto one construct (factor) using exploratory factor analysis (EFA) (Podsakoff *et al.*, 2003). The result shows the constrained one-factor EFA accounted for only 26.1% of the variance, while the unconstrained nine-factor model explained 79.2% of the variance, indicating that common-method bias was not an issue.

3.2.4 Construct validity. Given that multi-item measures were used to assess the different dimensions and sub-dimensions of environmental sustainability, it was essential to establish their statistical appropriateness.

Convergent validity: It ensures that the measures expected to be related, are in fact related. First and second-order confirmatory factor analysis (CFA) was used to assess the convergent validity of the constructs considered. The results are provided in Appendix 1. All items were loaded to their respective constructs with factor loadings greater than 0.50, indicating that the constructs have strong convergent validity (Anderson and Gerbing, 1988).

Discriminant validity: It ensures that measures that should not be related are in fact not related. To test for discriminant validity, a series of pair-wise CFAs were conducted by forcing measures of each pair of constructs into a single underlying construct and checking for any significant deterioration in model fit relative to a two-factor model (Anderson and Gerbing, 1988). The pair-wise tests, which were conducted separately for environmental practices, environmental drivers, environmental barriers, and performance benefits, showed significant deterioration in model fit for all cases, thereby demonstrating strong discriminant validity.

Construct reliability. It shows the degree of consistency, precision, and repeatability of the measures in the construct (Kline, 1998). The reliability of each construct operationalized in this study was verified using Cronbach's alpha. The reliability values of each construct are shown in Appendix 1. Larger values indicate better consistency in measurements. They were above 0.7 for all constructs, except for the internal barrier construct (0.62), which was still within the acceptable limit (Nunnally, 1978).

3.3 Phase 2 – interviews (qualitative)

Purposive sampling was used where the organizations (for the interviews) were so chosen as to ensure an equal representation of foreign and locally owned ones, and that all key stakeholders including developers are covered. To get a holistic perspective, multiple respondents were considered from each organization. A total of 19 semi-structured interviews with senior professionals (most of whom had more than ten years of experience in the construction sector) were conducted across ten firms (five foreign and five local). Demographic details on the respondents are presented in [Table 2](#).

The interviews, all of which were face-to-face, covered the four main aspects of environmental sustainability: environmental practices, environmental drivers, environmental barriers, and environmental performance benefits. Each interview lasted approximately 45–60 min. Most were digitally recorded, and where this was not possible, detailed notes were taken. All the interviews were transcribed within 48–72 h and crosschecked with the respondents for accuracy. Also, relevant secondary data was sought to complement the interview findings.

Thematic analysis was used to analyze the interview data. The data drawn from interview transcripts across the four dimensions of environmental sustainability were grouped into nine sub-categories: external and internal drivers; external and internal barriers; external and internal environmental practices; and environmental, cost/economic, and organizational performance. Codes were assigned to individual aspects identified within these sub-categories. For example, government regulation, identified as a driver of environmental practices was assigned a specific code within sub-category 1 (external drivers). Similarly, environmental commitment, another driver identified was assigned a specific code within sub-category 2 (internal drivers). Similarly, all the other individual environmental drivers were assigned codes and categorized within sub-categories 1 and 2. The same procedure was repeated for environmental barriers, environmental practices and performance for foreign and local firms. The key findings from the interviews are given in [Table 3](#).

4. Findings and discussion

In this section, both survey and interview findings are discussed in line with the research questions. First, the hypotheses test results are discussed. To test each hypothesis, an independent sample *t*-test, the most common statistical method to evaluate differences in means between two independent groups (in this case between foreign and local firms) is considered. Next, for each hypothesis, the findings of the interviews are discussed in sequence to enrich the understanding of why certain phenomena exist.

4.1 Environmental practices implementation related

[Tables 4 and 5](#) show the extents of implementation of external and internal environmental practices respectively, at foreign and local firms. The *t*-scores and *p*-values indicate whether the differences between the firms are significant. The tables clearly show the extents of implementation of both external and internal environmental practices to be higher at foreign firms. Moreover, the differences in the extents of implementation between foreign and local firms are significant and consistent, ranging from 0.2 to 0.8 for different practices, thereby supporting our hypotheses ([H1](#) and [H2](#)).

The interviews supported this position. For instance, the respondents stated that foreign firms have an edge over local ones in terms of knowledge as well as the ability to share/utilize the resources of their head office or other branches across the world. This was emphasized by an interviewee from a foreign subsidiary: “The good thing with us [a foreign contractor] is that we have inherited the entire Environmental Management System (EMS) and other systems from our head office.” Similarly, foreign architects/consultants had access to state-of-

Stakeholders	Interviewee details	Developer	Architect/ Consultant	Main contractor	Subcontractor	Supplier
Foreign (All key stakeholder firms involved are foreign)	Annual Turnover Designation of Interviewee	~\$ 825 million (1) Head of sustainability (2) Senior Vice President-Operations	~\$ 250 million (1) Lead Architect (2) Senior Consultant -Sustainability	~\$ 430 million (1) Regional Head -Sustainability (2) Head of Commissioning	~\$ 160 million (1) Technical Manager (2) Manager-LEED projects (3) Senior Engineer-MEP and Systems	~\$ 400 million (1) Product Specialist (2) Business Development Manager
Local (All key stakeholder firms involved are local)	Annual Turnover Designation of Interviewee	~\$ 690 million (1) Chief Operations Officer (2) Manager – Special Projects	~\$ 175 million (1) Head of Design (2) Manager – Compliance and Tender	~\$ 550 million (1) Project Manager (2) Project Engineer	~\$ 180 million (1) Project Engineer	~\$ 400 million (1) Product Manager

Table 2. Demographic details of interview respondents

Interview focus	Differences witnessed between foreign and local firms	Underlying reason for difference
<p>What are the environmental practices implemented by your firm?</p>	<p><i>External Environmental Practices</i></p> <p>(1) In foreign firms, the use of advanced green design standards and tools such as state of the art 3D modeling software were greater than local firms</p> <p>(2) Foreign firms were found to exceed the design requirements mandated by regulation, whereas local firms were found to meet only the minimum requirement as per the law</p> <p>(3) Foreign firms were found to use standard global procurement practices. Local firms' green procurement requirements were mainly limited to regulatory requirements and were found to use mostly local suppliers who have less environmental capabilities than foreign suppliers</p> <p>(4) In foreign firms, stringent environmental criteria in procurement contracts were seen. E.g., at the prequalification stage, more weight is given to environmental aspects. In the case of local firms, environmental criteria in procurements were mostly based on minimum regulatory and contractual requirements</p> <p>(5) In foreign firms, the selection of geographically closer suppliers to reduce transportation-related emissions was seen. No such practice was seen in local firms</p> <p>(6) In some foreign firms, full truckload transportation or minimum 80% capacity of the vehicle was mandated for the delivery of materials. No such practice was seen in local firms</p> <p>(7) In foreign firms, scheduling of material deliveries was mostly seen during off-peak times and during the night to reduce traffic congestion and associated transportation emissions. No such practice was seen in local firms</p> <p>(8) Foreign firms were found to use state of the art manufacturing facilities using imported equipment which are similar to ones used in headquarters. In most foreign firms, the use of video conferencing was common to minimize employee travel and thereby emissions. This was seen only in a few local firms</p> <p>(9) In foreign firms, Joint R&D was observed with other subsidiary locations and headquarters. Limited R&D was seen in local firms</p> <p><i>Internal Environmental Practices</i></p> <p>(1) In most foreign firms, the EMS system was inherited from headquarters. EMS implementation is seen at local firms too, though the stringency is less than foreign firms</p> <p>(2) In foreign firms, the frequency and depth of environmental training seen were high. Employees are sent to headquarters for training. Employees at all levels and even supplier firms are considered as part of their comprehensive environmental training programs</p> <p>(3) In local firms, environmental training is limited to their own employees and only covers very selected and project-specific aspects. Also, the duration of the training programs is limited</p> <p>(4) In foreign firms, internal auditing was found to be very stringent in line with headquarter policies and procedures. Also, suppliers and their suppliers (tier 2 and tier 3 supplies) are also audited for environmental aspects</p> <p>(5) In local firms, internal environmental auditing is seen, but is limited to specific projects and the stringency is also less. Suppliers' environmental auditing is very limited among local firms</p> <p>(6) In foreign firms, cross-functions teams within the organization, with other subsidiary locations and with headquarters, are common. Cross-functional integration is very limited in local firms</p> <p>(7) In foreign firms, end of life management is considered in most projects. Also, in most projects, end of life aspects are considered at the design stage itself. In local firms, end of life consideration is only seen for selected and prestigious projects</p>	<p>(1) Foreign firms' global practices are audited, and they are required to maintain consistency across all subsidiary locations</p> <p>(2) Superior technical and managerial know-how seen among foreign firms vis-à-vis local firms. In most cases, foreign firms have already implemented environmental practices in their home country and/or other subsidiary locations, and hence they have the experience which local firms is lacking</p> <p>(3) Foreign firms were seen to harness/request resources and expertise from their headquarters. Hence, foreign firms have resource sharing and economies of scale benefits</p> <p>(4) Higher levels of environmental practices witnessed at foreign firms are also because of expert employees who are sent to the subsidiary location from headquarters to oversee the projects</p> <p>(5) Organizational culture and organizational structure of foreign firms are supportive of implementing environmental practices such as cross-functional integration. In local firms, bureaucratic organizational culture and hierarchical organizational structure is a hindrance to environmental practices</p> <p>(6) Limited budget allocation for environmental aspects seen at local firms, whereas the dedicated budget is seen at foreign firms</p>

Table 3. Interview focus and a summary of the difference between foreign and local firms and underlying reasons

(continued)

Interview focus	Differences witnessed between foreign and local firms	Underlying reason for difference
<p>What are the factors that are driving your firm to implement these environmental practices? And why?</p>	<p><i>External Drivers</i></p> <p>(1) Similar regulatory pressure is faced by foreign and local firms since the UAE regulation does not differentiate foreign and local firms. However, foreign firms were found to be driven more by government regulation</p> <p>(2) Both foreign and local firms were found to be driven by stakeholder pressures. Foreign firms were found to pressurize local firms to implement environmental practices. However, foreign firms were found to consider stakeholder pressure seriously than local firms</p> <p>(3) NGOs were found to target foreign firms than local firms. Foreign firms were found to take NGO pressure seriously while local firms were found to ignore NGO pressure or develop corporate buffers against it</p> <p>(4) Both foreign and local firms were found to face similar competitor pressure. Foreign firms' competitor pressure was mainly due to the influx of other foreign firms, whereas local firms are more pressurized to implement environmental practices to stay competitive with foreign firms</p> <p><i>Internal Drivers</i></p> <p>(1) Environmental commitment was clearly seen higher among foreign firms than local firms. This is evident in their corporate environmental policy, vision, and mission statements. This is relatively less witnessed in local firms</p> <p>(2) Business benefits as a driver were seen higher among foreign firms. This includes cost reduction, winning environmental projects, and government projects with an emphasis on environmental aspects</p>	<p>(1) Foreign firms consider external pressure seriously to secure goodwill as well as legitimacy in the eyes of regulatory authorities as well as gain credibility among the local stakeholders</p> <p>(2) The level of visibility of foreign firms is relatively high compared to that of local firms and therefore are under the constant watch of NGO's</p> <p>(1) Foreign firms' headquarters policy mandates high environmental commitment and related standardization at all subsidiary locations</p> <p>(2) Foreign firms were found to self-regulate their environmental conduct more than local firms</p> <p>(3) Foreign firms have previous experience of achieving business benefits and therefore are very keen on implementing environmental practices. Local firms were found to be skeptical of these benefits</p>
<p>What are the barriers that are stopping your firm from implementing these environmental practices? And why?</p>	<p><i>External Barriers</i></p> <p>(1) The shortage of environmental professionals is less of a concern for foreign firms. Foreign firms were found to have more staff with environmental certification in their payroll than local firms</p> <p>(2) The shortage of local environmental suppliers is also less of a concern for foreign firms. Foreign firms were found to source more from global suppliers than local firms</p> <p><i>Internal Barriers</i></p> <p>(1) The high cost of implementation is a concern raised by both foreign and local firms. However, it was relatively lower for foreign firms</p> <p>(2) Local firms' vis-à-vis foreign firms were found to lack the knowledge on implementing environmental practices as well as general lack of awareness on the benefits of implementing environmental practices</p>	<p>(1) Foreign firms were found to use their global reputation to attract environmental professionals from across the world. Foreign firms were found to use professionals from head office to carry out project responsibilities and to train/certify local employees to become environmental professionals</p> <p>(2) Foreign firms were found to use its global supplier network for green materials</p> <p>(3) Foreign firms also were found to get favorable supply terms such as lower prices, credit, and faster delivery than local firms because of their higher bargaining power. Local firms, on the other hand, are finding it hard to develop good supply terms</p> <p>(4) Foreign firms have the advantage of resource sharing and economies of scale</p> <p>(5) Foreign firms have access to related managerial and technical know-how at both headquarters as well as subsidiaries. Also, constant knowledge transfer is happening between all headquarters to subsidiaries</p>

(continued)

Table 3.

Interview focus	Differences witnessed between foreign and local firms	Underlying reason for difference
Do you see any overall improvement in environmental performance (environmental, cost, and organizational) a while after the implementation of environmental practices? If so, how and why?	<p><i>Environmental, cost and organizational performance</i></p> <p>(1) All three performance aspects were found to be higher for foreign firms though local firms were not far behind foreign firms in all three performance aspects</p> <p>(2) The use of environmental performance measures and periodic reporting is higher in foreign firms; while the use of cost and organizational performance measures is similar among local and foreign firms</p>	<p>(1) Foreign firms are facing stringent head office environmental performance targets and reporting requirements</p> <p>(2) Foreign subsidiary environmental performance was found to be included in the group corporate annual report and hence was found to take it seriously</p> <p>(3) Foreign firms have greater efficiency and effectiveness of implementing environmental practices; this, in turn, is due to their extensive international experience, state-of-the-art technologies, and strong technical, procedural and managerial know-how</p> <p>(4) Foreign firms have more experience in leveraging their marketing channels for environment-publicity related gains</p> <p>(5) Foreign firms have the backing of their headquarters and hence have more financing options available including access to low-interest loans and superior credit and repayment terms from global lenders/ suppliers</p> <p>(6) Foreign firms were known for standardizing their environment strategies across countries and realizing global economies of scale (such as via centralized global procurement and sharing of resources)</p> <p>(7) Local firms were found to benefit from implementing low hanging fruits that required low capital investment such as video conferencing, sale of scrap materials</p> <p>(8) Reputation gain from environmental practices implementation has helped local firms get more environmentally conscious local customers, while it enabled foreign firms to attract more environmentally conscious foreign customers and institutional investors</p> <p>(9) Cost and organizational performance benefits are taken seriously by local firms as well as part of their generic risk management framework</p>

Table 3.

the-art 3D modeling software and other tools for innovative environmental design via their headquarters. Also, with regards to environmental purchasing, foreign consultants and contractors highlighted instances where they asked their suppliers to provide green materials beyond what was necessary for the tender. For example, the foreign contractor interviewed was found to exceed Developer’s contract requirements such as on green material specifications, auditing suppliers (for green) and on LEED experience, number of LEED-certified staff in rolls and ISO 14001 certification when selecting sub-contractors. This is because, in most cases, foreign firms were using their standard global procurement practices. Also, foreign firms were found to use video conferencing more than local firms, and buy from suppliers who are nearby since importing from distant suppliers’ was seen to defeat the underlying green/environmental objective due to (increased) emissions from (greater) transportation. In the words of a foreign contractor: “By the time the green materials reach here (UAE) from overseas, they are already brown.” Also, the significant difference (=0.8) for cross-functional integration (highest across all internal environmental practices) could be because of the difference in organization structure/cultures between the firms. While foreign firms were found to have a decentralized structure and an organizational culture that promoted formal/informal teams, a rigid, hierarchical organizational structure was observed in local firms, and one which was a hindrance to the development of cross-functional teams. Foreign firms were also found to develop cross-functional teams between the head office and the UAE subsidiary. Similarly, the relatively high mean difference (=0.6) in environment-

Hypothesis	External environmental practices	Extent of implementation (scale 1–5)		Difference in extent of implementation between local and foreign firms (mean)	<i>t</i> -value	Hypothesis supported (Yes/No)
		For local firms (mean)	For foreign firms (mean)			
H1a	Eco-design ^a	4.0	4.2	–0.2	–2.11*	Yes
H1b	Environmental purchasing ^b	3.5	4.2	–0.7	–6.38***	Yes
H1c	Environmental transportation	3.4	3.8	–0.4	–4.08***	Yes
H1d	Environmental manufacturing/construction ^b	3.8	4.2	–0.4	–2.93**	Yes
H1e	End of life environmental practices	3.4	3.7	–0.3	–2.36*	Yes
H1	Overall external environmental practices ^c	3.5	3.9	–0.4	–3.93***	Yes

Note(s): 1 means a very low level of implementation and 5 means a very high level; ***significance at $p < 0.001$; **significance at $p < 0.01$; *significance at $p < 0.05$, ^aNot relevant for contracting firms; ^bnot relevant for architectural/consulting firms; ^call external environmental practices considered together

Table 4. Extents of external environmental practices implementation for foreign and local firms

Hypothesis	Internal environmental practices	Extent of implementation (scale 1–5)		Difference in extent of implementation between local and foreign firms (mean)	<i>t</i> -value	Hypothesis supported (Yes/No)
		For local firms (mean)	For foreign firms (mean)			
H2a	Environmental Management System (EMS)	4.0	4.3	–0.3	–3.93***	Yes
H2b	Environmental training	3.9	4.3	–0.4	–4.23***	Yes
H2c	Environmental auditing	3.5	4.0	–0.5	–5.07***	Yes
H2d	Cross functional integration	3.5	4.3	–0.8	–6.89***	Yes
H2e	Environment-related R&D	2.7	3.3	–0.6	–6.18***	Yes
H2	Overall internal environmental practices ^a	3.5	4.0	–0.5	–5.48***	Yes

Note(s): 1 means very low level of implementation and 5 means a very high level; ***significance at $p < 0.001$, ^aAll internal environmental practices considered together

Table 5. Extents of internal environmental practices implementation for foreign and local firms

related R&D could be because foreign firms were found to allocate a greater share of revenue/profits and time to environment-related R&D activities than their local counterparts.

This echoes the findings in the literature on foreign firms showing greater environmental practices implementation because of superior technical, procedural, and managerial know-how (Child and Tsai, 2005; Kim *et al.*, 2016). The findings reject the pollution haven hypothesis and instead support the pollution halos hypothesis. Simultaneously, it is also important to highlight that local firms were found to be not too far behind foreign ones with regards to the implementation of certain practices, such as eco-design, end-of-life, and Environmental Management System (EMS).

4.2 Strengths/influences of environmental drivers related

Table 6 shows the strengths/influences of environmental drivers for local and foreign firms as well as the difference between them in statistical terms. First, looking at the external drivers, the table shows hypotheses H3a and H3c (for government regulatory pressure and NGO pressure respectively) being supported with pressure on foreign firms being greater. With regards to stakeholder pressure and competitor pressure though, no significant

Hypothesis	External environmental drivers	Strength/Influence (scale 1–5)		Difference in strength/influence between local and foreign firms (mean)	t-value	Hypothesis supported (Yes/No)
		For local firms (mean)	For foreign firms (mean)			
H3a	Government environmental regulation	3.0	3.3	-0.3	-2.24**	Yes
H3b	Stakeholder pressure (supply chain)	3.2	3.3	-0.1	-0.91	No
H3c	NGO pressure	2.0	2.5	-0.5	-3.69***	Yes
H3d	Competitor pressure	2.9	2.9	0.0	-0.10	No
<i>Internal Environmental Drivers</i>						
H3e	Environmental commitment	3.4	4.0	-0.6	-6.35***	Yes
H3f	Business benefits	3.5	3.9	-0.4	-3.21**	Yes
<i>External Environmental Barriers</i>						
H4a	Shortage of environmental professionals	3.6	2.6	1.0	8.22***	Yes
H4b	Shortage of local environmental/green suppliers	3.7	2.9	0.8	7.31***	Yes
<i>Internal Environmental Barriers</i>						
H4c	High cost of implementation	3.9	3.7	0.2	-2.36*	Yes
H4d	Lack of knowledge and awareness	3.7	2.8	0.9	7.99***	Yes

Table 6. Strengths/influences of drivers of and barriers (to environmental practices implementation) for foreign and local firms

Note(s): 1 means very low strength/influence, 5 means very high strength/influence; ***significance at $p < 0.001$; **significance at $p < 0.01$; *significance at $p < 0.05$

difference in the pressure between the firms was found; hypotheses H3b nor H3d were therefore not supported.

With regards to government regulatory pressure (H3a), the nature of environmental regulations in the UAE is the same for foreign and local firms. Therefore, the greater pressure experienced by foreign firms can be explained as due to the greater importance they place on these regulations. This is because (as evidenced through the interviews), foreign firms fear spillover of loss of legitimacy and reputation from one country to another. For example, one of the respondents highlighted that their global supply chain/operations are audited, and compliance with regulation is always at the top of the agenda for the auditors. Moreover, foreign firms were found to prepare for more stringent regulations in the future. Foreign firms were also observed to show a similarly high preparedness and seriousness with regards to NGO pressure (H3c) and for the same reasons. Both the findings and the rationale for it are in line with the literature discussed earlier (Spencer and Gomez, 2011; Kim *et al.*, 2016).

With regards to stakeholder pressure, the findings suggest this pressure to be independent of the nature of firm ownership. Instead, from the interviews, it was apparent that this pressure is more dependent on where an entity is located (position-wise) in a supply chain; for example, Architects/consultants were found to receive the same environment-related pressure and compliance requirements from developers with similar non-compliance penalties irrespective of their nature of ownership. Finally, similar levels of competitor pressure faced by foreign firms vis-à-vis local ones could be because of the increasing influx of foreign firms in UAE with similarly advanced green knowledge and capabilities, as reflected by the significant increase in foreign direct investment in the country's construction sector. Still, for both ownership categories, the influence of this pressure is moderate (2.9 out of a maximum 5).

Next, looking at the internal environmental drivers, Table 6 shows both H3e and H3f being supported; environment commitment and business benefits are both greater and hence bigger drivers for foreign firms. The difference between the firms is relatively large (=0.6) for environmental commitment and moderate (=0.4) for business benefits.

Foreign firms' high environmental commitment was also observed during the interviews. For example, the interviewed foreign contractor, as a part of their headquarters policy, had imparted environment/sustainability-related training to more than 350 Subcontractors over a three year period. No such demonstrated commitment was observed for the local firms. The same contractor was also found to pressurize subcontractors and suppliers to sign the United Nations Global Compact agreement. Also, for all the interviewed foreign firms, the environmental commitment was found to be clearly stated and communicated to employees and external stakeholders via environmental vision or mission statements and/or the establishment of corporate environmental policy. When probed, most foreign firms reiterated their need to maintain a standard environmental protocol across all branches/subsidiaries. The findings are therefore supportive of the literature which highlights foreign firms' strict adherence to a corporate policy that mandates a high level of environmental commitment and standardization at all subsidiary locations (Lyon and Maxwell, 2004). The findings further reject the pollution haven hypothesis.

With regards to business benefits as a driver, the interviews revealed that foreign firms use UAE as a base to operate in neighboring countries, such as Saudi Arabia. This required them to develop greater and more diverse environmental capabilities in order to be competitive. In contrast, local firms offered services predominantly locally and did not require environmental capabilities beyond those required by local regulators. Also, most foreign firm respondents were found to be well aware/convicted of the cost reduction potential of environmental projects. According to a respondent from the foreign developer, "Even small aspects such as reducing the flow rate of the showerhead or tape, or using light sensors in corridors, can bring significant cost savings, and much higher than what you can

imagine.” On the other hand, a general lack of awareness of the business benefits of environmental practices, including cost reduction, was found among local firms. Also, foreign firms are keen on improving brand image/reputation by implementing environmental practices. According to them, this will enable them to win projects from environmentally reputable developers; also enable them to charge a premium.

4.3 Strengths/influences of environmental barriers related

Referring to [Table 6](#) again, and looking at the external barriers, we can see hypothesis [H4a](#) and [H4b](#) being both supported. The difference in strength/influence between local and foreign firms is also relatively large; equal to 1.0 for the shortage of environmental professionals ([H4a](#)) and 0.8 for the shortage of local environmental/green suppliers ([H4b](#)).

The interviews indicated foreign firms to be more adept at managing the external barriers, and which is in line with the literature. For example, with regards to environmental professionals, foreign architects/consultant firms were found to transfer employees from their head office/other branches and thereby easily manage temporary project requirements. Foreign firms were also found to have strong global partnerships with international green suppliers and to use their (high) purchasing power to obtain favorable credit terms and delivery schedules from them. Local firms were found to struggle on this count. The local contractor interviewed, acknowledged the reluctance to purchase from foreign suppliers. The reluctance meant that environmental criteria in purchasing decisions were often relaxed to select local suppliers. These contractors also blamed the foreign architects/consultants’ building designs, which are mainly based on foreign suppliers they are familiar with, but which do not have subsidiaries in the UAE or in the region. This can be summarized in the words of two local interviewees: “There is uncertainty while switching suppliers, especially from local to foreign”; “. this challenge is even more so when we deal with foreign suppliers”.

Similarly, with regards to internal environmental barriers, [H4c](#) and [H4d](#) are both supported. The interviews indicated foreign firms to have easy access to global tools and expertise through their headquarters. Also that there was a continuous transfer of knowledge, including environment-related from head office to local UAE offices; UAE office employees are also routinely sent to the head office for training. The results echo the literature, which suggests local firms in emerging economies to have limited knowledge and awareness of environmental practices ([Child and Tsai, 2005](#); [Kim et al., 2016](#)). The findings also reject the notion put forth by some authors that foreign firms are disadvantaged due to lack of knowledge and awareness about the local business environment ([King and Shaver, 2001](#)).

With regards to the high cost of implementation of environmental practices as a barrier, it was found to be marginally lower for foreign firms than local ones. This is because (as evidenced from the interviews), by tapping into their headquarters’ systems, technologies, and manpower, foreign firms are able to reduce their upfront investments ([Earnhart et al., 2014](#); [Kim et al., 2016](#)); they also benefit from economies of scale because of centralized global procurement ([Christmann and Taylor, 2001](#)).

4.4 Performance benefits related

[Table 7](#) shows the extent of environmental, cost, and organizational performance benefits from environmental practices for foreign and local firms.

Firstly, the environmental performance benefits can be seen to be marginally higher for foreign firms, thereby supporting [H5](#). According to the interviews, the reason for this is the relatively high efficiency and effectiveness achieved (due to superior knowledge, experience, and tools) when foreign firms implement environmental practices. In addition, the stringent monitoring and periodic reporting of environmental performance measures, especially to the

Hypothesis	Environmental performance benefit measure	Extent of benefit (scale 1-5)			t-value	Hypothesis supported (Yes/No)
		For local firms (mean)	For foreign firms (mean)	Difference in benefit between local and foreign firms (mean)		
H5	Environmental performance	3.6	3.9	-0.3	-2.69**	Yes
H6	Cost performance	3.4	3.6	-0.2	-1.28	No
H7	Organizational performance	3.2	3.4	-0.2	-0.91	No

1759

Table 7.
Performance benefits from environmental practices for foreign and local firms

Note(s): 1 means a very low level of benefits and 5 means a very high level; ***significance at $p < 0.001$; **significance at $p < 0.01$; *significance at $p < 0.05$

head offices enable foreign firms to take corrective actions regarding their environmental practices and thereby further improve their environmental performance. However, it is important to note that local firms are not too far behind foreign firms; average value for local firms = 3.6 against 3.9 for foreign ones. It was also evident from the interviews that managers of local firms are making concerted efforts to improve their firms' environmental performance by establishing performance measures and through periodic reporting. One of the local contractor interviewees referred this to as "benefits of low-hanging fruits" or the implementation of environmental practices that required very low capital investment (e.g. use of video conferencing; transportation of material during lower-traffic periods; sale of scrap materials, etc.) but yielded high environmental benefits.

Next, looking at the cost performance benefits, the difference between foreign and local firms can be seen to be insignificant. Most respondents from local firms noted that they closely monitor these benefits as part of their firms' generic risk management frameworks. Despite being selective in environmental practices implementation, the performance of local firms being on par with their foreign counterparts is encouraging and shows that they are efficient and successful in implementing the right practices. However, there is significant scope for improvement for both firm ownership categories, as their overall ratings are well below 4 (out of a maximum 5).

Finally, with regards to organizational performance benefits, here too the difference between foreign and local firms is insignificant (refer Table 7). The findings show that local firms are able to realize organizational performance benefits (from environmental practices' implementation) at par with foreign firms. This should provide an impetus to them to take a long term (organizational performance perspective) when implementing environmental practices. As evidenced from the interviews, the local firms who have implemented environmental practices were able to win projects outside UAE, or suppliers were able to export to foreign countries with stringent environmental regulations.

5. Conclusions

This study is arguably the first comprehensive attempt to understand how various environmental sustainability aspects are perceived and performed by local and foreign firms. The study offers empirical evidence that firm ownership is an important factor in improving the environmental sustainability of firms. It identifies the least and most implemented environmental practices, the influence of different environmental drivers and barriers to its implementation and the best-and worst-performance aspects (among environmental, economic and organizational) for foreign and local firms. Though based on the construction sector, the findings are generically relevant.

The contributions of this study are many-fold. These contributions are expanded upon next:

(1) Industrial-level contributions:

Policy makers and practitioners could benefit from using this research to develop suitable policies/interventions so as to ensure that all firms irrespective of their ownership can contribute equitably towards environmental sustainability. Specifically:

- Foreign firms were found to show significantly greater levels of environmental practices implementation than local firms. Therefore, to promote sector-wide environmental practices implementation, policymakers and industry groups could facilitate transfer of environmental knowledge, expertise, and skills from foreign firms to local firms, which involve various stages such as initiation, persuasion, planning, adoption, and confirmation (Sarkis *et al.*, 2011). For example, this diffusion can happen through collaborative partnerships such as local-foreign joint ventures, foreign firms mentoring local firms and/or by encouraging foreign firms to pressurize local firms to implement environmental practices.
- Also, the study found heterogeneity in the influence of external drivers on foreign and local firms. This provides an opportunity for governments to leverage the external environmental drivers appropriately (as per firm ownership). In the UAE construction sector's case, for example, policymakers should give more attention to local firms, since they consider regulatory pressure to be a lesser driver than foreign firms. They could also support and empower NGOs who do not enjoy much legal backing in the UAE, so that they can impart related pressure on both local and foreign firms, rather than on foreign firms alone. Government and industry groups could also work towards increasing the competition in the market such as attracting more foreign companies to UAE from developed countries with advanced environmental capabilities or by providing incentives for new or existing companies to implement environment practices so that they can impart related pressure on both foreign and local firms. On the other hand, the internal drive of firms to implement environmental practices, whether it is a concern for the environment or to realize business benefits, was found to be greater for foreign firms than local firms. Governments and industry groups must, therefore, strive to increase local firms' awareness of their importance for a green economy and the business benefits they could realize from environmental practices implementation. Also, government tailored incentive programs could support and motivate local firms to implement environmental practices.
- The other key implication for policymakers is the relatively large influence of internal and external environmental barriers for local firms (vis-à-vis foreign firms). Government and industry groups must, therefore, strive to support local firms in particular in coping with these barriers; support mechanisms such as financial support, incentives, tax discount, training, and preferential treatment could be used.
- The findings on the actual performance benefits from environmental practices implementation show that "being green pays" both in the short and the long run, especially for foreign firms. However, the findings show that local firms are not too far behind foreign firms in any of the performance aspects (environmental, cost and organizational), which should, therefore, provide impetus to them to implement environmental practices.
- From a foreign policy perspective, the findings show globalization, liberalization, and foreign direct investment to be not just important for economic development and

industrial modernization, but also for environmental protection. With increasing internalization of firms, the understanding on the impact of firm ownership on environmental sustainability is essential for governments from a foreign direct investment perspective, i.e., whether to allow or block foreign firms to enter their country as well whether to hold them at a higher environmental standard than local firms. The evidence from this study shows that countries looking to improve their environmental sustainability, should encourage foreign firms, especially from developed countries, to establish subsidiaries there. Additionally, linking up and building relationships between foreign and local firms can help diffuse environmental practices.

(1) Research contributions:

The study contributes towards advancing research in this domain. Specifically:

- This study is arguably the first comprehensive attempt to understand the influence of firm ownership on environmental sustainability. The findings also bring some degree of consensus to the limited and scattered previous literature on the subject.
- This study responds to the calls in literature to utilize sequential mixed methods design (e.g., [Dubey et al., 2015](#); [Younis et al., 2019](#)) to gain a richer understanding on the different dimensions of environmental sustainability.
- Since the underlying attributes of construction sectors are similar across countries, the lessons learned from this study can be generalized to construction sectors in other countries.
- Also, given that the complexity of the construction sector, which includes architects/consultants (service providers), contractors/sub-contractors (integrators), and (material and equipment) suppliers, the study mirrors a broad spectrum of different sectors and industries ([MBIE, 2013](#); [DBIS, 2013](#)). Hence, findings of this study are expected to have broader generalizability and hence wider implications across other sectors as well.

(1) Theoretical contributions

This study makes few contributions towards theoretical advancement of the field. Specifically:

- The study provides some consensus on the ongoing debate such as around “pollution halos” and “pollution havens” hypothesis. The evidence from this study provides very little support for the pollution haven hypothesis and instead support the pollution halos hypothesis.
- The study also found limited support for the “liability of foreignness” argument, which argues that the cost of operation for foreign firms is higher because they face discrimination from host country consumers, governments, and suppliers.

(1) Study limitations

The study has some limitations as follows:

- More research is needed to enhance the generalizability of the findings, especially given that the results of this study are based on only one country and one sector.
- First, the study only considered the impact of firm ownership. Other firm characteristics such as firm age, size could also influence the environmental sustainability of firms. Also, future studies could investigate the combined effect of different firm characteristics (e.g., large foreign firms vs. small local firms) or/and firm age (new foreign firms vs. established foreign firms) on environmental sustainability
- Also, other firm ownership categories such as family ownership, institutional ownership, joint-ventures are not considered in this study. Future studies could consider these ownership categories.
- The use of perceptual measures because of the lack of availability of published performance data for environmental, economic, and organisational performance can be considered as a limitation. If the data becomes available, future research can focus on using actual and preferably more objective data on performance.

(1) Future research directions

The suggestions for future research are as follows:

- Future studies could focus on multiple sectors and multiple countries.
- Studies should investigate the impact of firm ownership and/or firm age on environmental management separately, or could strive to capture the combined impact of firm size and ownership.
- Future studies could also consider the benefits of GSCP implementation on other performance dimensions such as social and operational performance.

Despite the limitations, this study provides excellent insights to policymakers, practitioners, industry groups and other concerned stakeholders to make informed actions, strategies and policy interventions so that all firms, regardless of their ownership, can participate/contribute to a green economy.

References

- Aldrugi, A. and Abdo, H. (2014), "Determining the motives or reasons that make companies disclose environmental information", *Journal of Economics, Business and Management*, Vol. 2 No. 2, pp. 117-121.
- Anderson, J.C. and Gerbing, D.W. (1988), "Structural equation modeling in practice: a review and recommended two-step approach", *Psychological Bulletin*, Vol. 103 No. 3, p. 411.
- Balasubramanian, S. and Shukla, V. (2017), "Green supply chain management: an empirical investigation on the construction sector", *Supply Chain Management: An International Journal*, Vol. 22 No. 1, pp. 58-81.
- Brucal, A., Javorcik, B. and Love, I. (2017) "Pollution Havens or Halos? Evidence from Foreign Acquisitions in Indonesia", available at: https://economicdynamics.org/meetpapers/2017/paper_306.pdf.
- Chan, A.P.C., Darko, A., Olanipekun, A.O. and Ameyaw, E.E. (2018), "Critical barriers to green building technologies adoption in developing countries: the case of Ghana", *Journal of Cleaner Production*, Vol. 172, pp. 1067-1079.

- Chang, R.D., Zuo, J., Zhao, Z.Y., Soebarto, V., Lu, Y., Zillante, G. and Gan, X.L. (2018), "Sustainability attitude and performance of construction enterprises: a China study", *Journal of Cleaner Production*, Vol. 172, pp. 1440-1451.
- Chen, Y., Okudan, G.E. and Riley, D.R. (2010), "Sustainable performance criteria for construction method selection in concrete buildings", *Automation in Construction*, Vol. 19 No. 2, pp. 235-244.
- Chen, P.H., Ong, C.F. and Hsu, S.C. (2016), "The linkages between internationalization and environmental strategies of multinational construction firms", *Journal of Cleaner Production*, Vol. 116, pp. 207-216.
- Child, J. and Tsai, T. (2005), "The dynamic between firms' environmental strategies and institutional constraints in emerging economies: evidence from China and Taiwan", *Journal of Management Studies*, Vol. 42 No. 1, pp. 95-125.
- Christmann, P. and Taylor, G. (2001), "Globalization and the environment: determinants of firm self-regulation in China", *Journal of International Business Studies*, Vol. 32 No. 3, pp. 439-458.
- Darnall, N., Henriques, I. and Sadorsky, P. (2010), "Adopting proactive environmental strategy: the influence of stakeholders and firm size", *Journal of Management Studies*, Vol. 47 No. 6, pp. 1072-1094.
- Dasgupta, S., Laplante, B. and Mamingi, N. (2001), "Pollution and capital markets in developing countries", *Journal of Environmental Economics and Management*, Vol. 42 No. 3, pp. 310-335.
- DBIS (2013), *UK Construction an Economic Analysis of the Sector*, Crown, London, UK.
- Dean, J.M., Lovely, M.E. and Wang, H. (2009), "Are foreign investors attracted to weak environmental regulations? Evaluating the evidence from China", *Journal of Development Economics*, Vol. 90 No. 1, pp. 1-13.
- Dube, A.S. and Gawande, R.S. (2016), "Analysis of green supply chain barriers using integrated ISM-fuzzy MICMAC approach", *Benchmarking: An International Journal*, Vol. 23 No. 6, pp. 1558-1578.
- Dubey, R., Gunasekaran, A., Papadopoulos, T. and Childe, S.J. (2015), "Green supply chain management enablers: mixed methods research", *Sustainable Production and Consumption*, Vol. 4, pp. 72-88.
- Dubey, R., Gunasekaran, A. and Papadopoulos, T. (2017), "Green supply chain management: theoretical framework and further research directions", *Benchmarking: An International Journal*, Vol. 24 No. 1, pp. 184-218.
- Earnhart, D.H., Khanna, M. and Lyon, T.P. (2014), "Corporate environmental strategies in emerging economies", *Review of Environmental Economics and Policy*, Vol. 8 No. 2, pp. 164-185.
- Elbarkouky, M.M.G. and Abdelazeem, G. (2013), "A green supply chain assessment for construction projects in developing countries", *WIT Transactions on Ecology and the Environment*, Vol. 179, pp. 1331-1341.
- Eskeland, G.S. and Harrison, A.E. (2003), "Moving to greener pastures? Multinationals and the pollution haven hypothesis", *Journal of Development Economics*, Vol. 70 No. 1, pp. 1-23.
- Faith, A.T., Fagbenle, O.I., Amusan, L.M. and Adedeji, A. (2018), "Dataset on sustainable construction practices of foreign and indigenous construction firms", *Data in Brief*, Vol. 20, pp. 812-818.
- Green, K.W. Jr, Zelbst, P.J., Meacham, J. and Bhadauria, V.S. (2012), "Green supply chain management practices: impact on performance", *Supply Chain Management: An International Journal*, Vol. 17 No. 3, pp. 290-305.
- Hervani, A.A., Helms, M.M. and Sarkis, J. (2005), "Performance measurement for green supply chain management", *Benchmarking: An International Journal*, Vol. 12 No. 4, pp. 330-353.

- Hsu, C.C., Choon Tan, K., Hanim Mohamad Zailani, S. and Jayaraman, V. (2013), "Supply chain drivers that foster the development of green initiatives in an emerging economy", *International Journal of Operations and Production Management*, Vol. 33 No. 6, pp. 656-688.
- Kim, N., Moon, J.J. and Yin, H. (2016), "Environmental pressure and the performance of foreign firms in an emerging economy", *Journal of Business Ethics*, Vol. 137 No. 3, pp. 475-490.
- King, A.A. and Shaver, J.M. (2001), "Are aliens green? Assessing foreign establishments' environmental conduct in the United States", *Strategic Management Journal*, Vol. 22 No. 11, pp. 1069-1085.
- Kline, R.B. (1998), *Structural Equation Modeling*, Guilford, New York.
- Kuada, J. and Hinson, R.E. (2012), "Corporate social responsibility (CSR) practices of foreign and local companies in Ghana. Thunderbird International Business Review, 54(4), 521-536", *Journal of Environmental Economics and Management*, Vol. 42 No. 3, pp. 310-335.
- Liang, F. (2014), "Does foreign direct investment harm the host country's environment? Evidence from China", *Current Topics in Management*, Vol. 17, pp. 105-121.
- Ling, F.Y.Y. (2005), "Benefits that foreign AEC firms derive when undertaking construction projects in China", *Management Decision*, Vol. 43 No. 4, pp. 501-515.
- Liu, J.Y., Low, S.P. and He, X. (2012), "Green practices in the Chinese building industry: drivers and impediments", *Journal of Technology Management in China*, Vol. 7 No. 1, pp. 50-63.
- Luken, R. and Van Rompaey, F. (2008), "Drivers for and barriers to environmentally sound technology adoption by manufacturing plants in nine developing countries", *Journal of Cleaner Production*, Vol. 16 No. 1, pp. S67-S77.
- Lyon, T.P. and Maxwell, J.W. (2004), *Corporate Environmentalism and Public Policy*, Cambridge University Press, Cambridge, UK.
- Malviya, R.K. and Kant, R. (2015), "Green supply chain management (GSCM): a structured literature review and research implications", *Benchmarking: An International Journal*, Vol. 22 No. 7, pp. 1360-1394.
- MBIE (2013), *The New Zealand Sectors Report-Construction*, Ministry of Business, Innovation and Employment, New Zealand, available at: <https://www.mbie.govt.nz/assets/77439ddc45/Construction-report-2013.pdf>.
- Nunnally, J.C. (1978), *Psychometric Theory*, McGraw Hill, New York.
- Ofori, G. (1996), "International contractors and structural changes in host country construction industries: case of Singapore", *Engineering Construction and Architectural Management*, Vol. 3 No. 4, pp. 271-288.
- Pargal, S. and Wheeler, D. (1996), "Informal regulation of industrial pollution in developing countries: evidence from Indonesia", *Journal of Political Economy*, Vol. 104 No. 6, pp. 1314-1327.
- Podsakoff, P.M., MacKenzie, S.B., Lee, J.Y. and Podsakoff, N.P. (2003), "Common method biases in behavioral research: a critical review of the literature and recommended remedies", *Journal of Applied Psychology*, Vol. 88 No. 5, p. 879.
- Qi, G.Y., Shen, L.Y., Zeng, S.X. and Jorge, O.J. (2010), "The drivers for contractors' green innovation: an industry perspective", *Journal of Cleaner Production*, Vol. 18 No. 14, pp. 1358-1365.
- Qi, G.Y., Zeng, S.X., Tam, C.M., Yin, H.T., Wu, J.F. and Dai, Z.H. (2011), "Diffusion of ISO 14001 environmental management systems in China: rethinking on stakeholders' roles", *Journal of Cleaner Production*, Vol. 19 No. 11, pp. 1250-1256.
- Reinhardt, F.L. (1998), "Environmental product differentiation: implications for corporate strategy", *California Management Review*, Vol. 40 No. 4, pp. 43-73.
- Rogelberg, S.G. and Stanton, J.M. (2007), "Introduction: understanding and dealing with organizational survey nonresponse", *Organizational Research Methods*, Vol. 10 No. 2, pp. 195-209.

- Sarkis, J., Zhu, Q. and Lai, K.H. (2011), "An organizational theoretic review of green supply chain management literature", *International Journal of Production Economics*, Vol. 130 No. 1, pp. 1-15.
- SCAD (2017), "Statistics centre Abu Dhabi-waste statistics 2017", available at: https://www.scad.gov.abudhabi/Release%20Documents/db193a06-fe73-4b85-b767-9f76eaa070cd_Waste%20Statistic%202018%20fin%20EN.pdf (accessed 10 July 2019).
- Seuring, S. and Müller, M. (2008), "From a literature review to a conceptual framework for sustainable supply chain management", *Journal of Cleaner Production*, Vol. 16 No. 15, pp. 1699-1710.
- Spencer, J. and Gomez, C. (2011), "MNEs and corruption: the impact of national institutions and subsidiary strategy", *Strategic Management Journal*, Vol. 32 No. 3, pp. 280-300.
- Tatoglu, E., Bayraktar, E., Sahadev, S., Demirbag, M. and Glaister, K.W. (2014), "Determinants of voluntary environmental management practices by MNE subsidiaries", *Journal of World Business*, Vol. 49 No. 4, pp. 536-548.
- UAE Vision 2021 (2018), "UAE vision", available at: <https://www.vision2021.ae/en/uae-vision>.
- Vijayvargy, L., Thakkar, J. and Agarwal, G. (2017), "Green supply chain management practices and performance: the role of firm-size for emerging economies", *Journal of Manufacturing Technology Management*, Vol. 28 No. 3, pp. 299-323.
- Walker, H. and Jones, N. (2012), "Sustainable supply chain management across the UK private sector", *Supply Chain Management: An International Journal*, Vol. 17 No. 1, pp. 15-28.
- Walker, H., Di Sisto, L. and McBain, D. (2008), "Drivers and barriers to environmental supply chain management practices: lessons from the public and private sectors", *Journal of Purchasing and Supply Management*, Vol. 14 No. 1, pp. 69-85.
- World Bank Country Report of UAE (2018), "Data: United Arab Emirates", Retrieved August 3, 2018, from available at: <https://data.worldbank.org/country/united-arab-emirates?view=chart>.
- Yaziji, M. and Doh, J. (2009), *NGOs and Corporations: Conflict and Collaboration*, Cambridge University Press, Cambridge, UK.
- Younis, H. and Sundarakani, B. (2020), "The impact of firm size, firm age and environmental management certification on the relationship between green supply chain practices and corporate performance", *Benchmarking: An International Journal*, Vol. 27 No. 1, pp. 319-346.
- Younis, H., Sundarakani, B. and O'Mahony, B. (2019), "Green supply chain management and corporate performance: developing a roadmap for future research using a mixed method approach", *IIMB Management Review*, (Online First), available at: <https://www.sciencedirect.com/science/article/pii/S097038961730438X>.
- Zhu, Q. and Sarkis, J. (2004), "Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises", *Journal of Operations Management*, Vol. 22 No. 3, pp. 265-289.
- Zhu, Q., Sarkis, J. and Lai, K.H. (2012), "Examining the effects of green supply chain management practices and their mediations on performance improvements", *International Journal of Production Research*, Vol. 50 No. 5, pp. 1377-1394.

Further reading

- UN-DESA (2014), "World urbanization prospects: the 2014 revision, highlights", *Department of Economic and Social Affairs*, available at: <https://population.un.org/wup/Publications/Files/WUP2014-Highlights.pdf>.

Appendix 1

1766

Constructs and items (literature source)	First-order confirmatory factor loadings	Cronbach's alpha (α)	
<i>Environmental Design</i>			
Environmental impact assessment of design is considered	0.82	0.86	
Natural ventilation is considered in projects	0.71		
Natural lighting is considered in projects	0.79		
Waste water recycling is considered in projects	0.72		
Photo-voltaic panels is considered in projects	0.85		
Energy efficient lighting system is considered in projects	0.73		
Energy efficient heating and air conditioning systems is considered in projects	0.77		
Pre-fabricated components are considered in projects	0.64		
Materials with high re-cycled content and low embodied energy is considered in projects	0.88		
Non-hazardous materials are considered in projects	0.65		
<i>Environmental Purchasing</i>			
Environmental criteria(s) are included in material purchase decisions	0.92	0.84	
Environmental criteria(s) are included in tendering	0.86		
<i>Environmental Transportation</i>			
Provision of accommodation to employees near project sites is provided	0.83	0.86	
Use of video conferencing in place of face to face meetings is used	0.86		
Employees are encouraged to use shared transport and public transport	0.83		
Materials are transported in full truck load quantities	0.83		
Materials are transported in fuel efficient vehicles	0.87		
<i>Environmental manufacturing/construction</i>			
Provision for waste water recycling is available at project site	0.70		0.77
Pre-fabricated components are used at projects	0.74		
Materials with high re-cycled content and low embodied energy is used	0.83		
Non-hazardous materials are used in projects	0.71		
Comprehensive waste management plan is developed for project sites	0.79		
Automation is used for onsite construction activities	0.78		
Fuel efficient machinery is used	0.78		
<i>End of life environmental practices</i>			
Environmental impact is considered during end of life demolition and disposal	0.89	0.79	
Material from the end of life demolished projects is recovered and recycled	0.90		
Note(s): Please rate the environmental practices implementation in your organization, Strongly Agree (5), Agree (4), Neither Agree nor Disagree (3), Disagree (2), Strongly Disagree (1)			

Table A1.
External
Environmental
Practices (First-order
confirmatory factor
loadings and
reliability)

Table A2.
External
Environmental
Practices (Second-
order confirmatory
factor loadings and
reliability)

Constructs and items (literature source)	Second-order confirmatory factor loadings	Cronbach's alpha (α)
Environmental design	0.82	0.91
Environmental purchasing	0.81	
Environmental Transportation	0.86	
Environmental manufacturing/ construction	0.91	
End of life environmental practices	0.80	

Table A3.
Internal
Environmental
Practices (First-order
confirmatory factor
loadings and
reliability)

Constructs and items (literature source)	First-order confirmatory factor loadings	Cronbach's alpha (α)
Environmental management systems such as ISO 14001	0.84	0.79
Environmental training	0.87	
Environmental auditing	0.71	
Cross functional teams for implementing environmental practices	0.91	
Research and development to improve environmental practices	0.87	

Note(s): Please rate the environmental practices implementation in your organization, Strongly Agree (5), Agree (4), Neither Agree nor Disagree (3), Disagree (2), Strongly Disagree (1)

Table A4.
Environmental Drivers
(First-order
confirmatory factor
loadings and
reliability)

Constructs and items (literature source)	First-order confirmatory factor loadings	Cronbach's alpha (α)
<i>External Environmental Drivers</i>		
Government green-related regulations	0.84	0.76
Pressure from supply chain stakeholders	0.79	
Pressure from Non-government organizations (NGOs)	0.83	
Pressure from competitors	0.82	
<i>Internal Environmental Drivers</i>		
Commitment to protecting the environment	0.85	0.87
To achieve business benefits	0.83	

Note(s): Please rate the extent to which following factors have influenced your organization's drive to implement environmental practices, Extremely high influence (5) High influence (4) Moderate Influence (3) Little Influence (2) No Influence (1)

Table A5.
Environmental
Barriers (First-order
confirmatory factor
loadings and
reliability)

Constructs and items (literature source)	First-order confirmatory factor loadings	Cronbach's alpha (α)
External Environmental Barriers		
Shortage of local environmental/green professionals	0.80	0.72
Shortage of local environmental/green suppliers	0.71	
Internal Environmental Barriers		
High cost of implementation	0.69	0.62
Lack of knowledge and awareness on environmental aspects	0.77	
Note(s): Please rate the extent to which each of the following factors have acted as a barrier/challenge in implementing environmental practices in your organization, Extremely high influence (5) High influence (4) Moderate Influence (3) Little Influence (2) No Influence (1)		

Table A6.
Performance Benefits
(First-order
confirmatory factor
loadings and
reliability)

Constructs and items (literature source)	First-order confirmatory factor loadings	Cronbach's alpha (α)
<i>Environmental Performance</i>		
Number of environmental accidents has declined	0.64	0.94
Greenhouse gas emissions have decreased	0.72	
Water consumption has decreased	0.76	
Energy consumption has decreased	0.78	
Landfill waste has decreased	0.79	
Material use has decreased	0.66	
Hazardous material use has decreased	0.69	
<i>Cost Performance</i>		
Energy expenses has decreased	0.64	0.85
Water expenses has decreased	0.58	
Material expenses has decreased	0.69	
Cost of managing waste has decreased	0.94	
Total environmental penalties and fines has decreased	0.91	
<i>Organizational Performance</i>		
More project orders are received	0.93	0.90
Orders are received at a higher price	0.85	
Market share among competitors has increased	0.89	
Return on investment has increased	0.95	
Profits have increased	0.80	
Note(s): Please indicate the extent of improvement in performance from implementing environmental practices in your organization, Strongly Agree (5) Agree (4) Neither Agree nor Disagree (3) Disagree (2) Strongly Disagree (1)		

Corresponding author

Sreejith Balasubramanian can be contacted at: s.balasubramanian@mdx.ac.ae

For instructions on how to order reprints of this article, please visit our website:

www.emeraldgroupublishing.com/licensing/reprints.htm

Or contact us for further details: permissions@emeraldinsight.com

Reproduced with permission of copyright owner. Further reproduction prohibited without permission.