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Sustainable business and environment management

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Guest editorial

Sustainable business and environment management

Sustainable business and environment management is the key competitive advantage in the twenty-first century world. The sustainable management of people, process and product is a difficult task and firms should install a sustainable architecture to get the best out of both "mind-share" and "market-share" philosophy (Singh, 2018b). Leaders and managers across industry are engaged in developing organizational sustainable capabilities through fundamental changes in the organizational processes and systems to practice green management to develop green products and services. However, it has been observed that plants located in the emerging economies than in the industrialized and the developing countries are more particular to emphasize environmental initiatives across organizational processes, products and services (Schoenherr, 2012). Therefore, it call upon leaders and manager to increase organizational abilities to manage emerging challenges faced in both internal and external environments of the firms (Singh, 2018a, b).

Previous studies note that sustainability increases firms' competitiveness (Boons and Lüdeke-Freund, 2013; El-Kassar and Singh, 2018), creates environmental and social benefits (Boons *et al.*, 2013; Patnaik *et al.*, 2018) and at the same time the literature suggest for knowledge gap with regard to investing in sustainable innovation to gain benefit from sustainable business models (Schaltegger *et al.*, 2016; Singh and El-Kassar, 2019). Furthermore, it has also been found that the feed-in-tariff positively impacts nation's gross domestic product, employment and emission reduction and that calls upon the firms to increasingly practice eco-innovation (Fernando *et al.*, 2019). This special issue on "Sustainable business and environment management" was conceptualized to advance body of knowledge on how to leverage the best from sustainability as philosophy to manage people, processes, products and services in organizations across industry.

The first paper titled "Green supply chain practice adoption and firm performance: manufacturing SMEs in Uganda" is contemporary. It discusses about how to leverage green supply chain practices to enhance firm performance in small- and medium-sized enterprises.

The second paper titled "Conceptual aspects of environment security: evidence from India and Bangladesh." This paper brings about conceptual understanding on environment security by drawing on literature based evidence from two south Asia countries – India and Bangladesh.

The next paper titled "Sustain and legitimize reputation: the construction of the sustainability discourse of Samarco company." The paper mentions about ethos which relates to firm's image while "pathos" has capacity to trigger emotional reception of that image of the firms and to provoke positive expectations.

The fourth paper titled "Enablers of sustainable industrial ecosystem: framework and future research directions." It elaborates upon the enablers of sustainable industrial ecosystem and uses them together to present a framework for use of academia and practitioners.

The fifth paper titled "Accounting for environmental costs as an instrument of environmental controlling in the company" is in the context of the implementation of the sustainable development strategy. It asks for the leaders, managers and policy makers to apply and the systematization of methods, functions and tools, as well as the consideration of the environmental controlling tools in the firms to reap their benefits.

The sixth paper titled "Is sustainable reporting (ESG) associated with performance? Evidence from the European banking sector" deals with investigating the relationship between ESG and bank's operational, financial and market performance. It further discusses about implications for theory, practice and policy making.

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The next paper titled "Diversity, corporate governance and CSR reporting: a comparative analysis between top-listed firms in Egypt, Germany and the US." This paper explores the influence of diversity and corporate governance structure corporate social responsibility (CSR) reporting practices of firms in the context of both developing and developed country.

The eighth paper titled "Eco-capability role in health care facility's performance: natural resource-based view and dynamic capabilities paradigm." This paper is contemporary and discusses about developing environmental strategy in three areas, namely human, technology and relationship resources.

The ninth paper titled "Institutional pressures and corporate environmental management maturity." It discusses and emphasizes on the relevance of numerous institutional pressures in pushing the firms in the developing countries to benefit from higher levels of environmental management maturity.

The tenth paper titled "Critical success factors for sustainable construction: a literature review" synthesizes and evaluates the extant relevant literature in the field. It presents broad list of factors for sustainable construction based upon integrating literature from a variety of disciplines and stakeholders.

The next paper titled "Examining the effect of employee green involvement on perception of corporate social responsibility: moderating role of green training" is in the Indian context. It presents how employee green involvement influences their perception of CSR. It also discusses about how employee green training moderates on to the relationship between employee green involvement and their perception of CSR.

The 12th paper titled "An analysis of the community perceptions of well-being: special reference to nickel mining and processing industry." This paper developed and validated instrument on the community well-being in the context of nickel mining activities in Indonesia.

The 13th paper titled "Environmental concern: an issue for poor or rich" wherein the role of environmental concern on brand preference has been discussed. The paper suggests that social influence indirectly influences preferences for brand through environmental concern and attitude toward environment-friendly product.

The penultimate paper titled "Consequences of consumers' emotional responses to government's green initiatives: insights from a scenario-based experimental study." This paper develops body of knowledge in the field on social sustainability by investigating on the impact of emotional responses to the government's green initiatives.

The last paper titled "Silk Road Economic Belt strategy and industrial total factor productivity: evidence from Chinese industries" assesses the effectiveness of the Silk Road Economic Belt (SREB) strategy and its role of industrial productivity in China. This paper elaborates upon the short-term impact of SREB strategy.

We hope that this special issue is timely and answers many pertinent issues in the realm of sustainable business and environment management and the readers will like these 15 papers.

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Further reading

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Green supply chain practice adoption and firm performance: manufacturing SMEs in Uganda

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Abstract

Purpose – The purpose of this paper is to assess the relationship between five green practices and firm performance. In addition, this paper investigates the influence of each green practice on environmental performance, economic benefits, and economic costs.

Design/methodology/approach – Data were collected based on a cross-sectional survey of owner/managers of 200 manufacturing SME firms in Uganda, Africa. SPSS was used to find descriptive means and test relationships between green practices and performance outcomes. Structural equation modelling was used to test for the influence of each practice on performance outcomes. The structural equation modelling results were obtained using the Covariance-Based Structural Equation Modelling software. Results were compared with similar studies conducted in developing countries.

Findings – Different green practices affect different performance dimensions in different ways across different industries. For example, eco-design and internal environmental management practices significantly influence environmental performance; green purchasing and internal environmental management practices significantly influence economic benefits; and internal environmental management practices affect economic costs. Overall internal environmental management is the key to positive outcomes across the three performance criteria. The authors show how the results obtained vary from similar studies conducted in developing countries and explain possible reasons for the difference.

Research limitations/implications – Africa is a rapidly industrialising nation faced with difficult choices between economic growth and increased pollution. Because SMEs represent the majority of manufacturing firms, they are the main polluters. Hence, better understanding of the costs and benefits, both environmental and economic, is important to encourage green practice adoption for the betterment of community health and prosperity.

Originality/value – Despite numerous studies on the relationships between green practice adoption and performance outcomes, only a few studies include both economic costs and benefits in addition to environmental performance. The study covers five green supply chain practices, whereas most similar studies are limited in the number of practices examined. The African context is unique and important because industrial development and environmental protection goals are in conflict. Similar studies are predominant in an Asian context which is more developed than Africa. The findings and comparisons raise important questions for further research in relation to the roles of national regulations, geographical markets and industry types in furthering green practices in manufacturing.

Keywords Supply chain, SMEs, Sustainability

Paper type Research paper

1. Introduction

Greening the supply chain is an increasing concern for business firms because inbound and outbound logistics services are major environmental polluters. Ensuring a firm's activities do not harm the environment involves consideration of the entire supply chain. Green supply chain practices (GSCPs) commonly include: investment recovery, ecological design, green purchasing, customer cooperation and internal environmental management (Zsidisin and Hendrick, 1998; Zhu and Sarkis, 2004; Chien and Shih, 2007; Zhu *et al.*, 2008). The number of studies using GSCP adoption as an independent variable and performance as a dependent variable is fewer than those that use external motivations as the independent variable and adoption as the dependent variable. This is important because, although the motivations for adopting GSCPs include competitive advantage and improved economic and environmental

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performance (Zhu and Sarkis, 2004; Zhu *et al.*, 2004, 2007, 2008a, b; Rao and Holt, 2005), there are few studies examining the relationships between GSCPs and performance that include more than a single green practice and combine both environmental and economic performance outcomes, including economic costs and benefits. Furthermore, among these studies, the variables differ, the findings are inconsistent and, despite the relevance of green practices in supply chains to developing countries, the least developed countries are not represented.

There is a lack of consistency in the variables used to measure both practices and performance (see Table AI). Most studies on the relationship between specific GSCPs (internal environmental management, green purchasing, eco-design, investment recovery and customer cooperation) and performance outcomes focus on either one, two or three GSCPs rather than all five practices. Performance variables in studies of GSCP adoption and performance include the following variables, either singularly or in combination: environmental performance; financial performance (economic benefits); economic costs; operational performance; competitive performance; social performance; market performance; and intangible performance (see Zhu and Sarkis, 2004; Rao and Holt, 2005; Zhu *et al.*, 2007; Eltayeb *et al.*, 2011; Kim *et al.*, 2011; Yang *et al.*, 2011). Only two studies assessed the influence of the individual practices on both economic benefits and costs (Zhu and Sarkis, 2004; Zhu *et al.*, 2007). Although most research works linking GSCPs to economic performance focus on financial performance, the term "financial performance" refers to economic benefits without consideration of economic costs.

Among the findings on the relationships between GSCPs and performance, there is little agreement or explanation of the conflicting results. For instance, some studies find positive relationships between practice and performance (Zhu and Sarkis, 2004; Rao and Holt, 2005; Green *et al.*, 2012), some negative relationships (Eltayeb and Zailani, 2009) and yet others find no relationship (Laosirihongthong *et al.*, 2013). A possible reason for these inconsistencies, apart from method considerations, is the difference in contexts in which the research is conducted such as national regulations and industry type and market.

Adoption of GSCP is especially relevant in developing nations where pollution is more severe and leads to ill health, death and disabilities of millions of people annually (Oluwasola, 2014). Poverty, lack of investment in modern technology, weak environmental legislation and industrialisation combine to cause high pollution levels in developing countries (Briggs, 2003; Oluwasola, 2014). Industrialisation in developing countries is a high priority given the need for structural transformation from small-scale agriculture to manufacturing as a means to attain inclusive and pro-poor growth (Oluwasola, 2014). However, industrialisation, at least initially, requires massive use of energy resources which in itself lead to pollution and environmental degradation (Bruce and Ellis, 1993). For example, arguably China would not have achieved its impressive economic growth and development had it been concerned about pollution in its initial stages of development (Oluwasola, 2014). The growth in research on GSCPs is predominant in developing nations such as China and other Asian countries; however, most of these nations are well on the way to development (Malviya and Kant, 2015). The least developed nations such as those on the African continent have not been subject to research.

In order to address the issues outlined above, three objectives were set. The first focuses on the influence of five GSCPs (green purchasing, eco-design, investment recovery, internal environmental management and customer cooperation) on environmental performance; the second looks at the influence of the GSCPs on economic benefits, while the third embarks on the influence of GSCPs on economic costs. In addition to the overall relationship between practices and the three performance measures, we assess the relationship between each green practice and the three performance measures in total and by industry type. Our data are based on a cross-sectional survey of owner/managers of 200 Ugandan SMEs. The majority of the firms in Uganda are SMEs. The paper is structured as follows: Sections 2

and 3, respectively, discuss the theoretical perspective and development of three broad hypotheses, each with five sub-hypotheses reflecting each of the GSCPs based on previous studies; Section 4 outlines the method, and Section 5 discusses the findings and compares them to previous research in developing nations. Section 6 summarises the results and their implications for further research, and Section 7 outlines the study's contribution to literature, policy and practice, most especially its contribution to important insights into the costs and benefits of GSCP adoption in a developing African nation.

2. Theoretical perspective

We adopt a resource dependence theory (RDT) perspective in this research. Pfeffer and Salancik's (1978) work on "external control of organizations: a resource dependence perspective" serves as a foundation. RDT characterises firms as open systems that are dependent on circumstances in the external environment (Pfeffer and Salancik, 1978) and thus can be used to explain firm behaviour (Hillman *et al.*, 2009, pp. 1-12). The theory suggests that firms in a supply chain achieve higher performance if they are dependent on each other and work together (Sarkis *et al.*, 2011). For example, the implementation of GSCPs such as eco-design practices, internal environmental management practices and investment recovery practices require dependency on customers and suppliers for resources that are not available within a single firm (Sarkis *et al.*, 2011). According to RDT, not all firms have the critical resources necessary to undertake operations; hence, the need to acquire these resources motivates SMEs in particular to form strategic alliances (Dickson and Weaver, 2011). In the case of supply chains, pressures from customers and suppliers provide both impetus and resources for GSCP adoption.

3. Hypothesis development

Literature on the relationships and influence of GSCPs on performance outcomes covers five generally used GSCPs (green purchasing; eco-design; customer cooperation; investment recovery; and internal environmental management) and three performance outcomes (environmental performance, economic benefits and economic costs). We build on previous studies to develop three general hypotheses each with five specific hypotheses related to each of the five practices.

3.1 Environmental performance and adoption of GSCPs

Environmental performance includes reducing emissions, waste water, solid wastes, use of toxic substances and environmental accidents. Green practices such as eco-design, investment recovery and green purchasing activities have common environmental management strategies such as reuse, remanufacturing, recycling, repairs and refurbishing which contribute to a reduction in environmental impact (Min and Galle, 2001; Srivastava, 2008; Özceylan *et al.*, 2014). Despite common environmental strategies, some practices have unique strategies. Overall, when all GSCPs are combined, their adoption enhances environmental performance (Zhu and Sarkis, 2004; Chien and Shih, 2007; Darnall *et al.*, 2008; Zhu *et al.*, 2008). However, when each practice is treated individually, the effects differ between studies and among practices.

Previous research is characterised by conflicting findings on the influence of each GSCP on environmental performance, differences that might be based on the context or nature of the specific practice. In China, Zhu *et al.* (2007) indicated that only internal environmental management practices positively and significantly influence environmental performance, green purchasing has a negative effect on the environmental performance and the remaining practices have no influence. On the contrary, in Thailand, Laosirihongthong *et al.* (2013) found that green purchasing positively influences environmental performance, and it is the only practice of significance. In the USA, Green *et al.* (2012) found that green

purchasing has no significant influence; however, eco-design, investment recovery and customer cooperation significantly and positively influence environmental performance.

It is possible that the different nature of each GSCPs results in variable influences on environmental performance including their importance at different process stages. For example, green purchasing differs from other practices during two stages: product specification and supplier selection where environmental issues are considered (Blengini *et al.*, 2011). On the other hand, eco-design occurs in every stage across the product life cycle (Blengini *et al.*, 2011). Customer cooperation may contribute to positive environmental performance through providing environmental information necessary for the eco-product innovation process and also contribute to the reduction of the environmental impact caused by the inbound and outbound logistics activities in the supply chain (Vachon and Klassen, 2008). Internal environmental management contributes to environmental performance through investing in environmental management programmes like ISO 14001 environmental certification systems, information technology and total quality environmental management (Zhu *et al.*, 2008, 2013). Accordingly, we hypothesise as follows:

H1a. Green purchasing practices are positively related to and positively influence environmental performance.

H1b. Eco-design practices are positively related to and positively influence environmental performance.

H1c. Customer cooperation practices are positively related to and positively influence environmental performance.

H1d. Investment recovery practices are positively related to and positively influence environmental performance.

H1e. Internal environmental management practices are positively related to and positively influence environmental performance.

3.2 Economic benefits and adoption of GSCPs

Owner/managers engage in GSCPs to increase economic benefits beyond the economic costs incurred. We use the term "economic" rather than "financial" performance because economic performance includes the concept of opportunity cost and because it has been used in studies relevant to our own (Zhu and Sarkis, 2007; Zhu *et al.*, 2007, 2008a, b). Economic benefits refer to the positive outcomes obtained after the adoption of GSCPs. They include cost reductions in the following: materials purchasing; energy consumption; and waste treatment and waste discharge. Although most agree that emission reduction within a supply chain provides economic benefits to its members, there is no consensus on which practices result in economic benefits. For example, investment recovery improves economic benefits in some countries, while eco-design practices reduce economic benefits because the costs outweigh the benefits (Zhu and Sarkis, 2007; Green *et al.*, 2012), and green purchasing impacts economic benefits positively and investment recovery has no effect at all (Green *et al.*, 2012). Although each GSCP contributes in different ways, it is unclear which practices generate overall benefits compared to costs. For example, within developed countries, green purchasing and internal environmental management are found either to create economic benefits (Shi *et al.*, 2012) or have no impact at all (Azevedo *et al.*, 2011). Studies in the developing countries such as China (Zhu *et al.*, 2007), India (Vijayvargy and Agarwal, 2014) and Thailand (Laosirihongthong *et al.*, 2013) find that no individual practice significantly influences economic benefits; however, the samples for these studies are predominantly medium and large firms. Additionally, a comparison of large firms in a developing nation, China, and a developed nation, Japan, indicates that Japanese firms

attract higher economic benefits because of their lengthier experience in complying with government-initiated environmental management policies (Zhu *et al.*, 2010).

Although the adoption of GSCPs is meant to result in economic benefits through cost reductions, the effects are unclear. Engagement in investment recovery activities creates a reduction in disposal costs through reusing and repairing items and an increase in revenues through the sale of remanufactured and recycled goods (Eltayeb *et al.*, 2011). Conversely, investment recovery activities may require unique capabilities that differ among firms to signify an additional investment cost. While investment recovery activities deal with the end of supply chain waste, green purchasing activities deal with the prevention of waste at the beginning of the supply chain. Owner/managers must ensure that the raw materials acquired from suppliers can be recyclable, reusable and remanufacture enabled (Rao and Holt, 2005). This results in a cost reduction for materials purchased and lower fees for waste treatment and discharge. Waste from raw materials can be converted into a marketable state or be used during the manufacture of new products; however, this depends on customer demand. Both green purchasing and investment recovery practices are associated with eco-design practices (see Zhu *et al.*, 2008). During the eco-design stage of production, owner/managers must ensure that product designs comply with the various environmental standards for recycling, reuse, remanufacturing and repairing (Eltayeb and Zailani, 2009). Not only are environmental designs incorporated into products but consideration is also given to the amount of energy, water and other resources that may be consumed during product production as well as emissions from the production process which may increase benefits and/or costs (Marchi *et al.*, 2012). Despite the uncertainty over costs and benefits, we hypothesise the following:

H2a. Green purchasing practices are positively related to and positively influence economic benefits.

H2b. Eco-design practices are positively related to and positively influence economic benefits.

H2c. Customer cooperation practices are positively related to and positively influence economic benefits.

H2d. Investment recovery practices are positively related to and positively influence economic benefits.

H2e. Internal environmental management practices are positively related to and positively influence economic benefits.

3.3 Economic costs and adoption of GSCPs

The relationship with and influence of individual GSCPs on economic costs are generally overlooked in the green supply chain management empirical research; thus, there is little to draw upon apart from definitions and observations by Zhu *et al.* (2007). Economic costs include increased costs associated with investment, operations, training, and purchase of environmentally friendly materials. Although GSCPs enhance economic benefits, economic costs are incurred through investing in the practices (Zhu *et al.*, 2007). For example, green purchasing practices increase economic costs through green supplier development, employee training in green purchasing and environmental audit competences (Min and Galle, 2001); investment recovery practice costs include transportation of waste, return handling and production and packaging for remanufactured or recycled products (Ramírez and Morales, 2014; Ravi and Shankar, 2015). Internal environmental management practice costs include the following: environmentally friendly raw material; wages for environmentally competent employees; environmentally friendly equipment acquisition;

and purchase of pollution or emission control technology (Orji and Wei, 2016). Eco-design costs include knowledge gathering (Blengini *et al.*, 2011) and administration such as communication (Hong and Schniederjans, 2000). We hypothesise that:

H3a. Green purchasing practices are positively related to and positively influence economic costs.

H3b. Eco-design practices are positively related to and positively influence economic costs.

H3c. Customer cooperation practices are positively related to and positively influence economic costs.

H3d. Investment recovery practices are positively related to and positively influence economic costs.

H3e. Internal environmental management practices are positively related to and positively influence economic costs.

3.4 Conceptual model

Based on the above hypotheses, the resultant conceptual model has five independent variables, i.e. the five GSCPs (green purchasing, eco-design practices, customer cooperation practices, investment recovery practices, and internal environmental management practices) and three dependent variables (environmental performance, economic benefits and economic costs). The model is depicted in Figure 1 where the arrows moving from the five GSCPs to performance outcomes indicate the different hypotheses.

4. Method

This section outlines the sample, data collection, instrument and data analysis.

4.1 Sample

Our unit of analysis was the firm, but the unit of enquiry was a single owner/manager from each of 200 SME manufacturing firms in Uganda. Small firms are those having employees between 5 and 49, while medium-sized firms are those that employ between 50 and 100 employees. Owner/managers make most decisions related to green practices adoption in SMEs (Yahya *et al.*, 2014). The owner/managers' firms were selected using the simple random sampling method where owner/managers in the sample were randomly selected from the Ugandan Government SME Business Register without replacement. A random sample was generated using the RAND () function in the Excel work sheet (Quirk *et al.*, 2013). In line with Ugandan culture, each owner/manager was contacted by telephone and, upon agreement, personally delivered a hardcopy of the survey. The response rate was 67 per cent with a respondent profile as follows: 70 per cent of firms had operated for over ten years including 41 per cent having operated for between 11 and 20 years; 66 per cent employed over 50 employees; and 60 per cent were in the non-food manufacturing category. In Uganda, manufacturing firms are categorised as either food or non-food (Uganda Bureau of Statistics report, 2011).

4.2 Data collection and instrument

Data were collected via a hardcopy survey questionnaire with 35 items. The five independent variables, the GSCPs, had 20 items (three to four per variable), the three dependent performance variables had 12 items (four per variable) and there were three control variables (firm age, size and industrial type – only industrial type is included in this paper). Responses were plotted on a seven-point Likert scale in line with similar studies

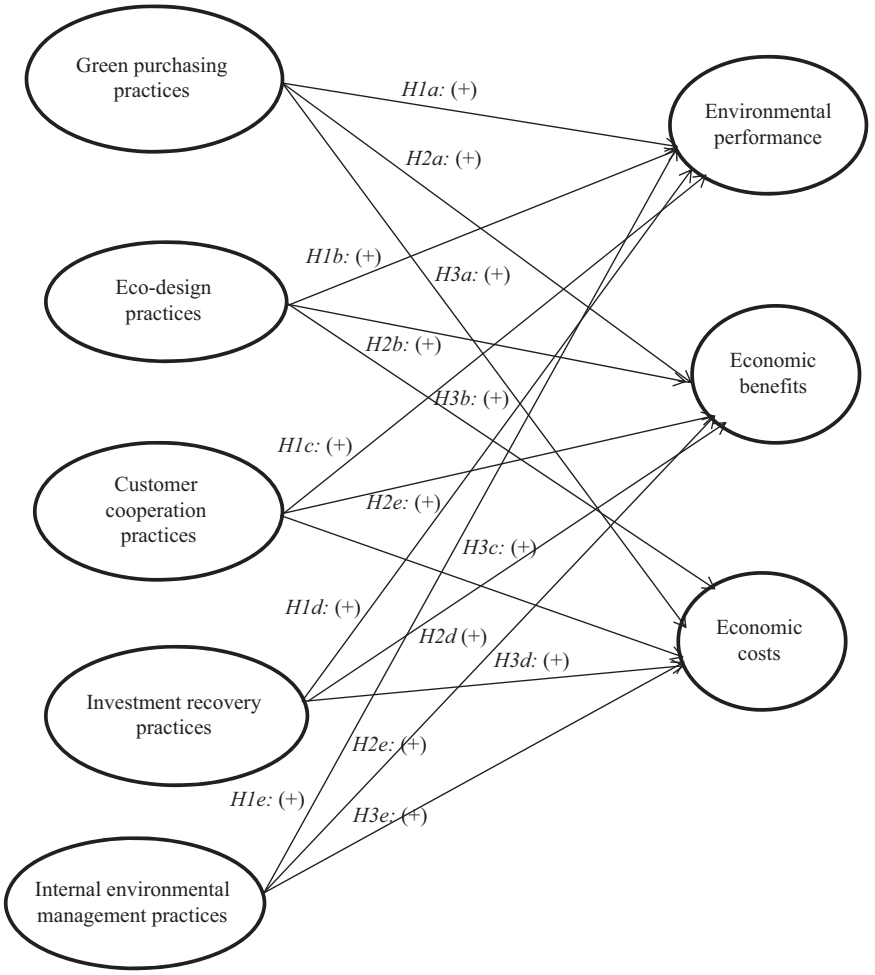

Figure 1.
Conceptual model

(see Tables AII and AIII for the measurement items for the practices and performance outcomes, respectively). Although similar studies have used a five-point Likert scale, a seven-point Likert scale is more commonly used because it is slightly better than a five-point Likert scale. A seven-point Likert scale provides more detailed information necessary for decision making, promotes accuracy in terms of reliability and validity and is easy to use (Chang, 1994; Darbyshire and McDonald, 2004; Finstad, 2010). Measurement items used for the independent practice variables were adapted from Zhu *et al.* (2007, 2008a,b) (see Table AII). Items for economic benefits included cheaper costs and fees in relation to the following: materials purchasing; energy consumption; waste treatment; and waste discharge. Items for economic costs included increased costs related to the following: investment; operations; training; and purchase of environmentally friendly materials (see Table AIII). The items for firm economic benefits and costs were adapted from Zhu and Sarkis (2007), Zhu *et al.* (2005) and Hervani *et al.* (2005). The three control variables were selected based on previous studies, indicating that the engagement of SMEs with environmental issues is sensitive to firm size, age and industry type. (Williams and Schaefer, 2013).

4.3 Data analysis

Data were entered in SPSS software and checked through tests for normality, multicollinearity, common method variance, convergent validity and discriminant validity. Confirmatory factor analysis was carried out to obtain the standardised loadings for each construct's measurement items and fit indices. Hypothesis testing was conducted using SPSS and AMOS software version 21.

The data were normally distributed with skewness values less than 2 and kurtosis values less than 7 for all variables. Previous research on normality suggests that the absolute value of univariate skewness should be <2, while the absolute value for univariate kurtosis should be <7 (Curran *et al.*, 1996; Xiong and King, 2015). Skewness values for all variables were less than 2 with a range from −0.027 to −0.706, while kurtosis values for all variables were less than 7 with a range from −0.119 to 0.896 (see Table AIV). Skewness or kurtosis values lying between +1.0 and −1 indicate the existence of a normal distribution (George and Mallery, 2006). Harman's single factor in SPSS was used to test for common method variance and all factors were well below 50 per cent as recommended for validating the data (Hazen *et al.*, 2011) (see Table AV). Similarly, there were no multicollinearity issues because the variance inflation factors (VIFs) were less than 10.0 and the tolerance factors were above 0.10. The tolerance values ranged from 0.446 to 0.885, while the VIF factors range from 1.13 to 2.241 (see Table I). The variables exhibited convergent validity with all average variance extracted (AVE) values above the minimum of 0.40 with values ranging from 0.53 to 0.73 (see Table I). Discriminant validity was confirmed because all item crossing loadings of the respective constructs with other constructs were higher on their respective constructs compared to other constructs (see Table AVI). Reliability values were above 0.70 as recommended (Nunnally and Bernstein, 1978).

Confirmatory factor analysis demonstrated a good fit for the constructs and their measurement items for all variables while factor loadings for measurement items were above 0.30 (see Table II). The goodness-of-fit indexes, comparative fit indexes, normed fit indexes and adjusted goodness-of-fit indexes were greater than 0.9; root-mean-square residuals were less than 0.05; root-mean-square error of approximations met the maximum value of 0.08; and CMIN/dfs were less than the maximum value of 5. Hence, the reliability and validity of the instrument were confirmed. Critical ratios were used to examine the relevance of the items to respective constructs. All items had critical ratios above 1.96 which is the minimum threshold which therefore means that all the critical ratios were relevant to their respective constructs.

5. Findings and discussion

This section provides the findings based on descriptive mean statistics, correlations and regression tests. Means scores were used to gauge the extent of implementation of each

Constructs	Reliability values	Average variance extracted (AVE)	Collinearity statistics Tolerance	VIF
Internal environmental management	0.85	0.53	0.446	2.241
Green purchasing	0.85	0.55	0.489	2.043
Customer cooperation	0.85	0.7	0.664	1.506
Eco-design	0.86	0.61	0.599	1.669
Investment recovery	0.86	0.73	0.743	1.346
Environmental performance	0.86	0.61	0.721	1.386
Economic benefits	0.86	0.89	0.885	1.13
Economic costs	0.86	0.89	0.681	1.468

Table I. Reliability and convergent validity results

Construct	Items	Standardised loadings	Critical ratios	Fit indices
Investment recovery	My firm engages in recovery (sale) of excess inventories/materials	0.78	9.683	GFI = 1.000
	My firm engages in the sale of scrap and used materials	0.80	9.771	CFI = 1.000 NFI = 1.000 RMR = 0.000
	My firm engages in the sale of excess capital equipment	0.74	14.706	
Customer cooperation	My firm cooperates with its customers on product eco-designs	0.64	8.446	GFI = 1.000
	My firm cooperates with its customers on cleaner production (environmentally friendly production)	0.84	10.610	CFI = 1.000 NFI = 1.000 RMR = 0.000
	My firm cooperates with its customers on green packaging	0.75	8.333	
Eco-design	My firm develops products designs that consume less material/energy	0.85	5.558	GFI = 1.000 CFI = 1.000 NFI = 1.000
	My firm designs products for reuse, recycle, recovery of material and component parts	0.70	5.336	RMR = 0.000
	My firm designs products to avoid or reduce the use of hazardous products and/or manufacturing processes	0.42	7.575	
Internal environmental management	My firm is committed to engagement in GSCPs	0.70	8.704	GFI = 0.978 CFI = 0.982
	My firm engages in cross-functional cooperation for environmental improvements	0.71	8.834	NFI = 0.964 RMSEA = 0.070AGFI = 0.933 CMIN (χ^2), p-value = 0.055
	My firm aims at achieving total quality environmental management	0.59	7.410	CMIN/df = 1.974
	My firm employs environmental compliance and auditing programmes to achieve better environmental performance	0.62	7.797	
	My firm obtained an ISO 14001 certification in order to produce environmentally friendly goods	0.66	8.249	
	My firm has made investments in environmental management systems	0.69	10.989	
Green purchasing	My firm provides design specifications to suppliers that include environmental requirements for the purchased item	0.61	8.112	
	My firm cooperates with suppliers on environmental objectives	0.67	8.962	
	My firm carries out environmental management audits for its suppliers' internal management	0.67	9.002	
	My suppliers are ISO-14000 certified	0.62	8.218	

(*continued*)

Table II.
Standardised item loadings continued

Construct	Items	Standardised loadings	Critical ratios	Fit indices
	My firm evaluates second-tier suppliers for environmentally friendly practices	0.76	9.444	
Environmental performance	Reduction of pollutant emissions	0.71	13.889	GFI = 0.989
				CFI = 0.990
				NFI = 0.983
	Reduction of waste water	0.83	9.595	RMSEA = 0.077
	Reduction of solid wastes	0.77	9.155	AGFI = 0.944
	Decrease of consumption for hazardous/harmful/toxic materials	0.50	6.016	CMIN (χ^2), p-value = 0.112
				CMIN/df = 2.193
Economic benefits	Decrease of cost for materials purchasing	0.73	11.805	GFI = 0.994
				AGFI = 0.938
				NFI = 0.994
				CFI = 0.996
	Decrease of cost for energy consumption	0.70	11.328	TLI = 0.979
				RMSEA = 0.086
	Decrease of fee for waste treatment	0.87	15.060	CMIN/df = 2.483
	Decrease of fee for waste discharge	0.88	9.900	RMR = 0.021
Economic costs	Increase in investment	0.52	7.788	GFI = 0.999
	Increase in operational cost	0.86	16.762	NFI = 0.999
	Increase in training cost	0.95	19.344	CFI = 1.000
	Increase in cost due to purchasing of environmentally friendly materials	0.88	8.403	AGFI = 0.987
				TLI = 0.950
				CMIN/df = 0.521
				RMR = 0.017
				RMSEA = 0.000

Table II.

practice and extent of performance outcomes, including by industry type. The findings are discussed in relation to: extent of implementation of each practice based on mean scores; extent of performance outcomes; industry differences; and specific practices and outcomes for each of the three general hypotheses.

5.1 Extent of GSCP implementation and firm outcomes: descriptive statistics

The level of implementation of practices and achievement of outcomes as judged by the mean scores is discussed for each of the five GSCPs and the three performance outcomes. The means cover a possible range from 1 to 7, where 1 is the lowest and 7 the highest.

5.1.1 Mean levels of GSCP implementation. The majority of statistical means for practice implementation are between 4.00 and 5.00, indicating a reasonable level of implementation of green practices (see Table III). The highest means were recorded for specific practices related to the following: total quality environmental management; produce designs to reduce the use of hazardous materials; and engagement in the sale of excess capital equipment.

5.1.2 Mean levels of performance outcomes. Although the environmental outcomes are reasonable with means around 5.00 and above, the means for economic benefits and economic costs are lower with means between 3.00 and 4.00 (see Table IV). The low level of economic benefits might imply a low customer demand for environmentally friendly products in Uganda and the lower economic costs may be the result of the considerable support obtained from the United Nations sponsored Cleaner Production Centres. Reductions in emissions, waste water and solid wastes may be the result of pressure from the Uganda National Environmental Regulations Authority, a government body that pressures firms to develop an environmental management policy and to install waste

	Mean	SD
Internal environmental management		
My firm is committed to engagement in green supply chain practices	4.9550	1.28500
My firm engages in cross-functional cooperation for environmental improvements	4.8600	1.27220
My firm aims at achieving total quality environmental management	5.0700	1.27405
My firm employs environmental compliance and auditing programmes to achieve better environmental performance	4.7900	1.38037
My firm obtained an ISO 14001 certification in order to produce environmentally friendly goods	4.6750	1.41754
My firm has made investments in environmental management systems	4.9800	1.21531
Green purchasing		
My firm provides design specifications to suppliers that include environmental requirements for the purchased item	4.7300	1.26694
My firm cooperates with suppliers on environmental objectives	4.7850	1.30279
My firm carries out environmental management audits for its suppliers' internal management	4.7200	1.33435
My suppliers are ISO-14000 certified	4.4900	1.45964
My firm evaluates second-tier suppliers for environmentally friendly practices	4.8600	1.36002
Customer cooperation		
My firm cooperates with its customers on product eco-designs	4.4250	1.54151
My firm cooperates with its customers on cleaner production (environmentally friendly production)	4.5000	1.51043
My firm cooperates with its customers on green packaging	4.4650	1.44193
Eco-design		
My firm develops products designs that consume less material/energy	4.6850	1.34716
My firm designs products for reuse, recycle, recovery of material and component parts	4.6700	1.40748
My firm designs products to avoid or reduce the use of hazardous products and/or manufacturing processes	5.2200	1.24068
Investment recovery		
My firm engages in recovery (sale) of excess inventories/materials	4.970	1.0793
My firm engages in the sale of scrap and used materials	4.9400	1.28243
My firm engages in the sale of excess capital equipment	5.0800	1.07208

Table III. Means for GSCP implementation

	Mean	SD
Environmental performance		
Reduction of pollutant emissions	5.0550	1.07131
Reduction of waste water	5.1350	1.15039
Reduction of solid wastes	5.1450	1.06284
Decrease of consumption for hazardous/harmful/toxic materials	4.9250	1.12056
Economic benefits		
Decrease of cost for materials purchasing	3.5000	1.46311
Decrease of cost for energy consumption	3.4500	1.49958
Decrease of fee for waste treatment	3.3700	1.38299
Decrease of fee for waste discharge	3.3400	1.42286
Economic costs		
Increase in investment	3.4800	1.47665
Increase in operational cost	3.8700	1.55731
Increase in training cost	3.9000	1.63811
Increase in cost due to purchasing of environmentally friendly materials	3.8500	1.95103

Table IV. Performance means and standard deviations (1 – lowest to 7 – highest)

treatment plants and environmentally friendly technologies through the threat of closure of non-complying firms. Further, other bodies like the Uganda National Bureau of Standards make regular inspections to ensure that products comply with national and international quality product and environmental standards. Both the Uganda Cleaner Production Centre and the Ugandan National Bureau of Standards provide environmental training. Additionally, the Uganda Cleaner Production Centre provides a wider range of services and resources such as advice, technical assistance, aid in waste generation reduction, conservation of materials, recovering, recycling and reusing of by-products and substitution of poisonous and hazardous materials.

5.2 Levels of GSCP implementation and performance outcomes by industry: descriptive statistics

The 200 firms in the sample covered 15 specific industries, including one we describe as "other" because of single representation. Because the sample sizes of each industry are small, we could only make a comment on the descriptive data; hence, our observations based on this data are very preliminary but insightful. Details of descriptive statistics showing the means and standard deviations for implementation of practices and performance outcomes across the 15 industries are provided in Table AVI. Six industries have the highest means (above 5.00) for green purchasing practices, in descending order: grain manufacturing; animal feeds; coffee and tea processing; leather and related products; rubber and plastic products and refined petroleum products. These industries are most likely to have international customers. No industry had a mean less than 4.0 for implementation of green purchasing practices. In terms of customer cooperation practices, the coffee and tea processing industry had the highest mean (above 6.0) followed by leather and related products and refined petroleum product manufacturing with means above 5.0. No industry had a mean below 4.0 for customer cooperation. For eco-design practices, again the coffee and tea processing industry had the highest mean (mean above 6.0) and no industry mean was below 4.0. For investment recovery practices, four industries had means between 5.00 and 6.00, the highest being petroleum products (5.833) and coffee and tea processing (5.778) and no industry mean was below 4.0. Finally, for internal environmental management practices, seven industries had a mean above 5.0 with five of the seven related to food manufacturing. Food industries in Africa are more likely to be part of global food chains.

The means for environmental performance outcomes were higher than those for economic benefits and costs. Environmental performance had a range of means between 4.75 and 5.75 with 5 of the 15 industries achieving means of above 5.0 led by the coffee and tea processing industry. Economic benefits had much lower mean scores ranging from 2.24 (leather and related products) to 3.36 (meat and fish processing). Similarly, but even lower, the means for economic costs ranged from 1.83 (meat and fish processing) to 2.86 (grain milling products). Clearly, owner/managers perceive environmental outcomes to be more substantial than the economic benefits arising from investment in green practices, although they perceive the economic costs to be low.

5.3 Influence of GSCPs on performance outcomes: correlation results

Correlation tests were carried out to assess the influence of each GSCP on each of the three performance outcomes (see Table V). All five GSCPs are positively correlated with environmental performance. Likewise, all but one practice, customer cooperation, is significantly related to economic benefits. Three practices had a positive correlation with economic costs, in ascending order, internal environmental management, green purchasing and investment recovery. A comparison of our findings is made with previous research in developing countries.

Correlational results for customer cooperation, green purchasing practices and environmental performance relationships are supported by the RDT theory. Given SMEs are resource constrained, they need to establish alliances with customers and suppliers in order to implement environmentally friendly practices. With the establishment of the alliances, owner/managers obtain access to free information resources on markets, technology, resource availability, expertise and finance.

Our finding of positive correlations between all five GSCPs and environmental performance is confirmed in several studies (Vachon and Klassen, 2008; Blengini *et al.*, 2011; Zhu *et al.*, 2013). Green purchasing contributes to environmental performance through involving environmental issues in product specification and supplier selection (Blengini *et al.*, 2011; Min and Galle, 1997). Eco-design practices contribute to environmental performance through employing a product life cycle analysis process concerned with the environmental soundness of the product from the first design stage to the disposal stage (Blengini *et al.*, 2011). Although customer cooperation has a direct impact on environmental performance, its influence on economic benefits is indirectly achieved through environmental performance (Green *et al.*, 2012). The positive correlation between customer cooperation and environmental performance is somewhat unexpected as Uganda is characterised as having a lack of cooperation between firms and their customers because of a less trusting environment. Ugandan firms fear that customer involvement in business decisions might lead to information leaking to competitors (Yigitbasioglu, 2004). The contribution of internal environmental management practices arises through its support for environmental management initiatives and investment in environmental management programmes like ISO 14001 environmental certification systems, information technology and total quality environmental management (Zhu *et al.*, 2008a, 2013).

In the case of economic benefits, internal environmental management, green purchasing and investment recovery practices correlate significantly and positively with economic benefits. Internal environmental management contributes to economic performance through encouraging the acquisition of competence and expertise in environmental management that results in engagement in investment and income-generating environmental programmes and related activities such as investment recovery activities, production of environmentally friendly products and cost reduction activities such as production processes that consume less energy, fuel and water (De Giovanni and Esposito Vinzi, 2012). Through green purchasing, owner/managers ensure that the raw materials acquired from suppliers can be recycled, reused and remanufactured, resulting in a reduction in materials purchased and reduced fees for waste treatment and discharge (Rao and Holt, 2005). Waste from such raw materials can be converted into a marketable state in several different ways or be used during the manufacture of new products. Engagement in investment recovery activities creates a reduction in disposal costs through reusing and repairing items and an increase in revenues through the sale of remanufactured and recycled products (Eltayeb *et al.*, 2011).

Green supply chain practices	Performance outcomes (standardised βs) Environmental performance	Economic benefit	Economic costs
Green purchasing	0.46***	0.325***	0.255***
Customer cooperation	0.35***	0.126	0.064
Eco-design	0.42***	0.18	0.106
Investment recovery	0.83***	0.216***	0.163**
Internal environmental management	0.14***	0.358***	0.297***

Notes: **$p < 0.01$; ***$p < 0.001$

Table V. GSCPs and performance outcomes: correlation results

The significant correlations between economic cost and the practices of internal environmental management, green purchasing and investment recovery are reasonably obvious. Internal environmental management practices require financial investment in various environmental management systems, training and technologies (Zhu *et al.*, 2005; Vachon and Klassen, 2006). Green purchasing requires investment costs in green supplier development, employee training in green purchasing and environmental audit competences (Min and Galle, 2001). Investment recovery increases operational costs for waste transportation, return handling and remanufactured or recycled products for resale and packaging of the remanufacture or recycled products (Ramírez and Morales, 2014; Ravi and Shankar, 2015). Extra investment recovery costs occur through investments in information technologies required to support investment recovery activities at different stages such as provision of product arrival information for the products to be returned, customer demand product information and information on product quality of waste product arrivals and recycled or remanufactured products (Ravi and Shankar, 2015).

Comparing our correlation results with those of Zhu and Sarkis (2004) in a Chinese context, there are several important differences. For example, Zhu and Sarkis (2004) found a positive correlation between customer cooperation and economic benefits, while we find no correlation between the two. Zhu and Sarkis (2004) explained the findings in terms of Chinese firms experiencing international customer pressure arising from strong collaborations with international customers. In Uganda, customers tend to be local or regional rather than international such that customer cooperation and demand for environmentally friendly practices is low. Furthermore, there is a general lack of cooperation and trust between owner/managers and their customers in Uganda and a fear that involving customers in business decisions may result in leaking business information to competitors (Yigitbasioglu, 2004).

A second conflict is between our finding of a positive correlation between investment recovery practices and economic costs and the finding of Zhu and Sarkis (2004) and Zhu *et al.* (2007) in which there is no relationship. The difference may be explained in terms of the greater strength of Chinese environmental regulations requiring firms to implement investment recovery practices and, as a result, Chinese managers perceive investment recovery practices a costly but necessary evil (Zhu and Sarkis, 2007). Compared to manufacturing firms in African countries, Chinese firms experience high competition, low customer demand for remanufactured products but are, however, forced into costly continuous improvement in remanufacturing technologies (see Zhu and Tian, 2016). On the contrary, and in the absence of strong regulations in Uganda, investment recovery practices are viewed as income generating rather than a necessary evil. Furthermore, the much wider global spread of customers of Chinese firms implies a complex supply chain that is harder to manage and requires more financial and labour resources for implementing investment recovery activities. Manufacturing firms in Uganda have a more restricted domestic and regional customer base where reverse logistics activities are more easily facilitated.

A third conflict is in our finding of no correlation between eco-design practices and economic costs, while Zhu and Sarkis (2004) found a positive correlation. This is possibly explained by Chinese manufacturing firms investing in advanced environmentally friendly manufacturing technologies. The increase in the labour costs in China has led to an influx of labour-intensive Chinese manufacturing firms relocating to Africa where labour costs and environmental regulations are much lower. In Uganda, the adoption of advanced environmentally friendly technologies is still in its early stages.

5.4 GSCPs and performance outcomes: structural equation modelling results

Structural equation modelling results explaining the influence of each of the practices on environmental performance, economic benefits and economic costs are presented below.

Comparisons of the results with previous findings are made and a discussion in support of the research findings is provided. See Table VI for a summary of the hypotheses testing outcomes.

In relation to environmental performance, investment recovery practices had the greatest impact on environmental performance, followed by green purchasing, eco-design, customer cooperation and internal environmental management. There were significant relationships between economic benefits and internal environmental management, and green purchasing and investment recovery practices. Economic costs were significantly affected by only one practice, i.e. internal environmental management (see Figure 2).

Although all the GSCPs positively correlated with environmental performance, structural equation modelling results indicate only eco-design ($\beta = 0.261$), and internal environmental management significantly ($\beta = 0.171$) predicted environmental performance. Environmental excellence begins with product and process designs with the environmental influence of the product being locked within the product design stage where materials and production processes are selected and product environmental performance is largely determined (Lai and Cheng, 2009). Further, making product returns profitable depends on good designs that make investment recovery practices reliant on eco-design practices so products may be disassembled, recycled or used in other investment recovery activities (Lai and Cheng, 2009). Ultimately, success in environmental performance depends on management commitment and internal management practices. Owner/manager support is an antecedent for the successful implementation of green purchasing practices, eco-design practices, customer cooperation and investment recovery practices (Green *et al.*, 2012). The success of environmental management initiatives requires owner/manager commitment (Lai and Cheng, 2009) to enable the adoption of a full green life cycle approach in an SME firm (Lai and Cheng, 2009), hence indicating the importance of internal environmental management practices.

While three practices were significantly and positively correlated with economic benefits, only two of them, internal environmental management ($\beta = 0.229$) and green purchasing ($\beta = 0.158$), significantly and positively influenced economic benefits. Internal environmental management practices increase economic benefits through focus on knowledge acquisition, competence and expertise in environmental management which, in turn, results in engagement in income-generating environmental activities such as investment recovery, production of environmentally friendly products, and cost reducing

Hypotheses	Hypothesis path	Result
H1a	Green purchasing → Environmental performance	Not supported
H1b	Customer cooperation → Environmental performance	Not supported
H1c	Eco-design → Environmental performance	Supported
H1d	Investment recovery → Environmental performance	Not supported
H1e	Internal environmental management → Environmental performance	Supported
H2a	Green purchasing → Economic benefits	Supported
H2b	Customer cooperation → Economic benefits	Not supported
H2c	Eco-design → Economic benefits	Not supported
H2d	Investment recovery → Economic benefits	Not supported
H2e	Internal environmental management → Economic benefits	Supported
H3a	Green purchasing → Economic costs	Not supported
H3b	Customer cooperation → Economic costs	Not supported
H3c	Eco-design → Economic costs	Not supported
H3d	Investment recovery → Economic costs	Not supported
H3e	Internal environmental management → Economic costs	Supported

Table VI. GSCPs and performance outcomes: structural model results

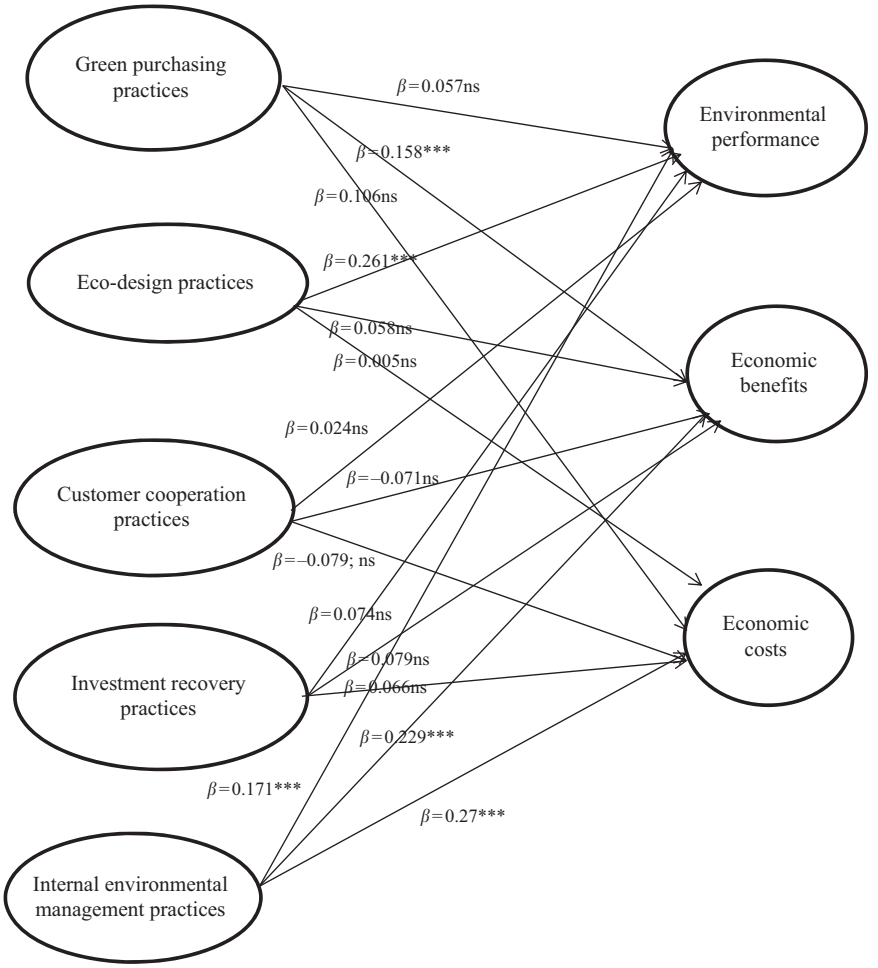

Figure 2.
Relationship between GSCP and performance outcomes: structural equation modelling results

Notes: Fit indicators: NFI=0.921; GFI=0.962; CFI=0.923; IFI=0.927; CMIN/df=15.234. ns, not significant. ***$p<0.001$

production processes that consume less energy, fuel and water (De Giovanni and Esposito Vinzi, 2012). Green purchasing increases economic benefits by reducing purchasing costs through ensuring that raw materials can be recycled, reused and remanufactured to decrease both materials costs and fees paid for waste treatment and discharge (Rao and Holt, 2005). Waste from raw materials can be converted into a marketable state in several different ways or be used during the manufacture of new products.

A possible explanation for investment recovery practices significantly correlating with economic benefits but not significantly predicting economic benefits is as follows. Investment recovery practices fail to produce economic benefits because economic benefits depend on the availability of markets for remanufactured products and the willingness of customers to return the product waste (Guide *et al.*, 2003). Additionally, owner/managers may experience difficulties in transforming returned waste into a useable form (Mishra and Napier, 2014), may not be able to determine demand for recycled products and/or the

investment recovery operation costs may outweigh the profits. The costs include the following: transportation from the customer's premises, expert labour and training. The absence of a predictive relationship between investment recovery practices and economic benefit implies low or no demand for remanufactured products in Uganda.

Although three practices had positive significant correlations with economic costs, only internal environmental management was able to positively predict economic costs. This relationship is reasonable, given that investment in internal environmental management practices is key to the adoption of environmentally friendly practices and represents considerable costs to the firm. It is possible that GSCPs other than internal environmental management are not predictors of economic cost because they are subsumed into internal environment management practices, that is, the successful implementation of GSCPs ultimately depends on internal environment management (Green *et al.*, 2012).

5.5 Comparison of research findings with similar research in developing countries

Our findings in Uganda have commonalities and differences with regression tests in similar studies in manufacturing industries in the developing countries such as China (Zhu *et al.*, 2007), Thailand (Laosirihongthong *et al.*, 2013) and India (Vijayvargy and Agarwal, 2014). First, in relation to individual practices and environmental performance, we find eco-design and internal management practices to be positively and significantly related to environmental performance with none of the remaining practices having a significant relationship whether positive or negative. In the Chinese context, Zhu *et al.* (2007) reported similar results in relation to internal management; however, green purchasing practices have a significant negative relationship with environmental performance. In contrast, and in a Thai context, Laosirihongthong *et al.* (2013) found that only green purchasing practices positively influence environmental performance. In India, none of the practices influence environmental performance (Vijayvargy and Agarwal, 2014). In the case of the Chinese and Thai studies, it is likely the different findings may be the consequence of sample differences in industry size and type rather than country contexts. Our sample consisted of SME firms in a range of manufacturing industries, while Zhu *et al.*'s (2007) sample is based on large firms in the automobile industry and Laosirihongthong *et al.*'s sample is from local and multinational manufacturing companies with ISO 14001 certification.

Second, our findings on the influence of individual practices on economic benefits were inconsistent with those carried out in China, Thailand and India. In contrast to our finding that green purchasing and internal environmental management practices positively influence economic benefits, none of the other three studies finds a positive and significant relationship between any single practice and economic benefits. The insignificant findings in these studies are explained respectively as being because Chinese firms lack the capacity to monitor performance associated with GSCPs (Zhu *et al.*, 2007), Thai manufacturers fail to exploit the positive impact that green purchasing practices have on their products and image (Laosirihongthong *et al.*, 2013) and Indian owner/managers lack willingness and commitment to implement GSCPs (Vijayvargy and Agarwal, 2014). It is not entirely obvious why Ugandan owner/managers perceive green purchasing and internal environmental management practices as positively affecting economics benefits apart from the obvious link to good management practices and commitment as explained above.

Third, apart from our study, only Zhu *et al.* (2007) examined economic costs and found that internal management practices are the only practice to significantly influence economic costs. However, Zhu *et al.* also found a significant but negative relationship between green purchasing and economic cost. This finding might be explained by China having a more international customer base which demands the adoption of costly environmental management practices.

6. Conclusions and further research

The extent of GSCP adoption in Uganda is surprisingly strong given the country's early stage of industrialisation, the relatively government-imposed weak environmental regulations and controls, the lack of trust in buyer and supplier relationships, and the restricted geographical markets. The practices are making a positive difference in terms of improving environmental performance; however, the economic benefits are generally low but in the context of even lower economic costs. The industries with the highest environment performance and economic benefits not only appear to have the highest economic costs but also the most international customers. In line with resource dependency theory, our very preliminary and descriptive findings on industry differences provide early indications of the importance of geographic markets, especially international customers, in not only encouraging the adoption of GSCPs for greater economic benefits but also at a greater economic cost. The role of international markets requires further research with much larger samples to allow more substantial statistical testing.

In Uganda, the importance of internal environmental management practices to improved environmental performance and economic benefit appears to be the fundamental GSCP for SME manufacturers. Unlike China, where owner/managers resent the interference and costs imposed by strict government environmental regulations and controls (Zhu and Tian, 2016), Ugandan owner/managers appear to hold a more positive and pro-active view of government policy. The role of government regulation in the adoption of GSCPs is well researched, however, little if any attention is given to the effect of perceived compulsion on the motivation of firm owners to more fully commit to internal environmental management practices. This lends itself to further research among industries with different levels of regulation as well as cross-national studies between countries with varying levels of regulatory environmental controls. Furthermore, the importance of adopting internal environmental management practices in Uganda raises the issue from Zhu *et al.*'s (2010) research as to whether the length of time and firm experience with GSCPs increase the performance outcomes.

Comparisons of our findings with those of similar studies in China, Thailand and India, although compromised by methodological differences, especially sample characteristics, raise important issues for further investigation. If cross-national studies were undertaken with more similar samples and methods, better understanding could be achieved of the extent to which differences in the three areas of performance outcomes that we found are the result of industry differences (including size, type and geographic markets), national context differences such as stage of industrialisation, government environmental controls, or national cultural differences.

Our research findings from Uganda and their comparison with similar studies in developing nations provide rich material for further research both in Africa and across nations. Two methodological suggestions for future research arise from the major limitation of our research being its cross-sectional survey design. Behavioural variables such as GSCPs are better studied through longitudinal research which better explains causality. Finally, given the potentially important influence of individual owner/manager attitudes and circumstances in GSCP adoption and perceived performance outcomes, qualitative methods such as interviews would provide a finer grained understanding of the motivations and factors affecting their perceptions and actions as well as unearthing other variables of relevance.

7. Contributions and implications of the research

In addition to raising important questions for further research, our study provides a unique contribution to the literature on GSCPs and their performance outcomes by including a larger range of GSCPs and performance variables than previous studies, five GSCPs (green purchasing, customer cooperation, investment recovery, internal environmental management and eco-design practices) and three performance outcomes, environmental,

economic benefit and economic cost. Previous research mainly limits the number of practices that are linked to environmental performance and economic benefits with few examining the impact of the practices on economic costs. Including more variables is important because the relationships between cost and benefits in particular are fundamental to firm adoption of GSCPs and government policy. For African governments and the United Nations, which play a key role in development and environmental protection in Africa, our findings suggest greater attention should be given to encourage internal environmental management practices in firms as this appears central to successful investment in other GSCPs. Similarly, for firms and policy makers alike, understanding and promoting the likely performance outcomes for each GSCP are of practical value in decisions about which practices to adopt and in which order.

Two specific findings are of especially managerial relevance. The finding that economic costs are possibly lower than they might otherwise be because of subsidies from the United Nations implies this is a successful strategy in encouraging GSCP adoption and promoting both environmental and economic performances such that these programmes might be continued and expanded. Questions raised in our research about the role of international markets in encouraging GSCP adoption and performance are not only fruitful for further research but also have policy implications for extending markets to outside Africa in order for firms to improve performance by leveraging more advanced expertise and technology from international buyers.

Finally, because our research has its context in Africa, its major contribution is to address the paucity of research on greening supply chains in this continent. Manufacturing supply chains are not only vital to the development of Africa but are also the greatest contributors to pollution. Contributions to further understanding and action in GSCPs in Africa are greatly needed.

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Appendix 1

Table AI. Green supply chain practices and performance outcomes: summary of research outcomes

Reference	EP	EB	EC	CP	IP	OP	MP	SP	Examination of the influence for each of the individual practices
Zhu and Sarkis (2004)	✓	✓	✓						Considers all practices
Zhu *et al.* (2010)	✓	✓				✓			Qualitative study
Zhu *et al.* (2007)	✓	✓	✓						Considers all practices
Rao and Holt (2005)		✓		✓					Internal environmental management practices do not influence performance
Green *et al.* (2012)	✓	✓				✓			Only four practices
Chien and Shih (2007)	✓	✓							Looks at green supply chain practice adoption as an overall construct
Azevedo *et al.* (2011)	✓	✓				✓			Looks at all practices but a case study approach is taken
Zhu *et al.* (2013)	✓	✓				✓			Considers all practices
Testa and Iraldo (2010)	✓			✓					No focus on the impact of each practice is made
Chan *et al.* (2012)		✓							Looks at only green purchase, customer cooperation and investment recovery
De Giovanni and Esposito Vinzi (2012)	✓	✓							Focuses only on internal environmental practices and green purchasing
Laosirihongthong *et al.* (2013)	✓	✓							Focus is on eco-design, green purchasing and reverse logistics practices
de Sousa Jabbour *et al.* (2014)	✓								Green purchasing and customer cooperation
Kim *et al.* (2011)	✓	✓				✓		✓	Considers all practices
Mitra and Datta (2014)		✓		✓					Green purchasing, eco-design, green manufacturing
Gandhi (2016)	✓								Eco-design, internal environmental management practices and investment recovery
Eng Ann *et al.* (2006)	✓						✓		Internal environmental management practices
Peng and Lin (2008)		✓			✓				Internal firm practices
Kim and Rhee (2012)		✓							Customer cooperation
Zhu *et al.* (2016)	✓	✓							Eco-design, Green purchasing
de Sousa Jabbour *et al.*	✓	✓							Qualitative study of combined effect of green supply chain practices
Diab *et al.* (2015)	✓	✓		✓		✓			Considers all practices
Mao *et al.* (2016)	✓	✓							Considers all practices
Carter *et al.* (2000)	✓	✓							Green purchasing
Rusinko (2007)	✓			✓	✓	✓	✓		Qualitative study: considers only green manufacturing
Sezen and Çankaya (2013)	✓	✓							Green manufacturing
Vijayvargy and Agarwal (2014)	✓			✓					Considers all practices

Appendix 2

Rate the extent to which your firm engages in the following practices. Tick the appropriate number	Much lower	Lower	Slightly lower	Neutral	Slightly higher	Higher	Much higher
Internal environmental management							
My firm is committed to engagement in green supply chain practices	1	2	3	4	5	6	7
My firm engages in cross-functional cooperation for environmental improvements	1	2	3	4	5	6	7
My firm aims at achieving total quality environmental management	1	2	3	4	5	6	7
My firm employs environmental compliance and auditing programmes to achieve better environmental performance	1	2	3	4	5	6	7
My firm obtained an ISO 14001 certification in order to produce environmentally friendly goods	1	2	3	4	5	6	7
My firm has made investments in environmental management systems	1	2	3	4	5	6	7
Green purchasing							
My firm provides design specifications to suppliers that include environmental requirements for the purchased item	1	2	3	4	5	6	7
My firm cooperates with suppliers on environmental objectives	1	2	3	4	5	6	7
My firm carries out environmental management audits for its suppliers' internal management	1	2	3	4	5	6	7
My suppliers are ISO-14000 certified	1	2	3	4	5	6	7
My firm evaluates second-tier suppliers for environmentally friendly practices	1	2	3	4	5	6	7
Customer cooperation							
My firm cooperates with its customers on product eco-designs	1	2	3	4	5	6	7
My firm cooperates with its customers on cleaner production (environmentally friendly production)	1	2	3	4	5	6	7
My firm cooperates with its customers on green packaging	1	2	3	4	5	6	7
Eco-design							
My firm develops products designs that consume less material/energy	1	2	3	4	5	6	7
My firm designs products for reuse, recycle, recovery of material and component parts	1	2	3	4	5	6	7
My firm designs products to avoid or reduce the use of hazardous products and/or manufacturing processes	1	2	3	4	5	6	7
Investment recovery							
My firm engages in recovery (sale) of excess inventories/materials	1	2	3	4	5	6	7
My firm engages in the sale of scrap and used materials	1	2	3	4	5	6	7
My firm engages in the sale of excess capital equipment	1	2	3	4	5	6	7

Sources: Zhu *et al.* (2007, 2008a, b) and Zhu and Sarkis (2007)

Table AII. Measurement scales for each green supply chain practice

Appendix 3

Rate the extent to which your firm has made an improvement in its performance based on green supply chain practice adoption	Much lower	Lower	Slightly lower	Neutral	Slightly higher	Higher	Much higher
Environmental performance							
Reduction of pollutant emissions	1	2	3	4	5	6	7
Reduction of waste water	1	2	3	4	5	6	7
Reduction of solid wastes	1	2	3	4	5	6	7
Decrease of consumption for hazardous/ harmful/toxic materials	1	2	3	4	5	6	7
Economic performance with positive impact							
Decrease of cost for materials purchasing	1	2	3	4	5	6	7
Decrease of cost for energy consumption	1	2	3	4	5	6	7
Decrease of fee for waste treatment	1	2	3	4	5	6	7
Decrease of fee for waste discharge	1	2	3	4	5	6	7
Economic performance with negative impact							
Increase in investment	1	2	3	4	5	6	7
Increase in operational cost	1	2	3	4	5	6	7
Increase in training cost	1	2	3	4	5	6	7
Increase in cost due to purchasing of environmentally friendly materials	1	2	3	4	5	6	7

Sources: Zhu *et al.* (2005) and Hervani *et al.* (2005)

Table AIII. Measure scales for firm performance

Appendix 4

Variables	Skewness statistics	Kurtosis statistics
Green purchasing	−0.186	−0.544
customer cooperation	−0.027	−0.81
Eco-design	−0.269	−0.468
Investment recovery	−0.557	−0.17
Internal environmental management	−0.141	−0.701
Environmental performance	−0.706	0.896
positive economic performance	−0.487	−0.296
negative economic performance	−0.09	−0.119

Table AIV. Skewness and kurtosis normality results

Appendix 5

Total variance explained						
	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.352	26.099	26.099	8.352	26.099	26.099
2	3.205	10.016	36.115			
3	2.888	9.025	45.140			
4	2.204	6.887	52.027			
5	1.540	4.813	56.840			
6	1.373	4.292	61.132			
7	1.209	3.778	64.909			
8	1.165	3.639	68.548			
9	0.926	2.893	71.442			
10	0.818	2.556	73.997			
11	0.762	2.380	76.377			
12	0.744	2.324	78.701			
13	0.673	2.103	80.804			
14	0.612	1.912	82.716			
15	0.545	1.704	84.421			
16	0.523	1.634	86.055			
17	0.460	1.439	87.494			
18	0.410	1.283	88.776			
19	0.409	1.278	90.055			
20	0.382	1.193	91.248			
21	0.361	1.127	92.375			
22	0.333	1.041	93.416			
23	0.299	0.935	94.351			
24	0.272	0.851	95.202			
25	0.260	0.813	96.016			
26	0.253	0.790	96.806			
27	0.229	0.715	97.521			
28	0.197	0.616	98.136			
29	0.197	0.614	98.750			
30	0.151	0.471	99.222			
31	0.147	0.459	99.681			
32	0.102	0.319	100.000			

Note: Extraction method: principal component analysis

Table AV.
Common method variance results

Appendix 6

Variable item	CC	ED	ECO-B	ECO-C	ENV-P	GP	IEM	INV-R
CC1	0.79	0.51	0.14	0.028	0.28	0.32	0.28	0.24
CC2	0.87	0.54	0.12	0.116	0.20	0.29	0.24	0.39
CC3	0.85	0.51	0.08	0.015	0.22	0.32	0.32	0.37
ED1	0.64	0.84	0.06	0.043	0.26	0.26	0.34	0.32
ED2	0.50	0.81	0.14	0.041	0.37	0.17	0.25	0.34
ED3	0.32	0.70	0.29	0.267	0.24	0.27	0.40	0.25
ENV-P1	0.34	0.31	0.32	0.070	0.78	0.29	0.32	0.23
ENV-P2	0.24	0.28	0.33	0.079	0.86	0.20	0.25	0.20
ENV-P3	0.17	0.31	0.37	0.002	0.83	0.21	0.26	0.25
ENV-P4	0.12	0.25	0.37	0.120	0.66	0.16	0.23	0.14
GP1	0.25	0.15	0.25	0.159	0.11	0.68	0.54	0.19
GP2	0.27	0.21	0.23	0.226	0.14	0.76	0.50	0.29
GP3	0.22	0.19	0.35	0.311	0.21	0.76	0.48	0.28
GP4	0.32	0.28	0.25	0.025	0.28	0.70	0.47	0.28
GP5	0.32	0.28	0.34	0.240	0.28	0.81	0.58	0.35
INV-R1	0.33	0.41	0.21	0.144	0.26	0.27	0.35	0.86
INV-R2	0.37	0.33	0.23	0.102	0.21	0.39	0.37	0.87
INV-R3	0.33	0.25	0.20	0.181	0.21	0.31	0.30	0.83
IEM1	0.23	0.21	0.28	0.243	0.22	0.55	0.76	0.36
IEM2	0.33	0.33	0.30	0.297	0.22	0.52	0.78	0.41
IEM3	0.17	0.32	0.32	0.300	0.29	0.37	0.68	0.26
IEM4	0.19	0.36	0.42	0.244	0.25	0.45	0.70	0.24
IEM5	0.29	0.30	0.26	0.084	0.21	0.57	0.71	0.26
IEM6	0.24	0.31	0.29	0.140	0.30	0.55	0.74	0.19
ECO-B1	0.13	0.15	0.78	0.085	0.45	0.24	0.30	0.22
ECO-B2	0.06	0.14	0.71	0.102	0.44	0.24	0.30	0.19
ECO-B3	0.10	0.20	0.82	0.123	0.34	0.31	0.32	0.18
ECO-B4	0.13	0.11	0.80	0.112	0.38	0.31	0.29	0.15
ECO-C1	0.04	0.15	0.085	0.689	0.14	0.17	0.20	0.12
ECO-C2	0.07	0.06	0.102	0.902	0.06	0.21	0.20	0.11
ECO-C3	0.12	0.12	0.123	0.903	0.04	0.25	0.30	0.18
ECO-C4	0.003	0.076	0.112	0.918	0.06	0.26	0.30	0.15

Table AVI. Discriminant validity results

Notes: CC, customer cooperation; ED, eco-design; ECO-B, economic benefits; ECO-C, economic costs; EP, environmental performance; GP, green purchasing; IEM, internal environmental management; INV-R, investment recovery

Appendix 7

Variable	Industry	Mean	SD
Green purchasing	Meat and fish processing	4.6000	0.21909
	Grain milling products	5.3667	0.27039
	Animal feeds	5.3500	0.77621
	Manufacture of bakery products	4.4923	0.22360
	Coffee and tea processing	5.6667	0.29059
	Beer and spirits	4.9667	0.38442
	Soft drinks and mineral water	4.6000	0.17112
	Leather and related products	5.2000	0.41633
	Construction materials	4.1579	0.19621
	Paper products and printing	4.9750	0.26323
	Rubber and plastic products	5.0667	0.44920
	Metal products	4.9846	0.30589
	Refined petroleum products	5.6000	0.40825
	Chemicals and chemical products	4.9111	0.24212
	Other products	4.5040	0.13489
Customer cooperation	Meat and fish processing	4.2000	0.22608
	Grain milling products	4.5000	0.66528
	Animal feeds	4.4167	0.59900
	Manufacture of bakery products	4.5256	0.21418
	Coffee and tea processing	6.2222	0.40062
	Beer and spirits	4.9444	0.46680
	Soft drinks and mineral water	4.0185	0.27937
	Leather and related products	5.0000	0.38490
	Construction materials	4.1579	0.25791
	Paper products and printing	4.7708	0.30689
	Rubber and plastic products	4.3889	0.36935
	Metal products	4.6410	0.42275
	Refined petroleum products	5.5833	0.69887
	Chemicals and chemical products	4.7593	0.32428
	Other products	4.1533	0.17721
Eco-design	Meat and fish processing	4.8000	0.29059
	Animal feeds	4.5000	0.34694
	Manufacture of bakery products	4.7051	0.18976
	Coffee and tea processing	6.1111	0.48432
	Beer and spirits	5.2778	0.26411
	Soft drinks and mineral water	4.5926	0.20086
	Leather and related products	4.5556	1.11111
	Construction materials	5.0175	0.24645
	Paper products and printing	5.0417	0.23149
	Rubber and plastic products	5.0556	0.31525
	Metal products	4.9231	0.37393
	Refined petroleum products	5.4167	0.68550
	Chemicals and chemical products	5.0556	0.26023
	Other products	4.5867	0.15895
Investment recovery	Meat and fish processing	4.6000	0.49889
	Grain milling products	4.3333	0.52352
	Animal feeds	4.1667	0.61614
	Manufacture of bakery products	4.8718	0.19311
	Coffee and tea processing	5.7778	0.29397
	Soft drinks and mineral water	4.8704	0.20370
	Leather and related products	4.8889	0.67586
	Construction materials	4.9474	0.25777

(*continued*)

Table AVII. Descriptive statistics for each GSCP and performance outcome by industry

Variable	Industry	Mean	SD
	Paper products and printing	5.5000	0.22771
	Rubber and plastic products	5.3333	0.40369
	Metal products	5.1282	0.28629
	Refined petroleum products	5.8333	0.50000
	Chemicals and chemical products	4.8148	0.21427
	Other products	4.9867	0.12379
Internal environmental management	Meat and fish processing	4.3667	0.17795
	Grain milling products	5.2778	0.33793
	Animal feeds	4.4167	0.52924
	Manufacture of bakery products	5.0064	0.17795
	Coffee and tea processing	5.4444	0.58794
	Beer and spirits	5.1667	0.38968
	Soft drinks and mineral water	5.1667	0.16667
	Leather and related products	4.0000	0.72648
	Construction materials	4.9825	0.20900
	Paper products and printing	5.2708	0.19830
	Rubber and plastic products	4.7222	0.37185
	Metal products	4.8077	0.34738
	Refined petroleum products	5.4583	0.36878
	Chemicals and chemical products	4.6296	0.23086
	Other products	4.6833	0.14578
Environmental performance	Meat and fish processing	4.8000	0.25495
	Grain milling products	5.3333	0.23863
	Animal feeds	5.3125	0.25769
	Manufacture of bakery products	4.8365	0.17918
	Coffee and tea processing	5.7500	0.90139
	Beer and spirits	4.7500	0.58808
	Soft drinks and mineral water	4.8472	0.18318
	Leather and related products	4.7500	0.94648
	Construction materials	5.1842	0.16539
	Paper products and printing	5.2188	0.18802
	Rubber and plastic products	5.3333	0.08333
	Metal products	4.8846	0.33567
	Refined petroleum products	5.6875	0.57168
	Chemicals and chemical products	5.0900	.69759
	Other products	5.0650	.86029
Economic benefits	Meat and fish processing	2.2571	0.29416
	Grain milling products	3.0000	0.32156
	Animal feeds	2.6786	0.46793
	Manufacture of bakery products	2.3187	0.15000
	Coffee and tea processing	2.5238	0.54917
	Beer and spirits	2.5714	0.34007
	Soft drinks and mineral water	2.5952	0.10601
	Leather and related products	2.2381	0.38978
	Construction materials	2.4962	0.14384
	Paper products and printing	2.8661	0.15456
	Rubber and plastic products	2.8810	0.17464
	Metal products	2.6703	0.21964
	Refined petroleum products	3.3571	0.55174
	Chemicals and chemical products	2.6032	0.17950
	Other products	2.6686	0.09619
Economic costs	Meat and fish processing	1.8286	0.24075
	Grain milling products	2.8571	0.31515
	Animal feeds	2.6429	0.27664

Table AVII. (*continued*)

Variable	Industry	Mean	SD
	Manufacture of bakery products	2.3956	0.15874
	Coffee and tea processing	1.9048	0.19048
	Beer and spirits	2.5476	0.43081
	Soft drinks and mineral water	2.7460	0.16192
	Leather and related products	2.5714	0.14286
	Construction materials	2.3233	0.18502
	Paper products and printing	2.5268	0.25645
	Rubber and plastic products	1.9524	0.41677
	Metal products	2.6264	0.22734
	Refined petroleum products	2.5000	0.35714
	Chemicals and chemical products	2.2540	0.15817
	Other products	2.3200	0.11841

Table AVII.

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Conceptual aspect of environment security: evidence from India and Bangladesh

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Abstract

Purpose – The fast depletion of natural resources that has resulted in the scarcity of resources and degradation of environment and the subsequent conflict over resources within and among the states have given rise to a growing concern for environmental security all over the world. It may be pointed out here that since the beginning of human civilization, humans have been relying on the environment for their needs and demands. Therefore, the concern of human beings to the environment has been always and obvious. But now with the depletion of natural resources, the concern for environmental security is being advocated. The purpose of this paper is to analyze environmental issues in the context of South Asia. It may also be added here that in a situation as stated above, any stress on the environment can cause conflicts involving violence within the state as well as between the nation states. Moreover, this paper will look into other issues related to the environment degradation in India and Bangladesh.

Design/methodology/approach – The first approach confines environment to the nature and the problems and constraints related to it. It can be termed as ecological approach. This approach is too narrow in its scope, as nature alone is not responsible for many types of hazards. How it is being exploited and protected is equally important. The other approach has been termed as the maximize approach and it includes both the ecology and its human domains. This approach takes into consideration the interaction between the two. It believes that the excessive dependence of human beings affects the environment. Also, the depletion and degradation of the environment affect human beings. The environmental security has to include both the domains and understand their inter-linkages. In fact, the uses of environment and its proper maintenance are related to the human domains.

Findings – The environment-related problems and their implications are more similar in both countries. It is true that there is a growing awareness on environmental issues in almost all the countries in the last few years and the individual countries have persuaded environment-friendly policies in certain sectors. Apart from this regional level, a common approach to securing the environment may involve the following aspects: sharing of knowledge and expertise regarding population control measures, policies and programs; cooperation for development and poverty eradication; regularization of inter-state migrations, evolving a regional framework for controlling, repatriation and rehabilitation of refugees; establishment of a system of disaster management and disaster preparedness at the regional level; exchange of knowledge and research works on seismic tremors, earthquakes, and landslides, their causes and possibilities; evolving common flood control measures and development of a regional flood warning system; common measures can be taken up for increased agriculture productivity, treatment of salinity, development of cyclone warning system, reforestation, development of water resources, air pollution control system, etc.

Originality/value – This research will not only be useful for India and Bangladesh but also for other South Asian countries and developing countries as well.

Keywords India, Bangladesh, Natural hazard, Environmental security, Population displacement

Paper type General review

1. Introduction

Security is the ultimate expedition for "all" in all circumstances. With the change in security scenario, it becomes difficult to separate internal and external threats to security. Protection of the state from any attack by other states is seen as the traditional definition till the Cold War. But, the post Cold War, a new as well as dynamic theme was added in the study of

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international security. As several scholars also say that the traditional concepts and definitions for instance the notion of state-centric security, defined by military aspects, is insufficient to explain emerging security threats. The traditional security concerns have now given way to a comprehensive approach to security. Four main types of threats have been identified: territorial, economic, political and environmental threats. Environmental security represents a significant departure from traditional approaches to study. The environmental security as a concept was precisely brought up the first time in 42nd Session of the General Assembly of the United Nations in 1987. Since then, it has become a significant aspect of security studies both in theoretical and empirical contexts. At the Stockholm Conference on Environmental Stress and Security in 1988, the Swedish minister of environment and energy pointed out, "so far most of these statements of interconnections between environmental destruction and security are hypothetical." According to the Our Common Future (1987) on environmental and development (Brundtland Commission Report) titled "Our Common Future," the whole notion of security as traditionally understood in terms of political and military threats to national sovereignty must be expanded to include the growing impact of environmental stress locally, nationally, regionally and globally. There is no military solution to environmental security. The report further says, "We have in the past been concerned about the impacts of economic growth upon the environment. We are now forced to concern ourselves with the impact of ecological stress upon our economic prospects." Further, "it has been widely accepted that the indiscriminate attitude of the people and the governments toward the environment, the self-interest, overexploitation of resources, etc., have caused scarcity of resources and their fast depletion as well as degradation of the environment. This has caused conflicts and violence among and between the states" (Thomas and Homer-Dixon, 1994).

The rapid diminution of natural resources has led to the paucity of resources and the degradation of environment on one hand and the resultant intra and inter-state conflict has given rise to a growing concern for environmental security all over the world. It is being widely accepted that the environmental scarcity and the environmental degradation pose a threat to the national security. Hence, there is a close linkage between the environmental degradation and the national security. In the recent years, it has been widely accepted that environmental security is a significant dimension of national and regional security frameworks of the nation states. It has been observed that in recent years, the concern for environmental security is being promoted. Further, the concerning issues with regard to environmental security are both emergent and highly complex. They are emergent because of the interactive impacts on environmental security of dynamic global and regional trends. In the Asia-Pacific region, these include rapid economic development and the demand for natural resources, population growth (especially in South Asia), pollution, poverty and climate change; and complex because the issues of environmental security and governance are multi-minded, with many independent decision-makers impacting one another, and because they are characterized by patterns of circular causation, or feedback, leading to possible tipping points which can rapidly change the state of the environmental security system (Dasgupta and Ehrlich, 2013; Hauger *et al.*, 2014).

While it is true that there is a growing awareness on environmental issues in almost all the countries of South Asia in the last few years and many countries have persuaded environment-friendly policies in sectors like agriculture, industries, health and others, both India and Bangladesh receive less attention in terms of environmental security at the international level. Further, depleting natural resources, exponential growth of population, increasing pressure on natural resources combined with industrialization and excessive urbanization call the urgent need to conceptualize the environment security for these two countries. Bangladesh is historically and geographically close to its nuclear-armed neighbor India. India has always been an important and prime factor in the making of foreign policy of Bangladesh and for the country's security concerns. This paper will analyze

environmental issues in the context of South Asian region. As a preliminary note, it can be said that in a highly populated (rather overpopulated) and resource-scarce region with ill-coordinated development activities, threats to environment become more prominent. Therefore, there is a greater need for securing the environment in such areas. It may also be added here that in a situation as stated above, any stress on the environment can cause conflicts involving violence to allow to very high magnitude within the state boundaries as well as between the states. This paper will conceptualize the emerging issues of environmental security in India and Bangladesh. Further, different issues related to the environment degradation in India and Bangladesh are also central concern to this study. Therefore, in tune with these perspectives and comprehensive understanding for the readers, the next sections deal with the conceptual framework for environmental security with special focus on India and Bangladesh. Further, approaches to environmental security and nexus between India and Bangladesh with regard to environmental issues have been discussed in the subsequent section of the paper. Finally, concluding remarks and future course of actions toward environmental security have been presented in the last section of this paper.

2. Environmental security: a conceptual framework

The concept of comprehensive security provides a framework for understanding the issues of environmental security. Hsiung (2004) provided a concise description of the concept:

> A nation's security is no longer the traditional "national defense" (military security) but has economic, environmental, and human dimensions as well (separately known as economic security, environmental security, and human security). All three dimensions may be subsumed under the rubric of "comprehensive security", a new umbrella concept that grew out of the post-Cold War debate over the ramifications of security and over security studies as a field of inquiry (p. 1).

Environmental security represents a significant departure from traditional approaches. The traditional concept of security is surrounded along defending territory and political integrity of a country. The state was responsible for defending its sovereignty and integrity and armed forces were assigned to this duty. The state alone had to perform this responsibility, as there were no such other institutions that could share it. The environmental security has become an important dimension of the comprehensive national security. The environmental security as a concept was officially mentioned for the first time in the General Assembly of the UNO in 1987. Since then, it has become a significant aspect of security studies both in theoretical and empirical contexts. It has been widely accepted that the indiscriminate attitudes of people and the governments toward the environment, the self-interest, overexploitation of resources, etc., have caused scarcity of resources and their fast depletion as well as degradation of the environment. This has caused conflicts and violence among and between the states. The scarcity of resources may give rise to a conflict for the remaining resources. Therefore, there is a need to secure the environment. The security of the environment needs a positive attitude toward it. Thus, environmental security may be defined as the avoidance of negative linkages between human activities and the environment. The relationship between environmental stress and conflict is therefore characterized by multi-causality, reclusiveness and feedback loops. Just as environmental stress can lead to conflict under unfavorable social, economic and political conditions, conflict can lead to environmental stress. Both characteristics are inherent in the two case studies in South Asia discussed in this paper and can be illustrated by Figure 1.

Environmental security has introduced an interdisciplinary perspective into security studies. "Environmental security encompasses the interactive dynamics of the diverse human and natural networks that constitute the modern world" (Matthew and McDonald, 2004, p. 36). "The link between environment and security has a long history that is suitable to understand the relation between both of these the two. Furthermore, environment as a

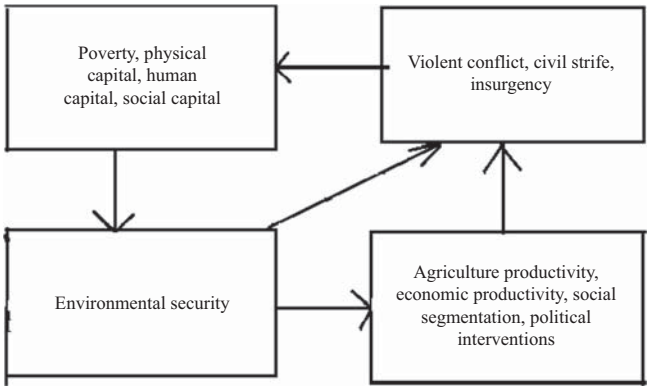

Figure 1. Conceptualizing environmental stress and violent conflict

resource has strategic significance for nation states who build power through natural resources like water, oil, gas, and various other minerals" (Biswas, 2011). Hassan (1991, p. 56) discussed Hassan (1991) discussed that relationship between environment degradation and effects on economy of the country. According to his argument, continuous environmental calamities decrease the economic growth of a nation, hamper its social cohesion and destabilize its political structure. Environmental change reduces economic opportunities for a country by causing demographic displacement within states and across international borders. Environmental stress can also cause an affected sub-national group to shift its allegiance from the center to the periphery, increasing the possibilities of political disorder, civil strife, and even insurgency (Hassan, 1991, p. 58).

Deudney (1991) described, "the concept of national security, as opposed to national-interest or well-being, has been centered upon organized violence." He gives the example of natural calamities like earthquakes or hurricanes that had caused excessive damage; he opposed the notion that such events are threats to national security. In 2000, International Union for Conservation of Nature and Organization for Economic Cooperation and Development report advocated the idea that security and insecurity are closely related to poverty, resource scarcity and social discrimination. This approach also advocates that environment-induced conflict is one of the many factors influencing individual or societal security. Lodgaard (1990, p. 17) relates that "there is a conceptual kinship which makes it natural to speak of security in both connections, under certain circumstances, irreparable environmental degradation or ecological system in dramatic change may increase the likelihood of violent conflict erupting." Therefore, there are a number of aspects by which environment security relationship can be viewed. Conflict over the resources is another dimension of environment and security relationship that is shared by a number of countries.

According to Buzan (1983, p. 83), "threats to national security might also come in ecological forms, in the sense that environmental events, like military and economic ones, can damage the physical base of state, perhaps to sufficient extent to threaten its idea and institution." Similarly, Lodgaard (1986, p. 251) feels that "the concept of environmental security challenges established frames of mind and political conflicts and it conveys a message that environmental problems have a legitimate claim for status as military problem have." The impact of environmental degradation and consequences of environmental changes are increasingly associated with non-conventional notions of security. Considering the environment as a threat to individual, national or global security has created a new agenda in the discourse of security studies. The increasing scope of international security now readily includes environmental degradation, global warming and climate change. These issues have extended the human understanding of environmental change, conflict

and vulnerability and explored the roles of conservation and sustainable development in promoting peace, stability and human security. Thus, the importance of understanding environmental security is twofold. First, one has to understand the transformations in the theoretical developments of the concept of security. Second, one also has to envisage the link between environmental change and livelihood strategies of human beings on the local level and the broader impact of environmental changes on a society. These two dimensions help define environmental issues as important factors of security.

3. Approaches to environmental security

It is clear from the definition of environment security that the central thrust of environmental security is to secure the environment. But the question is how to determine the phenomenon of environment? In this regard, there can be two major approaches to define the environment concern:

(1) The first approach confines environment to the nature and the problems and constraints related to it. It can be termed as ecological approach. This approach is too narrow in its scope, as nature alone is not responsible for many types of hazards. How it is being exploited and protected is equally important.

(2) The other approach has been termed as the maximize approach and it includes both the ecology and its human domains. This approach takes into consideration the interaction between the two. It believes that the excessive dependence of human beings affects the environment. Also, the depletion and degradation of the environment affect human beings. The environmental security has to include both the domains and understand their inter-linkages. In fact, the uses of environment and its proper maintenance are related to the human domains.

It may also be added here that the question of environmental security has to be addressed in a broader perspective. Both the living non-human domains and the human domains have to be included within the purview of environmental security. It is also important that a futuristic attitude has to be adopted in securing the environment. Today's environmental hazards can be environmental challenges for tomorrow. Therefore, it is not sufficient that today's needs and demands are kept in view. It is equally important that the possible human-environment inter-linkages are taken into consideration in securing the environment.

4. Major environmental issues in South Asia: India and Bangladesh nexus

In this section, we will try to focus on the environmental, social and demographic issues that are very relevant for the environment security in South Asia as well as in India and Bangladesh. The focus on environmental problems in South Asia as in the case of other developing countries is more on local and regional systems such as cropland, forests, water and marine resources on which the bulk of the population depends for its livelihood. The major environmental issues in South Asia, especially in India and Bangladesh, could be population explosion, poverty, threat to biodiversity, cross-border migration and conflicts and natural and other hazards. Under the threat of natural and other hazards, there are too many subcategories like river erosion, desertification, deforestation, flood and drought, water availability and water quality, land degradation, air pollution and climate change. In such scenario, it becomes imperative to discuss the major environmental issues holistically.

4.1 Population explosion

Population has a direct effect on resources and the environment at large. There has to be a balance between population and resources. Otherwise, it is bound to create environmental hazards. South Asia is one of the most densely populated regions of the world. The total

population of South Asia is 1728.5 million (UNDP, 2011). The region holds more than 24 percent of the world's total population. It has only 3.5 percent of the total land area of the world (United Nations, 2015). Its shows that the region has much population in comparison to its total land area. India is the second-largest populated country in the world as it holds the largest share of the population of the region with 1,241.5 million populations (Census of India, 2011). Nevertheless, Bangladesh is overpopulated compared to its total land area. It is clear that all these countries are overpopulated. The excessive pressure of population on resources causes numerous environmental problems and constraints. The problems of environmental depletion and environmental scarcity are closely associated with the problem of uncontrolled population growth.

4.2 Poverty

There is a direct correlation between population, poverty and environmental degradation. The poor countries are more vulnerable to environmental changes. Hence, they are more prone to environmentally induced conflicts. Poverty and underdevelopment affect the environment by causing environmental depletion and scarcity, thereby contributing to environment-related conflicts. The poverty conditions in South Asia can be understood by the fact that the region generates only 1.2 percent of world's total income (Irfan, 2000). The Human Development Report of South Asia states that 32.3 percent of the total population is below the poverty line in the region. Bangladesh has 40 percent of its population under the poverty line, while India's 27 percent population is under the poverty line (UNDP, 2011). The Population Division of United Nations recently stated that nearly 22 percent of the total population is without access to health services, 63 percent population without access to sanitation facilities and 11 percent without access to safe drinking water (UNDP, 2016). These data clearly show that the South Asian countries are faced with the challenges of poverty and underdevelopment.

4.3 Threat to biodiversity

The South Asian region is rich in biodiversity. The different ecological regions like mountains, hills, plains, deserts and the seacoasts have specific varieties of flora and fauna. Climate change, with the concomitant increase in temperature and sea-level rise, is a real threat to the whole ecosystem and biodiversity of the country, especially the Sunderbans. The Sunderbans might be completely inundated by a one-meter rise in sea level. The area may shrink and many flora and fauna species may face extinction. The development of roads, construction of dams, fast depletion of forests, pollution of rivers, excessive exploitation of plants, species and floral varieties for individual and commercial uses have posed threats to biodiversity. The issues involved here are biodiversity conservation and growth, protection of intellectual property rights, patents, security from bio-imperialism, etc.

Due to reduced water flow and salinization, the mangrove forest in the coastal area faces the problem of regeneration, along with the possible extinction of wild life, aquatic habitats and various species of plants and trees. Serious degradation has accrued in the Sunderbans, which is recognized as a World Heritage site by UNESCO, due to the lack of sweet water. Apart from this, the western part in India has great interferences in its rich biodiversity due to construction of rail, road, cutting the forest and high degree of urbanization process.

4.4 Cross-border migration

Migration from Bangladesh is largely a result of a high population density, poor natural resource base, vulnerability to natural disasters and an undiversified economy that depends primarily on rice and jute. Environmental degradation as well as population pressures on

the scarce natural resources in Bangladesh has contributed to a large-scale migration of Bangladeshis to the north-eastern states as well as to some of the large urban centers in India. Though the exact number of migrants from Bangladesh to India is difficult to assess, about 20-23 million Bangladeshis were estimated to have migrated to India by the year 2008 (Ahsan *et al.*, 2014). The north-eastern states in India have attracted large-scale migration largely due to the low population densities, and fertile agricultural land, even though the economic conditions may not be ideal in these states. These factors have contributed to providing cheap unskilled labor and agricultural land as a means of livelihood for the immigrants. In many instances, the immigrants have benefited at the cost of the development of the original inhabitants, thereby leading to adverse social, economic, environmental and political impacts.

As is evident from the above discussion, environmental degradation and resource depletion are the two main factors that contribute to population movement and subsequent conflict. Other key factors include rapidly growing populations and inequitable distribution of income and resources. The poor have been the worst affected as a result of environmental problems. This implies that policy recommendations focus on sustainable resource utilization, consider the factors that underlie the population growth rates and address the inequitable distribution of income and access to resources within and between countries. Greater effort is also required for improving environmental awareness at all levels, involving local communities in environmental programs and increasing support for NGOs to assist the government agencies in environmental protection.

4.5 Natural and other hazards

The region is prone to numerous kinds of natural hazards having a direct curse on the environment of the region. In South Asia, forests play an important role in the developmental process as well as catering to the needs of the people. People have depended on forests for food firewood, fodder, manure, medicinal herbs, timber, etc. Forests play a significant role in soil and water conservation, reduction in air pollution and improvement of the environment, preservation and conservation of wild life, storage of water and controlling the greenhouse effect. The South Asian region is vulnerable to a range of natural disasters with varying severity. This coupled with the lack of infrastructure and technological preparedness to predict and cope with natural disasters has led to a large-scale devastation on a periodic basis.

In India and Bangladesh, for instance, floods and cyclones have caused widespread devastation on an annual basis, while the north-eastern Himalayan region represents the greatest seismic hazard in the Indian subcontinent. Bangladesh alone has experienced some of the most devastating flood. In Bangladesh, 18-19 million people are affected by floods every year. The whole country is seriously affected by flood during the Monsoon season. Bangladesh has the highest number of deaths due to natural disasters, that is, six million two million people annually. In India, during the Monsoon period, many states face flood problems, for instance, Bihar, U.P., and West Bengal that suffer from severe conditions of flood. We know that there is a direct co-relationship between environmental change and flood.

According to IPCC 4th assessment report 2007, in the case of Bangladesh, it is written that one-third of the country may be submerged by 2050 due to the rise in sea levels. It has been estimated that one-meter rise in sea level would cover 14 percent land area of the country and thereby displacing 10 percent of its total population. In India, both the coastal regions (western and eastern) are facing serious problems due to an increase in sea levels. Erosion in Bangladesh is a regular and recurring phenomenon. Erosion of land surfaces, riverbanks and coastal areas is already causing serious problems for the country. An increase in rainfall in summer is apprehended due to climate change, and this would, in turn, increase the surface erosion. Land erosion will intensify through current deforestation and

other land use practices (such as Jhum cultivation). Riverbank erosion is a serious problem in Bangladesh. It is a process largely controlled by river dynamics. The disruption in the life of many local communities is almost a continuous process due to riverbank erosion and the changing course of rivers. During floods, riverbank erosion becomes very acute, and leads to a loss of valuable land. Soil salinity and acidification also affect large areas under cultivation in Bangladesh and the northern region of India. Over 30 percent of the net available cultivable land of Bangladesh is located in the coastal areas. But it has been observed that all the coastal cultivable lands are not being utilized for crop production, mostly due to soil salinity. Increased soil salinity limits the growth of standing crops and affects overall crop production, and also makes the soil unsuitable for many potential crops. Soil salinity has been considered a major constraint to food grain production in the coastal areas of the country (Huq, 1999).

Groundwater depletion emerged as a major concern in India and Bangladesh. It is estimated that as much 70-80 percent of the agriculture production in India depends on groundwater irrigation (Central Ground Water Board, 2017). In states like Haryana, Rajasthan, Delhi, Punjab, Gujarat and Maharashtra, the extent of overexploitation of groundwater ranges from 100 to 260 percent as compared to the critical level of 85 percent. Similarly, in Bangladesh, a fall in water table in the northern and central parts of Bangladesh has resulted in severe water shortage. In Bangladesh, the arsenic concentration of groundwater has been linked to the intensive use of fertilizers and is a potential hazard for about one million people. India and Bangladesh have severe flood conditions every year that cause problem for agriculture production, causing food scarcity, scarcity of fodder, scarcity of drinking water, hunger and unemployment. The decline in water quality as a result of untreated sewage and industrial effluents is a growing concern in the South Asian region. In India, an estimated 10,286 million liters of sewage is discharged into the Damodar River every day. Similarly, the total pollution load in the Yamuna river has been assessed at 1,286 million liters per day. In Delhi alone, 17 big drains are discharging about 1,068 liters of sewage daily into the Yamuna River. A survey of the major Indian rivers which form a part of the regional river systems shows that while most can support aquatic life, the water is completely unfit for drinking or even bathing. Similarly, in Bangladesh, water pollution from raw sewage, industrial wastes and agricultural run-off has assumed great significance.

The anthropogenic sources of sulfur dioxide (SO2) emissions that result in acid rain include coal-based power generation, vehicular emissions and household energy used for cooking. The effects of coal burning tend to be spread over large areas, resulting in acid rain and fly ash deposits in areas near the coal burning plants as well as further away. Fly ash results in an increase in the suspended particulate matter content and hence a deterioration in the air quality. TERI has been involved in the Asian implementation of the model that considers emissions of sulfur dioxide (SO2) as the major pollutant contributing to the acidification of natural ecosystems. The level of sulfur deposition that an ecosystem can bear without long-term damage from acid rain is known as the critical load of that ecosystem. These critical loads differ from one region to another based on the sensitivity of each ecosystem to sulfur deposition. The rise in sea levels and increase in sea-surface temperature are the most probable major climate change-related stresses on coastal ecosystems. Coral reefs are particularly sensitive to prolonged increases in seawater temperature and increased irradiance, as this has been observed to cause coral bleaching. In the South Asian region, large populations live in low-lying coastal areas or adjacent to river deltas. Coastal dwellers and inhabitants of regions near deltas are especially vulnerable to sea-level rise and associated with backwater flooding which is among the most immediate consequences of an increase in average global temperatures.

South Asian countries are predominantly agriculture societies. With the rise of population, there is an increased demand for agricultural productivity. Heavy conflicts have

arisen due to this. The demand for higher productivity has necessitated the use of fertilizers and chemicals, which has generated many problems. In fact, the quality of soil productivity has gone down along with many other environmental complications.

5. Concluding remarks

The environment-related problems and their implications are more similar in both countries. It is true that there is a growing awareness on environmental issues in almost all the countries in the last few years and the individual countries have persuaded environment-friendly policies in certain sectors.

Apart from this regional level, a common approach to secure the environment may involve the following aspects:

(1) sharing of knowledge and expertise regarding population control measures, policies and programs;

(2) cooperation for development and poverty eradication;

(3) regularization of inter-state migrations and evolving a regional framework for controlling, repatriation and rehabilitation of refugees;

(4) establishment of a system of disaster management and disaster preparedness at the regional level;

(5) exchange of knowledge and researches on seismic tremors, earthquakes, and landslides, their causes and possibilities;

(6) evolving common flood control measures and development of a regional flood warning system; and

(7) common measures can be taken up for increased agriculture productivity, treatment of salinity, development of cyclone warning system, reforestation, development of water resources, air pollution control system, etc.

All these measures can be covered within the framework of a Regional Environmental Security Treaty. Such a treaty will provide an institutional basis for the growth of a common approach to environmental protection and management in South Asia. The South Asian Association for Regional Cooperation (SAARC) can take a lead in this regard and prepare the necessary background for a regional environmental security treaty. The SAARC can further consolidate its environmental protection measures because it is through regional cooperation alone that many of the environment-related issues can be settled.

The environmental security constitutes a significant dimension of the comprehensive national security. In South Asia, environmental issues have become significant in the overall framework of security due to high population growth, excessive dependence on nature, uneven infra-structural development, poverty, underdevelopment and fragile ecology. Therefore, along with the strengthening of SAARC, a Regional Environment Security Treaty can be suggestive. It has to be realized that the environmental security in South Asia is possible through a regional approach only. Therefore, the efforts made by the individual countries need to be coordinated in a regional framework. Finally, it can be concluded from the present study that both India and Bangladesh are highly environmentally sensitive from the perspective of its geographical location and different aspects and threats to the environment generated from the many sources, which degrade the whole country environment at an extreme level. So there is a need to think about the protection of environment of the country and also rethink about the policy and programs that are introduced by the government to procure or secure the environment.

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Sustain and legitimize reputation

The construction of the sustainability discourse of Samarco Company

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Abstract

Purpose – The purpose of this paper is to analyze the discursive resources used to sustain and legitimize the reputation of the mining company Samarco Mineração regarding sustainability, before the environmental accident occurred in 2015.

Design/methodology/approach – The sustainability reports from 2005 to 2014 were accessed for the analysis of the presentation texts, and the discourse analysis method was applied to access the discursive resources employed.

Findings – From the classical concepts of rhetoric, ethos, pathos and logos, it was found that they reinforced the reputation and legitimacy of the company. The ethos is responsible for the company's image, while pathos triggers the emotional reception of that image, provoking positive expectations. The logos relate the built image and its emotional reception to a rational discourse that values the company's expertise. The analysis, in the light of the new rhetoric, exposes the strategies to lead the public to accept the image of solidity and confidence given by a reputation respected nationally and internationally.

Research limitations/implications – As a limitation, the quantitative data of the report were not analyzed, since the objective was to analyze the discourse construction, understanding that the research was adequate for the established purposes. For the future, it is suggested to analyze the discourse of the company after the environmental accident in order to verify the strategies used in the same theme; analyze the discourses in other reports published in the Global Reporting Initiative model; investigate how the logic of sustainability report construction based on a standard model can interfere in the formation of reputation and legitimacy of the companies; and analyze the impact of CSR on the strategy of the companies.

Practical implications – The knowledge about the functioning of the language and discourse as an indicative of subjectivity provides a more critical reading and reveals elements implicit in the discourse of the organization. It was verified that the sustainability reports in encapsulated formats allow some stability in the discourse, since companies tend to follow the same line of previous years, even with changes in the organizational structure.

Originality/value – Discourses built by the companies do not always reflect the true operational and engineering situation practiced by them, and that successful and reputed companies can surprise their stakeholders with events of great magnitude that cause significant losses, be they monetary or human lives.

Keywords Sustainability reports, Discourse analysis, Corporate responsibility, Environment accident, New rhetoric

Paper type Research paper

Introduction

The mineral industry is important due to its several contributions to the development of a society, for providing raw material from metallic and non-metallic minerals and energy (ICCM, 2012), as well as for enabling the development of remote areas with the help of infrastructure for the local communities (Günther *et al.*, 2008). The industry pursues the latest concept of sustainability, the triple bottom line (TBL), and seeks a balanced agenda between economic, environmental and social issues. At the same time, it has been criticized with regard to sustainability because of its profile of mineral resources depletion (Onn and Woodley, 2014) and the various accidents that have occurred over the last years; the one

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highlighted here is the story of the collapse of Fundão dam, of the mining company Samarco Mineração, in November 2015, in Minas Gerais/Brazil, which is considered the largest socio-environmental accident in the history of Brazil (Lacaz *et al.*, 2017).

Until the accident, the Samarco Mineração sought to present an agenda focused on environmental issues, respect for people, integrity and mobilization for results (Vescovi, 2014). Their numbers led them to be recognized as the best mining company of the year 2014 in the ranking of *Exame Magazine* (Salomão and Melo, 2015). Over the last ten years, it has published its sustainability reports, presenting itself as a transparent and reputable company, as its CEO revealed in a speech in 2014: "in our understanding of how we should act, we choose a synthesis word: reputation" (Vescovi, 2014).

The Ocean Tomo's (2015) report pointed out that about 80 percent of a company's value lies in its intangible assets, such as reputation, image and brand, which was confirmed in studies conducted where profitability is positively linked to intangible assets (Contractor *et al.*, 2016; Gaur *et al.*, 2014). Therefore, it is increasingly common for companies to voluntarily submit reports on their environmental performance to demonstrate to their stakeholders how much do they support environmental issues (Lozano and Huisingh, 2011; Bicalho and Santos, 2013). In this way, the reports serve to present their sustainability agenda and to build a positive perception about themselves, as well as to influence the perception of several stakeholders, including their shareholders, the surrounding community and their employees (Heyes, 2013).

Social activists target relatively large and profitable firm. According to Judge *et al.* (2010), both target firm-level characteristics and the national institutional context influence the likelihood of shareholder activism, making pressure over firms to present results to confirm their expectations and innovate (Lee *et al.*, 2017).

To analyze the content of the companies' speeches contained in the sustainability reports is fundamental to identify the character of the information that reaches the population, since it is, in theory, one of the reasons for the imposition of its sustainability agenda (Heyes, 2013). According to Coelho *et al.* (2013, p. 164), "the institutional discourse expresses the values, the ideology and the mission of the company, and its communication is directed towards a collective and points to a mobilizing cultural relationship" and, as emphasizes Fonseca (2009), "the sustainability discourse is liable to generate symbolic profit or loss and may be strategic for certain social actors, aiming to achieve socially (and economically) advantageous positions." Fonseca (2009, p. 25) argues that "the discursive support to the norms continues to be a source of symbolic profit and the stigma of being a 'social deviant' is avoided, while it is not emphasized that such support does not correspond to effective actions."

In the case of Samarco Mineração, there is a contradiction between the admirable reputation in the market and the practices that culminated in the accident with the Fundão dam, in Mariana/MG, resulting in the concern and interest in understanding the discursive resources used by the company to sustain and legitimize its reputation regarding sustainability before its stakeholders in the ten years leading up to the biggest environmental accident in the Brazilian mining history.

Thus, this paper aims to analyze the discursive resources that sustained and legitimized the reputation regarding the sustainability of Samarco Mineração, in front of its stakeholders, before the accident with the Fundão dam, in November 2015. In order to achieve this objective, the sustainability reports available on the company's website, corresponding to the period from 2005 to 2014, were accessed, and the presentation texts of the reports signed by the company's presidents of the time were analyzed.

Assuming that the discourse is not neutral (Goncalves, 2005), a methodological tool was applied in order to access the discursive resources employed. The starting point for discourse analysis is the basis of the Aristotelian classical rhetoric: discursive ethos, pathos and logos and the concepts of the new rhetoric of Perelman and Olbrechts-Tyteca (1996).

This paper is structured as follows: after this brief introduction, the theoretical foundation related to the corporate reputation, corporate social responsibility and discourse analysis will be presented; then, the materials and methods, the discussion of the results, the final considerations and the references that gave theoretical support to the research are presented.

Literature review

The discourse of corporate social responsibility presents and justifies the reputation of companies, characterizing it as an intangible asset.

Corporate social responsibility and its relationship with organizational reputation and legitimacy

Several authors mention reputation as an intangible asset related to marketing and financial performance (Miles and Covin, 2000; Johan and Noor, 2013). Dedicated to the analysis of the various concepts of reputation present in the literature, Fombrum and Van Riel (1997, p. 10) synthesized them as "the collective representation of past actions and results of a firm, which describes its ability to deliver value to various interested parts."

Good reputation produces advantages such as: price concession; high morale; risk reduction; strategic flexibility; and improvement in financial performance (Fombrum and Shanley, 1990; Gaur and Delios, 2015). Studies have pointed out that companies with a positive reputation need less monitoring costs and fear less in terms of decrease in the consumer's intention to change brands (Maden *et al.*, 2012). Thus, good reputation is a differentiating factor between organizations and, therefore, they act strongly to manage it with their stakeholders (Johan and Noor, 2013). There is an impact of resources in a governance structure on its long-term performance (Popli *et al.*, 2017).

One of the ways to achieve a good reputation is the corporate social responsibility, which goes beyond economic performance. Because of the diversity of their public, companies are also evaluated for the way they respond to their non-economic agenda (Fombrum and Shanley, 1990), which contemplates in its concept the ethical behavior of the company and recognizes its actions in the environment and in the society (Johan and Noor, 2013). Studies show that there is a significant correlation between social responsibility and the reputation of organizations (Johan and Noor, 2013; Maden, *et al.*, 2012). Social responsibility actions are signals to society and are used by companies to develop a positive impression and greater exposure in organizations' media (Reverte, 2009) and to legitimize them before their public (Maden *et al.*, 2012).

There are three elements of corporate social responsibility: the economic, relating to transparency, profits, competitive advantage and effectiveness; the environmental, with the triad of climate changes, use of resources and biodiversity security; and the third, which deals with social issues related to community-oriented actions, human resource care, the product life cycle and, more recently, cultural responsibility, included in this construct (Pasi, 2009). These concepts were defended and denominated by Elkington in 1997 as the "TBL," which became the basis of corporate sustainability. This concept and the concept of sustainability are interchangeable in the literature. Based on sustainability, the TBL provides a theoretical framework to measure the success of organizations in these three measures (economic, environmental and social), since they express the expansion of the environmental agenda through integration with the social and the economic (Alhaddi, 2015).

Behind social responsibility, Pasi (2009) pointed out three ideologies: the most common, with the focus on the owner, aims to bring financial gains at a lower cost; the second puts the stakeholders in focus and has become the most popular, where the corporate responsibility incorporates the zero-sum as the starting point of the corporate economic interests; and finally, the third, rarer to be found, is the model of sustainable development, which does not aim at profit as the first objective, but advocates the well-being of the society and the planet.

In Brazil, the social responsibility theme began to be used in the 1960s through the Association of Christian Business Leaders (Associação dos Dirigentes Cristãos de Empresas), which defended the expansion of the concern of companies with their employees and community of influence, according to Baracho and Felix, as cited by Maranhão and Motta (2008). After that, several initiatives aimed at disseminating the concept, such as the creation of the Brazilian Institute of Social and Economic Analysis (Instituto Brasileiro de Análises Sociais e Econômicas) in the 1980s, and the Group of Institutes, Foundations and Enterprises (Grupo de Institutos, Fundações e Empresas) in the 1990s. More recently, the Ethos Institute has developed research and diagnosis to disseminate practices adopted by interested companies and its pillars are values, transparency and governance, internal public, environment, providers, consumers and customers, community, government and society (Maranhão and Motta, 2008). In addition to these mechanisms, companies usually adhere to the presentation of the Sustainability Report, linked to the Global Reporting Initiative (GRI) (www.globalreporting.org) whose materiality should cover, as a principle, that the significant economic, environmental and social impacts of the organization be reflected in its content; or those that can substantively influence the evaluations and decisions of the stakeholders.

Environmental reports have two purposes: to communicate the stage in which the company is in the economic, social and environmental dimensions and to communicate its environmental effort and progress to its stakeholders (Lozano and Huisingh, 2011). In addition, environmental reports are those that, in the strict sense, are public and present to the reader, in a quantitative or qualitative way, how the company faces the challenges of corporate sustainability (Daub, 2007). Historically, they can come in three forms: annual reports, which, in addition to the economic data, after the 1990s, have been adding information of ethical, social and environmental nature; environmental reports, to which safety and health information and social aspects have been integrated; and social reports, less frequent, aimed at publishing corporate social issues (Daub, 2007).

The sustainability report based on GRI contains several aspects and standard content that must be presented by the companies that decide to adopt it. Briefly, there are two types of standard content: general and specific. The general standard contemplates: strategy and analysis; organizational profile; identified material aspects and limits; stakeholder engagement; report profile; governance; and ethics and integrity. The specific standard includes information about the form of management as indicators and management information related to specific aspects of the company (GRI, 2015).

From the textual point of view, the sustainability report is a genre that follows, in general, a previously defined pattern. In this research, the content of this report is related to the strategy and analysis chapter. This content provides an overall strategic view of sustainability in the organization, balancing what will be presented in terms of qualitative and quantitative information in the rest of the report. Its purpose is to provide insight into the organization's strategic topics and not just summarize the content of the submitted report. It is built by the most senior decision maker of the organization, such as the CEO, the chairman of the board of directors or relevant position, and has the function of presenting the global and strategic vision of short, medium- and long-term, emphasizing the management of the significant economic, environmental and social impacts generated by the organization; the trends that may lead to changes in priorities, events, achievements or failures; the performance evaluation with respect to outlined goals and perspectives for the future; among other elements (GRI, 2015).

Methodology

According to Prodanov and Freitas (2013), this research is classified as basic due to its nature, as it involves universal interests. As for its objectives, it is classified as descriptive,

since it aims to classify, explain and interpret facts that occur in the studied corpus. From the point of view of technical procedures, it is classified as a case study, since it seeks to carry out a deep and exhaustive analysis of one or a few objects, in a way that allows its ample and detailed analysis. Regarding the approach to the problem, it is classified as qualitative research, considering that there is a dynamic relationship between the real world and the environment as a direct source of data, and in relation to the time, it is classified as longitudinal, covering the period 2005-2014.

The corpus, in discourse analysis, plays a fundamental role as the raw materials and the set of discursive sequences for extraction or isolation of a discursive field of reference are obtained from it (Sargentini, 2017). According to Ferreira and Vieira (2013) "discourse genres are intrinsically linked to the sphere of communication of which they are part and reflect the specific conditions", and they unfold themselves from three basic elements: thematic content, which treats the subject to be enunciated and aims to give the mastery of meaning; compositional structure, which corresponds to the structure of the text; and the language style, which deals with the selection of the linguistic resources to be used according to the audience and sphere in which the genre in question will circulate (Ferreira and Vieira, 2013).

The material used in the analyses was collected from Samarco Mineração's website (www.samarco.com/institucional/relatorios) from November 1 to 15, 2016. In total, nine annual reports about sustainability for the period from 2005 to 2014, consistent with the GRI model, were accessed. Each report presents in its first pages the "Message from the CEO," which is inserted in the standard content of this report related to strategy and analysis, which has become the object of analysis. The choice for this corpus was due to the ease of access because it is the summary of the intentions and results achieved by the company and also because it has a pattern related to the GRI model, compatible with other reports of the same nature. It is not expected to be exhaustive from the more global point of view of the sustainability reports available in the market, but it is exhaustive within the organization under study, since all the reports available on the company website for ten years will be evaluated.

According to Perelman and Olbrechts-Tyteca (1996), the discourse analysis (DA), which was used as an analysis technique, is the interpretation of the words of the enunciator (writer/speaker) and the filling of missing links, which poses risks to those who perform it. Schemes established in the analysis are always a more or less probable hypothesis, although argument schemes whose particular analyzed cases become universal can be deduced from the text.

The DA aims at the study of the discourse itself. It has a three-dimensional nature through the inter-linking of distinct disciplines such as linguistics, historical materialism and psychoanalysis (Gondim and Fischer, 2009). In this research, DA is not only treated as a methodology, but also as a multidisciplinary area of study. Thus, it is necessary to briefly discuss the theoretical conceptions that will support the analyses, since it is intended to go beyond the formulations of the statements, that is, to penetrate them to bring to light the present ideological points of view and the extra-linguistic factors constituted to support the discourse.

The conception of discourse that permeates this research is one that goes beyond the syntagmatic sphere of the text, i.e., it is in the interrelationship between the text and its context (Charaudeau, 2010). It is, therefore, the observation of the conditions of production, in other words, the moment in which the statement is produced and for whom it is produced, observing the explicit (external, visible face) and implicit (intentionality of the subject) questions that are given in the circumstances in which the discourses are produced, as Charaudeau (2010) argued. Thus, the understanding is that the discourse considers not only the sequence of linguistic signs, but also the interaction between the producer and the

receiver of the message, according to what is advocated by Mainguenau (2008): "discourse is a form of action on the other and not just a representation of the world." The theory developed by the contemporary DA is constituted from the traditional and modern Rhetoric.

The theoretical basis for this research is rhetorical studies that relate to the use of language and other symbols to influence the way an audience thinks, feels or acts (Higgins and Walker, 2012). Rhetoric is present in interactions and communications and is at the center of the communicative process that coordinates social actions (Higgins and Walker, 2012). In this way, concepts of the Aristotelian classical rhetoric related to the art of persuasion, specifically the concepts of ethos, logos and pathos, will be used.

In Aristotelian rhetoric, the adherence to a thesis will depend on how aligned it is with the beliefs of the audience. There must be an alignment between the orator (speaker) and the audience (receiver) based on the credibility of the speaker, i.e., in his/her ethos. Analysis categories that identify ethos include similarity, experience, deference, self-criticism, which, in the context of organizational reporting, are used to gain credibility, positioning and categorization (Higgins and Walker, 2012). The pathos symbolizes the passions of the audience that will be the object of provocation of the speaker in order to achieve maximum adherence. Finally, the logos means the adaptation of the discourse to the situation and the thesis defended: it tries to connect the discourse with the values, the desires and the needs of the auditorium, that is to say, to the ethos of that auditorium (Mari *et al.*, 2001).

More recently, the basic concepts of rhetoric were reworked and presented as the new rhetoric by Perelman and Olbrechts-Tyteca, which brings a more modern view of the theme (Mari *et al.*, 2001). The authors return to the role of the speaker and the auditorium as central elements of the argumentation and of the way in which the former needs to adapt to the latter in order to induce adherence to the theses presented. The positive relation between speaker and audience is given as a starting point for the argumentation (Paullinelli, 2014). The auditorium is presented by the authors in three ways: the first is the universal auditorium which embraces all mankind, or at least, all adult and normal men. The second is formed only by the interlocutor to whom it is addressed (particular), understood as a participant in a dialogue. The third auditorium covers the own individual, when he/she deliberates with himself/herself. In this case, there is a coincidence between the auditorium and the speaker (Perelman and Olbrechts-Tyteca, 1996; Vaz, 2010).

Some argumentative techniques proposed by Perelman and Olbrechts-Tyteca (1996) outline the relationships that are constructed to convince the audience through the speaker and are present in the texts. They are as follows: argument by analogy: deals with the similarity between structures, whose most generic model is: A is for B as C is for D; argument by sacrifice: it alleges the effort subjected to achieve the result, that is, the greater the sacrifice, the greater the value of the argument; inclusion of the part in the whole: the relation of the whole to its parts is treated by the quantitative angle, which means that the whole encompasses the part and, therefore, is more important than it; argument by comparison and the rule of justice: the comparison between one or more objects prevails and justice requires identical rules and treatments to all; argument by authority: makes use of the judgment of a person or a group as a means of proving a thesis (Vaz, 2010) and aims to attribute credibility and foundation to the thesis presented through the citation of authors, researchers and institutions that, for their prestige, are invoked (Silveira, 2013); argument by comparison: it uses the comparison between several objects in order to evaluate them in relation to others, and can be reached by opposition, by ordering, by quantitative ordering or by the combination of more than one criterion.

Initially, a study was conducted on the corpus in order to extract the central ideas and key expressions and identify the meanings of the text, taking into account the relations between enunciators and enunciated and the relationship between the text produced and the conditions of production, synthesizing them into homogeneous groups of expressions that

are part of the present discursive formations. Subsequently, it was sought to analyze, in the light of the presuppositions of rhetoric and the new rhetoric, the contents initially located in the original corpus. Finally, it was attempted to capture the rhetorical elements constitutive of the discourse and their influence on the construction of the ideological senses present in the discourse composition (Figure 1).

Discussion of results

The selected corpus represents the ten years of Samarco sustainability reporting. The texts were produced under the management of two CEOs of the company and, in a first analysis, have the function of being one of the first contacts of the reader with the results and strategies of the company researched, following the GRI model. Following this pattern causes a certain homogeneity and standardization in the information presented throughout the texts. In a comprehensive way, the main results of the company, the difficulties faced, the investments made, the achievements and projections for the future, among others, are presented.

As Perelman and Olbrechts-Tyteca (1996) argued, the way the data are presented in discourse is not only intended to produce argumentative effects, but it may also offer a set of characteristics relating to the communion with the audience. It is noteworthy that, even with the CEO's change in 2012, there was no significant change in the structure and construction of the texts of subsequent years, having been used simple syntactic constructions without refinements aimed at all types of public, showing that the structure imposed on the GRI overall standard is maintained, regardless of the change in the highest position in the company hierarchy. It is written in remembrance of the main events of the year, using the first person singular (I) or plural (we) in past tense, since it is published in the year following the result presented. It stands out the passage of the report of 2005 "In the last two years **I** have used this space to comment about **our** results in the previous period and to point out some perspectives for the following year." This "I" brings attention to the figure of the enunciator, who is the CEO, who speaks on behalf of Samarco, although soon after the enunciator changes position and involves the whole auditorium, which becomes the "we" of the discourse. At that time, all those who represent or are part of Samarco, including the auditorium itself, are opinion leaders with the company, as in the following excerpt from the report of 2009: "with the engagement of all, **we** want to build the true Development with Involvement."

In the first lines of the analyzed texts, mostly, numerical information of production and investments made is presented. It then addresses issues related to sustainability programs, stakeholder relationships and the progress made, where no numerical results are presented. Finally, the future prospects of the company are shown, as in the excerpt of this report from 2008:

> The year of 2008 was the best year in Samarco history. Besides to being the milestone of our corporate change, with the start-up of the Third-Pelletizing Complex, we accounted record operating and financial results. With the new complex, Samarco increased its productive capacity by 54%. The production reached 17.15 million dry metric tons, an increase of 20.2% over the previous year. Faced with the new challenges imposed by the globalized market, the company has developed a series of internal projects towards business excellence in the economic, social and environmental areas.

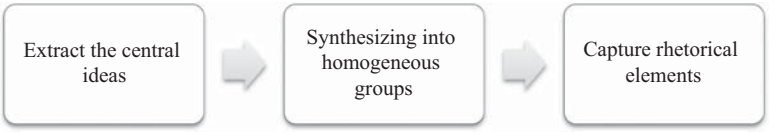

Figure 1.
Research diagram

The careful reading of the content allowed to identify the central idea present in the texts and to answer the research question that is: Which discursive resource (s) is (are) used by the company to sustain and legitimize its reputation with respect to sustainability? Briefly, the analyzed corpus brings the idea that Samarco is a company whose history is cleared, with solid and non-negotiable values, built arduously by the people, including its employees and other stakeholders such as suppliers, communities, customers and government, among others, based on an open and transparent dialogue and a strong, reliable and lasting relationship. It is positioned at the level of the company that has sustainability as a strategic driver of its actions and that has gradually evolved throughout its history, making it one of the best companies to work for and a reference in the mining sector in Brazil. All this makes it proud of the built image and the reputation acquired over more than 35 years of life.

The audience, to which the statements are destined, is universal, and it is considered as one who has power over the company. In other words, without its authorization, it is not possible to have a company and it is with it and through it that things happen and are defined. The logos is triggered due to the notion that decisions are taken from the outside inwards and not from the inside out as what actually occurs, as attested by this passage of the report from 2007: "The Social Investment Policy, launched in 2007, is one of the instruments for us to overcome the quality of our relationship with the communities." However, while the notion of power is given to the audience, responsibilities are assigned to it at the same level as the company, as shown in the excerpt from the Report of 2010:

> Ensuring sustainability in our actions and attitudes is a permanent issue. **It is up to all of us** – Samarco, civil society, governments, public prosecutors, community representatives, suppliers – to build lasting actions for the proper management of our social, economic and environmental impacts.

The pathos is activated to design good things for the future, both for the company and for the stakeholders, passing trust and security in the relationship, as in this excerpt from the report of 2007:

> The choice for sustainability is fundamental to the strategy of a company like Samarco, which depends directly on mineral resources. The way we visualize the integration of our work with society allows us to predict **a successful future for the company, as well as for all stakeholders.**

In another section of the same report, the appeal to the auditorium's confidence is presented: "Let us not disappoint those who praise us. On the contrary, we want to surpass brands and continue to deserve the support of society. After all, this is what legitimizes our existence." It starts from the assumption that no one wants a bad future, then, it is created the metaphor that together we will be better and stronger linked with the perception of power to develop the auditorium's adherence to the thesis that reinforces the concept of sustainability, that, according to the report, is the driving force behind its actions, as shown in the excerpt from the Report of 2008:

> Sustainability is one of the pillars of Samarco's management and it directs our professionals in the conduct of business and relations with different audiences. For us, to guide our activities for this concept, even if it is still evolving, means generating value not only for the company, but also for the stakeholders.

The formation of ethos takes place through a discourse that intends to make its audience believe in the excellent reputation of the company that is built and reinforced over several years. According to the company, it is because of this reputation that it is granted to it the "social license to operate" (Reports from 2014) a "patrimony conferred by society"

(Reports from 2012/2013). According to what Perelman and Olbrechts-Tyteca (1996) proposed, the argument by authority is a rhetorical resource most used for the construction of the theses defended and formation of Ethos. This resource is present throughout the corpus researched and is widely applied to reinforce the image and reputation of the company, as a way of legitimizing the company by an external person who has authority recognized by the great majority, as in the following examples:

> Due to complexity, structuring and planning, the Third-Pelletizing Project was recognized by the Independent Project Analysis (IPA) as a reference in relation to the other projects in execution in Brazil. The evaluation, unprecedented in Brazilian industry, gives us even greater confidence in the capacity to manage the expansion within the established time and budget (Report from 2005).

> In the area of environment, the best certificate of our performance was the obtaining, in Minas Gerais and Espírito Santo, of all environmental licenses for the start of the Third-Pelletizing Project (Report from 2005).

> Samarco was awarded with prizes from different sectors and honored by public and private institutions. These demonstrations indicate that we are on the right track and fill us with responsibility (Report from 2007).

> We ended the year among the 150 Best Companies to Work for, from Exame and Você S/A magazines, with the support of the Institute of Administration Foundation (Fundação Instituto de Administração – FIA-USP). In order to maintain our high performance, it is fundamental to continue investing in the development of employees, in proper human resources practices and actions, and in the improvement of the internal climate.

> The market has been realizing our direction in favor of sustainability. As a result of this perception, we entered into a financing agreement with the Japanese development agency NEXI – Nippon Export and Investment Insurance. What draws attention is that NEXI does not finance companies that are not serious about dealing with socio-environmental issues (Report from 2010).

Another rhetorical resource applied in the construction of statements is the argument by sacrifice. This resource was used mainly when some point did not have satisfactory results or to impress the auditorium with respect to some progress achieved, as in this report from 2009:

> In 2009, we had two different worlds. In the first half of the year, the global economic and financial crisis affected us considerably. Sales declined drastically, causing a fall in the price of products. However, the involvement of people has transformed this period of instability into learning for the organization. During this period, we studied all possible scenarios, significantly reduced our costs and expenses, increased our level of austerity, and further expanded our commitment with the sustainable development of the company with communities, public authorities, suppliers and clients. Such adjustments have allowed us to adapt adequately to overcome the international crisis. Such adjustments have allowed us to adapt ourselves properly to overcome the international crisis.

> I start with the management effort. We have evolved in our efforts to continuously improve the management processes and the insertion of sustainability in our operations and routine, and the perception of people and society have been positive (Report from 2010).

In this case, there is an emphasis that working within the proposed concept is not easy. It requires sweat and a lot of work from the company and from everyone.

The argument by analogy is also used as a rhetorical resource, as in the excerpt from the report of 2008 below. In this case, in complying with the principles of the covenant, it promotes a more just and dignified world:

> The construction of a world more egalitarian and with more opportunities is based on cooperative relationships that add value for the whole society. That is why Samarco is a signatory of the

> Global Pact and supports the Millennium Development Goals – UN initiatives that promote a more just and dignified world. The company has made every effort to meet such principles.

The arguments by the rule of justice and inclusion of the part in the whole are also present in the construction of the discourse used, as in this excerpt of the report from 2013, when the company places itself in a passive position regarding the mobilization of the workers, not including itself as responsible for the conditions of the country and, specifically, of the 13,000 workers who were under its management in that moment of crisis. From this, the company legitimizes the mobilization by withdrawing itself from the scenario. At the same time, it puts itself as a victim of the situation, as the other workers affected by the economic crisis:

> At the peak of the works, in June 2013, we counted 13 thousand workers in the working sites, distributed between Minas Gerais and Espírito Santo. At the same time, we have witnessed the legitimate mobilization of the Brazilian population in search of improvements in infrastructure and quality of life, with immediate repercussions on the country's political agenda. Due to movements and manifestations that evolved into strikes carried out by employees of contracted companies in Espírito Santo […] (Report from 2013).

The argument by comparison is present as a way to value adequacy efforts, as in the report from 2012: "The learning of conformity has brought us understanding beyond the laws that regulate what is best for our country; it has brought us grants to achieve a level of organization of the Company that contributes to the favorable reputation with our stakeholders."

To summarize the main discursive resource used along the GRI reports, Table I is presented.

Final considerations

Sustainability reports presented annually by several companies have been a means to reinforce their position toward their stakeholders regarding social responsibility, as well as their reputation, by relying on the TBL concept. As a research objective, it was sought to analyze how the strategies were built to reinforce the reputation and legitimacy of Samarco Mineração before the environmental accident. In this way, it was tried to answer the following question: Which is (are) the discursive resource (s) used by the company to sustain and legitimize its reputation with respect to sustainability? As stated by the studied authors, the discourse is constructed with the intention of influencing the audience. Therefore, ethos, pathos and logos are built to reinforce the discourse in order to strengthen the reputation and legitimacy of the company with its public. The ethos is systematically reinforced by the discourse of others with power and credibility in the market. The pathos is triggered by the emotionality of the audience, creating a sense of a better future for everyone. The logos, in

Table I. Main discursive resource

Discursive resource	Strategy
Argument by authority	To reinforce the image and reputation of the company, as a way of legitimizing the company by an external person who has authority recognized by the great majority
Argument by sacrifice	It was used mainly when some point did not have satisfactory results or to impress the auditorium with respect to some progress achieved
Argument by analogy	To promote a more just and dignified world
Rule of justice and inclusion of the part in the whole	To legitimize the mobilization by withdrawing itself from the scenario. At the same time, it puts itself as a victim of the situation, as the other workers are affected by the economic crisis
Argument by comparison	It was used to present as a way to value adequacy efforts

turn, brings the understanding of the responsibility and power given by the company for all who are "partners."

The analysis considering the presuppositions of the new rhetoric made it possible to understand how the argumentative strategies can lead to the propagation of an image that is constructed, disseminated and repeated as a mantra. From Samarco's case, it became evident that the use of these strategies is to build a solid and trustworthy image, as an unquestionable reputation, respected at national and international levels, giving to the interested public a view coherent with the sustainability agenda related to the TBL.

Another finding of the research was to identify the creation of protection of the company reputation through its discourse, to avoid doubts or questioning by its interlocutors about possible operational weaknesses, and with that, it was produced pressure for results increasingly better and for non-occurrence of errors. This shows that the discourses built by the companies do not always reflect the true operational and engineering situation practiced by them, and that successful and reputed companies can surprise their stakeholders with events of great magnitude that cause significant losses, be they monetary or human lives, as was the case of the Fundão dam and others widely publicized in the media, such as scandals involving recently the Brazilian beef.

Thus, creating a discourse that promotes reputation is a practice of several organizations; what draws attention is the distance between this discourse and the possible traps created in the daily routine of the companies that require the improvement of the managerial practices in order to avoid undesirable events, as well as the discourse approximation of the sustainability reports of the operation and engineering. This opens opportunities for the improvement of controls and the implementation of new managerial and supervisory processes.

It was observed that the company also needs to establish legitimacy in the external environment in which it operates to ensure its successful existence. The CSR published in the environment report (GRI) was a way to expose this strategy. In future research, the implication of CSR and sustainability for the successful implementation of firm strategies and firm survival should be studied. The works of Li and Gaur (2014) and Hwang and Gaur (2009) provide little guidance in this direction.

The discourse analysis methodology proved effective in understanding the rhetorical assumptions used in the development of the discourse constructed within the scope of sustainability reports. It is possible to apply the same method to other reports from different companies, since it is shown as an effective technique. The knowledge about the functioning of the language and discourse as indicative of subjectivity provides a more critical reading and reveals elements implicit in the discourse of the organization. It was verified that the sustainability reports in encapsulated formats allow some stability in the discourse, since companies tend to follow the same line of previous years, even with changes in the organizational structure.

As a limitation of this research, we can cite the fact that the quantitative data to verify advances in numerical results were not analyzed. However, as the objective was to analyze the construction of the discourse, it is understood that it was adequate, including the treatment of the data produced during ten years of publication, even in the period of presidency change. Nevertheless, it was decided to analyze some argumentative strategies more present in the text, opening the field for future and wider research. Such research works may extend this analysis to the company's discourse after the environmental accident, in order to verify its position about the same theme and compare the strategies used to reconstruct its image, analyze whether the argumentative strategies used are present in other environmental reports published in the GRI model and, finally, investigate how the logic of sustainability report construction based on a standard model can interfere in the formation of the reputation and legitimacy of the companies.

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Enablers of sustainable industrial ecosystem: framework and future research directions

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Abstract

Purpose – The purpose of this paper is to dig out enablers of sustainable industrial ecosystem to develop a framework.

Design/methodology/approach – To test the framework statistically, a structured questionnaire was designed. Measures for the questionnaire were adopted from an extensive literature review. Further, the questionnaire was pretested and further pilot study was conducted. Adding to this, the reliability and validity of the constructs was examined using confirmatory factor analysis followed by covariance-based structural equation modeling to test research hypotheses.

Findings – The statistical analyses suggest that the model exceeds the threshold limit for goodness of fit after undergoing through few iterations. Normative pressure has a low effect than rest of the factors.

Originality/value – The present study is a unique contribution in terms of its theoretical implications and practical use. Finally, research findings are concluded and further research directions is outlined.

Keywords Sustainability, Technology adoption, Institutional pressure, Top management commitment

Paper type Research paper

1. Introduction

Rapid industrialization, over a period of several decades, has taken its toll by producing countless externalities besides increasing productivity, wealth and prosperity. One of the externalities lingering most of the nation's world across is industrial pollution. The challenge being for sustainable development is to crack the linkage between continual growth and the magnitude of pollutants released to the environment, by way of reducing the pollution intensity of industrial production. In the light of above background, it is therefore an urgent need to foster a new integrated industrial planning and management mechanism. Industrial ecology/ecosystem (IE) or industrial symbiosis (IS) is one such emerging concept in the evolution of environmental management paradigms (Ehrenfeld, 2007) and springs from interests in integrating notions of sustainability into environmental and economic systems (Ehrenfeld, 2007). IE refers to the study of industrial activities to reduce, recycle, reuse, repair and recover the by-products, thereby reducing the adverse environmental impacts (Graedel, 2002; Frosch and Gallopoulos, 1989; Ayres and Ayres, 1996; Graedel and Allenby, 1995). The concept of IE was first introduced in the year 1989 by Robert Frosch and Nicholas Gallopoulos of the General Motors Research Laboratory at Michigan. Since then, the industrial development has entered into a new perspective and process system. IE states that industrial complexes should be designed to diminish the conflict between two systems, i.e. the industrial subsystem, and the natural (mother) ecosystem, on which the entire industrial activities are dependent and imitate the natural ecosystem as closely as possible (Garner and Keoleian, 1995).

Sustainable IE involves taking into consideration economic, social and environmental aspects with respect to potential reuse and recycle. Sustainability in IE must be discussed in

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the broader domain of firms' pursuit of growth in domestic and international markets. One of the main challenges with sustainability is the desire to grow at any cost. The development of new institutions not only opens up an opportunity for the new methods but also restricts the usage of past strategies. The firms strategically respond to institutional change. There is a negative relationship with the number of new investment projects when the pro-market reform is high and positive relation when it is low. Business group affiliation acts as a moderating role in new strategy application (Singh *et al.*, 2018). Ownership structure has an important role on international diversification during institutional transition. The firm's desire to grow for sustainability is stronger if the owner is a foreign firm (Gaur and Delios, 2015). Singh and Gaur (2013) examined the impact of firm-level governance structure on the innovation and international strategies. Business groups have only embarked on international expansion. Product diversification has a negative relation with level of internationalization. International orientation creates awareness, opportunity identification, understanding the success factor and gain better access (Kumar *et al.*, 2012). In few countries, government policies do not encourage to undergo sustainable growth interacting with foreign companies. In many times, there is a divergence between managers and owners. Such divergence creates a hurdle for growth through sustainability as owners feel the manager to think for their interest instead of their own. Family ownership and group affiliation positively affect R&D intensity. Academicians and practitioners discuss for sustainability but there are very few works on enablers for the desire to grow for sustainability. This frames the research question:

RQ1. What are the enablers which lead to a sustainable IE model?

While there is a rich body of literature focusing on IE, most of the research either focuses on waste management or life cycle assessment. Second, there is a paucity of empirical study in context of the sustainable IE model related with the theories. Driven by the need for the study, the objective of the study is to develop a conceptual framework for sustainable IE, linking the theories of the seminal articles, and to empirically validate our conceptual framework.

The rest of the paper is organized as follows. Section 2 deals with the literature review and building blocks of theoretical framework. In Section 3, we discuss our research design. In Section 4, we present and discuss our statistical analysis which includes testing reliability, validity and hypotheses testing using covariance-based structural equation modeling. In Section 5, we have outlined academic and industrial implications. In Section 6, we present our conclusion followed by limitations and further research directions of our study.

2. Literature review and theoretical framework

An extensive literature review has been conducted using content analysis through data collection, coding, analysis and interpretation of the coded context (Gaur and Kumar, 2018). An industrial process is composed of its own life cycle which constitutes of resource utilization process, primary process, complementary process and, ultimately, recycling and disposal (Graedel and Allenby, 2010). Even though every industrial life cycle process deals with the use of resources with an efficient implementation of technology and their interactions, but at the same time, it should also be linked with the impacts on social and environmental aspects (Barata, 2009). Past literature shows that there is a great deal of ignorance in regard to the impact of industrial activity on social and environmental aspects. This might be due to the lack in understanding of the concept of IE. Svensson and Wagner (2015) reported the case of four companies in context to sustainability where networking results in enhanced outcome. Among several industrial categories, sugar manufacturing industry is one of the core examples of an initiative toward IE (Zhu *et al.*, 2007). Sustainable IE has taken into consideration economic, social and environmental aspects. Pollution prevention and control have been promoted under sustainable development by 3R

approaches, namely, recycling, reuse, repair, regeneration, recovery, re-manufacturing and others (Gupta *et al.*, 2018). There are several alternatives for reducing pollution by industry. Sustainability can be a reference for appropriate implementation of policies.

Environment protection has become an emerging issue for the world. This has led to the structure of industrial environment sustainability index. The IESI includes enablers, namely, HR, financial support, firm activities, including firm investment and intellectual assets, and output, including innovation and economic effects (Arbolino *et al.*, 2017). Ormazabal *et al.* (2017) discussed environment management maturity model in their article. There is hardly anyone in charge for the rising environmental issues. A model for environment management comprises legal requirements, systematization, responsibility assignment and training, ecological and economic benefits, eco innovative product and services leading green company. The application of socio-ecological intergradation has brought locality, steady state, gradualism, heterogeneity and interdependence (Gruner and Power, 2017).

Empirical studies on industry are considerable to confirm an evolutionary change in the implementation of technologies which can lead to a sustainable IE. Graedel and Allenby (2010) argued that IE should be linked with the relationship between society, environment and economy. Such practices are seen in China, Egypt, Brazil and South Africa. However, in the Indian context, there is a paucity of literature regarding IE.

2.1 Literature on sustainable IE

Research themes and methodology of literature on sustainability covers both narrow and a broad scope. Table I gives few of the literature on sustainable IE with theme and methodology. The literature has helped to move further toward developing a conceptual model and the measures of the constructs.

MNCs and large firms exploit international markets often at the cost of the broader environment and human right issues. A country with high level of human rights abuses should lower its human rights standards to survive, collective efforts by all firms to improve human right conditions and a multiplicative effect of human right practices. If an MNC that upholds high human rights standards in home country enters a host country in which the overall human right conditions are poor, the firm must lower its standards for survival. The effect of a firm's human right violations can be reduced by other firm's human rights violations. Institutional pressures often force to adapt to the local environment. Active participation by host government is essential to raise the human rights' standards (Hwang and Gaur, 2009; Li and Gaur, 2014). Gaur *et al.* (2013) proposed a model where firms affiliated with a business group have more firm- and group-level international experience,

	Scope	
Area	Narrow	Broad
Research theme	Input-output analysis (Leontief, 1975; Ardent *et al.*, 2009; Bailey, 2009; Barata, 2009), life cycle assessment (Brent and Labuschagne, 2007), waste management (Duchin, 1990), reduce, recycle (Knoeri *et al.*, 2011)	Industrial ecology (Ayres and Ayres, 1996; Barnes, 1998; Ehrenfeld and Gertler, 1997), industrial symbiosis (Frosch and Gallopoulos, 1989; Chertow, 2007; Park and Behera, 2014), industrial park (Chertow, 1998)
Research methodology	Content (Stubbs and Cocklin, 2008), grounded theory, case study (Apeaning and Thollander, 2013; Murty *et al.*, 2006; Zhu *et al.*, 2007), bibliometric study (Meerow and Newell, 2015)	Qualitative (Ribeiro and Pereira da Silva, 2015), quantitative (Kytzia, 2009; Sureeyatanapas *et al.*, 2015)

Source: Gaur and Kumar (2018)

Table I.
Literature review on sustainable industrial ecology

technological and marketing resources than others. Such firms shift from exports to FDI. The firms that are rich in resources find it easy to make changes toward sustainability.

DiMaggio and Powell (1983) defined three basic types of the institutional theory, namely, coercive, mimetic and normative pressure. The institutional theory plays an important role in sustainable practices. However, the institutional theory and top management commitment together can enhance the sustainability of any organization. The literature shows that there has been a limited study on the institutional theory and top management commitment. The institutional theory, combined with top management commitment, can play a significant role in sustainability. The factors responsible for sustainable practices in IE are top management commitment, technology adoption and institutional pressures. According to Colwell and Joshi (2013), the institutional theory proposed in recent literature has ignored the role of top management. Results show that institutional pressure is enhanced when top management commitment is very high.

2.2 Building blocks of sustainable IE

The foundation of conceptual framework comprises the institutional theory, top management commitment, technology adoption and sustainable IE (see Figure 1). The conceptual framework has been presented to study the needs of the time. A conceptual model was developed and each construct was measured using a proper statistical tool. This matched the construct network in text with SPSS (Gaur and Gaur, 2006). To test the conceptual model, correlation design has been examined. The potential causal impact of each factor has been taken into consideration (El-Kassar and Singh, 2018). A survey instrument was designed for predicting the relationship between the factors. Content validity of the scale was improved from academicians and experts from industry. All the constructs were measured with multiple scale items.

CP was measured by competition from other factories, competition from other industry, industrial policy and government policy. MP was measured by the compatibility of the use of waste material, the response to uncertainty and the degree of compatibility of the waste material to be used. NP was measured by the working conditions, the methods of work like drying, packaging and crystallization, availability of raw materials, distance between the waste producer and sharing of potential benefits. TMC was measured by the efficient use of natural resources, reduction of the emission of harmful elements, creation of more jobs, promotion of local culture and products (UNEP *et al.*, 2011), sharing of mission and vision statement, sharing potential benefits and creating awareness. AT was measured by perceived usefulness, ease of use visibility, easy to use, attitude toward adoption and usability and perception. SS was measured by amount of wastes generated, supply chain cost,

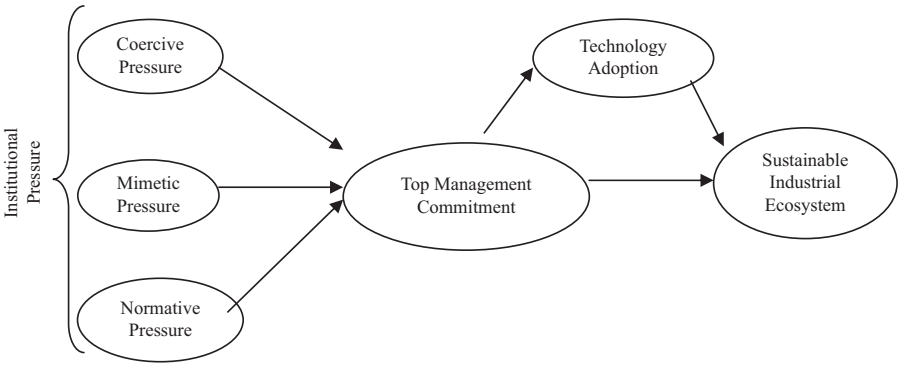

Figure 1.
Theoretical framework

responsiveness cost, human rights, employment generation, safety of workers, quality of the product and emissions of harmful gases (see Table III).

In this section, the extant literature is classified based on the major building blocks of the proposed conceptual framework (see Tables II and III):

H1. Institutional Pressure significantly affects top management commitment.

H2. Top management commitment significantly affects the sustainability of IE.

H3. Top management commitment significantly affects technology adoption.

H4. Technology adoption significantly affects the sustainability of IE.

2.2.1 Institutional pressure. The institutional theory was studied by Dimaggio and Powell (1983) for the efficiency of an organization. It is one of the most popular theories, which have addressed issues like environment, quality programs and technology applications (Heras-Saizarbitoria *et al.*, 2011). The institutional pressure constitutes of coercive pressure (CP), mimetic pressure and normative pressure. The governance environment is an important factor. It consists of three pillars with formal and informal institutions. Formal comprises the rules, regulations, law enforcement mechanism and informal includes normative and cognitive pillars. Strategies are affected by both formal and informal aspects. A week institutional environment possesses risk for the MNCs (Hwang and Gaur, 2009).

The literature suggests that more empirical research is required for the application of institutional pressure toward sustainability.

2.2.2 Coercive pressure. Policy makers have a major role to play in controlling greenhouse gases. Researchers report that the increase in the emissions of greenhouse gases largely depends on the use of fossil fuels (Mongelli, 2010). Input-output analysis builds a relationship between production and consumption considering environment pressures and international trade in different ways. Organization works on the formal and informal pressures created by other organizations and society. Zhu and Sarkis (2006) noted that companies are under pressure from stakeholders, such as customers and the government, to embrace sustainable practices. However, Miemczyk (2008) argued that CP can always lead to adoption of practices, but not always lead to efficiency.

2.2.3 Linkage between CP and top management commitment. CP has significant effect on top management commitment. There is literature supporting the direct relationship between

Building blocks	Reference
Coercive pressure	Delmas and Toffel (2004), Glover *et al.* (2014), Liang *et al.* (2007), DiMaggio and Powell (1983), Zhu and Sarkis (2006), Miemczyk (2008), Mongelli (2010)
Mimetic pressure	Lawrence *et al.* (2001), Heras-Saizarbitoria *et al.* (2011)
Normative pressure	Nysveen *et al.* (2005), Conner *et al.* (2003), Lawrence *et al.* (2001), Chertow *et al.* (2008)
Technology adoption	Shrivastava (1995), Ramasamy (2004), Chertow *et al.* (2008), Shrivastava (1995), Graedel (1994), Karahanna *et al.* (1999)
Top management commitment	Liang *et al.* (2007), UNEP *et al.* (2010), Zutshi and Sohal (2004)
Sustainability	Brundtland (1987), Zutshi and Sohal (2004), Hart (1997), Barnes (1998), WCED (1987), Carter and Rogers (2008), Azevedo *et al.* (2011), Ageron *et al.* (2012), Tisdell (1996), Carter and Rogers (2008), Azevedo *et al.* (2011), Deif (2011), Bhateja *et al.* (2012), Seman *et al.* (2012), Whitelock (2012), Carter and Rogers (2008), Pochampally *et al.* (2009), Gunasekaran and Spalanzani (2012), Dües *et al.* (2013), Gavronski *et al.* (2013), Mani *et al.* (2016)

Table II. Building block of sustainable industrial ecosystem

Constructs	Definition	Indicators	Reference
Coercive pressure	Coercive pressure is defined as the external formal and informal pressures from the external organizations or competitors of the firm or from the cultural expectations of the society in which it operates	Competition within industry Government policy Industrial policy	Delmas and Toffel (2004), Glover *et al.* (2014), Liang *et al.* (2007), DiMaggio and Powell (1983), Zhu and Sarkis (2006), Miemczyk (2008), Mongelli (2010)
Mimetic pressure	It is often associated with the state and refers to the threat by powerful actors of the organization. It involves the perception of some value of mimicking a behavior. Mimetic pressure copies the extensive form with the uncertainty. It refers to the variation in action to model themselves as their ideal organization	Response to uncertainty Degree of compatibility of the waste material to be used as raw material of the other	Lawrence *et al.* (2001), Heras-Saizarbitoria *et al.* (2011)
Normative pressure	The concept of normative pressure is used to describe the concept beyond the adoption of technology It is the strongest predictor of intentions It occurs from our cultural expectations that have to be honored Promotion of industrial symbiosis can be obtained by growing the environmental awareness in the industry, need to identify the symbiosis and emphasizing on economic development	Working condition Methods of work Availability of raw materials Distance between waste producer and consumer awareness	Nysveen *et al.* (2005), Conner *et al.* (2003), Lawrence *et al.* (2001), Chertow *et al.* (2004)
Technology adoption	Technology includes identification, preparation, training, implementation and evaluation New technology helps in the prevention of ecological degradation and leads to economic growth. Industrial ecology is the use of resources with an efficient implementation of technologies Innovations and technology adoption accounts for sustaining industrial and economic growth	Behavioral beliefs Perceived usefulness Image compatibility Ease of use visibility Result demonstrability Trialability Normative beliefs Top management supervisor Peers friends Local computer specialists Attitude toward adoption Subjective norms	Shrivastava (1995), Ramasamy (2004), Chertow *et al.* (2004), Shrivastava (1995), Graedel (1994), Karahanna *et al.* (1999)
Top management commitment	Top management commitment comprises top management Participation and top management beliefs Top management beliefs (TMB) refer to the extent to which top	Efficient use of natural resources Reduction of the emission of harmful elements Creation of more jobs Promotion of local culture	Liang *et al.* (2007), UNEP *et al.* (2010), Zutshi and Sohal (2004)

Table III.
Constructs and definitions

(*continued*)

Constructs	Definition	Indicators	Reference
	managers consider that sustainable consumption and production will have an immense impact on sustainable development	and products Sharing of mission and vision statement Sharing potential benefits	
	Top management participation (TMP) refers to the extent which top managers translate their beliefs into desirable actions	Creating awareness	
Sustainability	Sustainability is defined as to meet the needs of the present without affecting the future. Sustainability constitutes of three stages namely product stewardship, pollution prevention and clean technology. Industrial Ecology will be a guiding principle in sustainability in twenty-first century	Economic goals Environmental goals Social goals	Brundtland (1987), Zutshi and Sohal (2004), Hart (1997), Barnes (1998), WCED (1987)
	Economic	Environmental cost Supply chain cost Cost to quality Responsiveness cost Physical factors Market-related factors Competitiveness	Carter and Rogers (2008), Azevedo *et al.* (2011), Ageron *et al.* (2012), Tisdell (1996), Svensson and Wagner (2015)
	Environmental	Recycling efficiency Eco packaging Level of process management which includes pollution control, climate change, global warming, waste emissions, carbon footprints	Carter and Rogers (2008), Azevedo *et al.* (2011), Deif (2011), Bhateja *et al.* (2012), Seman *et al.* (2012), Whitelock (2012), Svensson and Wagner (2015)
	Social goals	Commitment Customer satisfaction Employee development Safety Health and welfare ethics Human rights Philanthropy	Carter and Rogers (2008), Pochampally *et al.* (2009), Gunasekaran and Spalanzani (2012), Dües *et al.* (2013), Gavronski *et al.* (2013), Mani *et al.* (2016), Svensson and Wagner (2015)

Table III.

CP and top management participation (Liang *et al.*, 2007). CP was operationalized in terms of the extent of external pressures including government policies, customer pressures and competitors (Liang *et al.*, 2007).

2.2.4 Mimetic pressure. It is often associated with the state and refers to the threat by powerful actors of the organization. It involves the perception of some value of mimicking a behavior. Mimetic pressure copies the extensive form with the uncertainty (Heras-Saizarbitoria *et al.*, 2011; Lawrence *et al.*, 2001). "Mimetic pressure" refers to the extent to which one organization tends to mimic their competitors' or partners' best practices related to sustainable consumption and production.

2.2.5 Linkage between mimetic pressure and top management commitment. Mimetic pressure has a positive influence on top management participation (TMP) (Liang *et al.*, 2007). Mimetic pressure also positively influences the perceptions of top managers, which helps in

making better decisions. On the basis of literature (Zhu and Geng, 2013), top management has shown a tendency to mimic the actions of their peers or competitors who were very successful. There has been paucity of research on the exploration of the relationship between mimetic pressure and top management commitment. Therefore, the role of mimetic pressure in top management commitment needs to be explored in sustainability studies.

2.2.6 Normative pressure. The concept of normative pressure is used to describe the concept beyond the adoption of technology. It is the strongest predictor of intentions. It occurs from our cultural expectations that have to be honored. Normative pressure evolves from the working conditions, obtained by the growing environmental awareness in the industry, identification and emphasizing on economic development (Chertow *et al.*, 2004; Lawrence *et al.*, 2001).

2.2.7 Linkage between normative pressure and top management commitment. Normative pressures usually permeate through the channels of professional affiliations (Liang *et al.*, 2007), and hence the normative pressure has a strong impact on sustainability (Tseng *et al.*, 2013). However, the literature surrounding sustainable consumption and production has not stressed much on the relationship between normative pressure and top management commitment.

2.2.8 Technology adoption. With time, technologies have led to the improvement of several problems occurring in the sustainability. The changing technologies since past has been consistently helping the industry to move toward sustainability (Lall, 2000). The use of technology in industries is limited which is the major barrier for sustainability (Kumari and Patil, 2017).

2.2.9 Linkage between technology adoption and sustainability. Technology largely influences the productivity and market growth (Labrecque *et al.*, 2007). Beckman and Sinha (2005) argued that high technology firms recognize that consumer not only go for high value of the products, but also for the high service providers. Due to the introduction of new technologies, it is very essential to build a timely and implementation strategy for the high technology industry in order to make their practices sustainable (Yasuda, 2005; Kumari, 2017; Kumari, Kasat and Patil, 2017; Kumari, Kumbhar and Patil, 2017). The research on technology adoption reports that technology adoption in industry may lead to sustainability (Kumari and Patil, 2017).

2.2.10 Top management commitment. Top management commitment comprises of top management beliefs (TMB) and TMP. TMB refers to the extent to which top managers consider that sustainable consumption and production will have an immense impact on sustainable development. TMP refers to the extent which top managers translate their beliefs in sustainable consumption and production into desirable actions.

2.2.11 Linkage between top management commitment and sustainability. Diversification performs relationship is a widely explained research question. The lack of experience and expertise leads to the costs associated with diversification. Experienced top management helps in bringing knowledge and develop goodwill (Singh *et al.*, 2010). Top management commitment can have a positive impact in an organization by providing leadership, motivation to the employees, proper training, adequate communication and timely resources for implementation of any change (Zutshi and Sohal, 2004). This commitment can be obtained through proper awareness, understanding and subsistence knowledge about the organization. Bansal (2005) found that the two forces of institutional pressure mimetic and coercive were the key drivers in fostering sustainable development. According to Greenwood and Hinings (1996), top management commitment entails three capabilities namely understanding the new destination, having the skills and competencies and the ability to manage how to get to the destination. According to Colwell and Joshi (2013), top management commitment is defined in terms of commitment to reform and capacity for change.

2.2.12 Sustainability. Sustainability is the economic, social and environmental needs of contemporary society without sacrificing future generation's resource needs. Economic viability of a business for a sustainable business depends upon physical and market-related factors (Tisdell, 1996). Marketing factors include level of price of outputs and inputs, price uncertainty and instability and trends in prices of commodities (Tisdell, 1996). The economic sustainability is defined as the cost benefits and optimization of inputs for maximizing the output or profit. Environment aspect means the reduction of greenhouse gases, minimization of carbon dioxide and reduction of pollution. In order to address environmental problems, several energy management and environment management programs have been introduced after post liberalization (Patil and Rao, 2015). The consumption of energy and environmental resources can be reduced through several factors like reuse and recycle (Hart, 1997; Kumari and Patil, 2017). Social aspect pertains to employment and social benefits. However, the social dimension has received very little attention in the literature. The social dimension comprises of philanthropy, safety, health and welfare, human right and ethics (Mani *et al.*, 2016). The success of the sustainable program is measured in terms of "sustainable management after and efficient use of natural resources," "significant reduction of harmful elements," "creates more jobs," "improves health standard of the workers" and "improving living standard for the people" as adapted from Veleva and Ellenbecker (2001) and UNEP *et al.* (2010). Carter and Rogers (2008) reported that social and environmental performance of industries deals with many other factors like packaging wastes, health, safety costs and labor costs, to name a few.

3. Research design

In this section, an attempt has been made to develop an instrument to measure the constructs and test research hypotheses. The instrument has been developed scientifically. Once an instrument has been developed, it was pretested to further operationalize each constructs and their items that were included in the instrument. Once the samples were identified, the data were collected using stratified random sampling followed by non-response bias test to ensure that data collected were free from non-response biasness.

3.1 Measures

Multi-item measures for constructs have been used to measure the theoretical framework to improve reliability, reduce measurement error, ensure greater variability among survey individuals and improve validity (Churchill, 1979). The instrument was pretested by academic experts, industry professionals and researchers. Each building block consisting of items was assessed using a five-point Likert scale, ranging from "1 = strongly disagree" to "5 = strongly agree."

3.1.1 Data collection. Data were collected from industry professionals at top and medium levels of management. The complete survey was sent to targeted individuals in different regions of a sugar industrial state. Maharashtra, having the highest number of sugar factories, was selected for the study.

3.1.2 Non-response bias. Non-response bias is the difference between the answers of respondents and non-respondents (Lambert and Harrington, 1990). Early and late waves of the responses were compared (Lai *et al.*, 2013; Armstrong and Overton, 1977; Lambert and Harrington, 1990). The first group is referred as early wave and second group is referred as late wave. Paired sample *t*-tests was performed on the two groups yielded no statistically significant differences ($p > 0.05$). The results suggest that the non-response bias is not a serious concern.

4. Result and discussion

This paper contributes to the literature on IE tested with covariance-based structural equation model. We examine the positive relationship between the enablers leading to sustainable IE.

We expect theoretical and organizational implication of our contribution toward sustainability. Sustainability cannot be secured unless the policies pay attention to such considerations like reorientation of technology, changes in access to resources and impact of the organization to society. Industries with low technological appropriability have a positive relationship between business-group share and R&D intensity than industries with high technology (Lai *et al.*, 2016). The dark side of the organization is that they do not go for sustainability. All would be better off if each organization takes into account the effect of the acts on economy, environment and society. But each organization is unwilling to assume that others will behave in sustaining desirable pattern, and hence all continue to pursue narrow self-interest.

This section discusses about the instrument reliability, validity and model testing.

4.1 Instrument reliability

Cronbach's α for all the constructs is higher than 0.7, the reliability has been established (Gaur and Gaur, 2009) and the constructs can be used for further analysis (see Table IV).

4.2 Common method bias test

This test is also used to measure the reliability of the items (see Table V).

In this method, explained variance of a single factor solution is extracted using exploratory factor analysis (EFA). If extracted variance is less than 50 percent, the method is considered acceptable. In this study EFA is carried out using IBM SPSS statistical software, to extract single factor. The single factor variance extracted is 25 percent, which is below 50 percent, hence the constructs are acceptable. Details of factor analysis with single factor extracted are provided in Table IV.

Common method bias test was done in covariance-based structure equation model using a latent factor (Woszczynski and Whitman, 2004; Sharma *et al.*, 2009). The *p*-value of the χ^2 difference between both the constrained and unconstrained model is found to be more than 0.05 (see Table VI). This proves that the two models do not share much of the variance and common method biasness is not a major issue (see Figure 2).

4.3 Instrument validity

To determine discriminant validity (Bagozzi, 1980; Bagozzi *et al.*, 1991), inter-factors correlation matrix has been derived in Table VI, modified as per Fornell and Larcke's (1981) suggestion. The diagonal (colored) elements represent the square root of the average variance extracted (AVE), whereas the lower half indicates the correlation coefficients between the various constructs. If the diagonal elements are greater than the lower half, the constructs possess discriminant validity. The constructs in the current study possess discriminant validity with only one value marginally higher than the square root of the AVE. There are no cross-loadings among the variables in the factor loadings, which also proves discriminant validity.

Table IV.
Reliability of all the constructs used in the model

Constructs	Reliability Statistics	
	Cronbach's α	*n* of items
Coercive pressure	0.675	5
Mimetic pressure	0.715	6
Normative pressure	0.686	6
Top management commitment	0.748	7
Technology adoption	0.927	8
Sustainable practices for sugar industrial ecosystem	0.890	7

Total variance explained						
	Initial eigenvalues			Extraction sums of squared loadings		
Component	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	10.172	25.429	25.429	10.172	25.429	25.429
2	6.162	15.406	40.835			
3	2.735	6.839	47.674			
4	2.508	6.270	53.944			
5	1.776	4.439	58.383			
6	1.475	3.689	62.072			
7	1.384	3.460	65.532			
8	1.288	3.221	68.753			
9	1.078	2.696	71.449			
10	1.032	2.581	74.030			
11	0.931	2.329	76.359			
12	0.879	2.198	78.556			
13	0.833	2.082	80.639			
14	0.774	1.934	82.573			
15	0.684	1.710	84.284			
16	0.606	1.516	85.799			
17	0.549	1.373	87.172			
18	0.462	1.156	88.328			
19	0.456	1.140	89.468			
20	0.415	1.038	90.506			
21	0.403	1.008	91.513			
22	0.392	0.981	92.494			
23	0.348	0.869	93.363			
24	0.318	0.794	94.157			
25	0.294	0.735	94.892			
26	0.277	0.693	95.585			
27	0.271	0.676	96.261			
28	0.223	0.559	96.820			
29	0.216	0.541	97.361			
30	0.179	0.446	97.807			
31	0.142	0.356	98.163			
32	0.130	0.325	98.488			
33	0.119	0.297	98.785			
34	0.117	0.293	99.078			
35	0.107	0.267	99.344			
36	0.091	0.229	99.573			
37	0.076	0.191	99.764			
38	0.056	0.140	99.904			
39	0.029	0.072	99.977			
40	0.009	0.023	100.000			

Table V.
Method bias is tested using (Harman's single factor method)

	χ^2	Degrees of freedom	*p*-value
Unconstrained model	1,266.904	386	0.00
Fully constrained model	1,255.131	389	0.00
	11.773	3	0.82

Table VI.
χ^2 difference test for common method bias

4.3.1 Convergent validity. The scale composite reliability was to be greater than 0.7 and AVE greater than 0.5 (Campbell and Fiske, 1959). The expected AVE is 0.5 or more (Hair *et al.*, 2010). Since AVE scores for constructs of normative pressure is smaller than expected score of 0.5, other construct validity measures of factor loading and construct reliability are studied. Considering the low score of AVE of normative

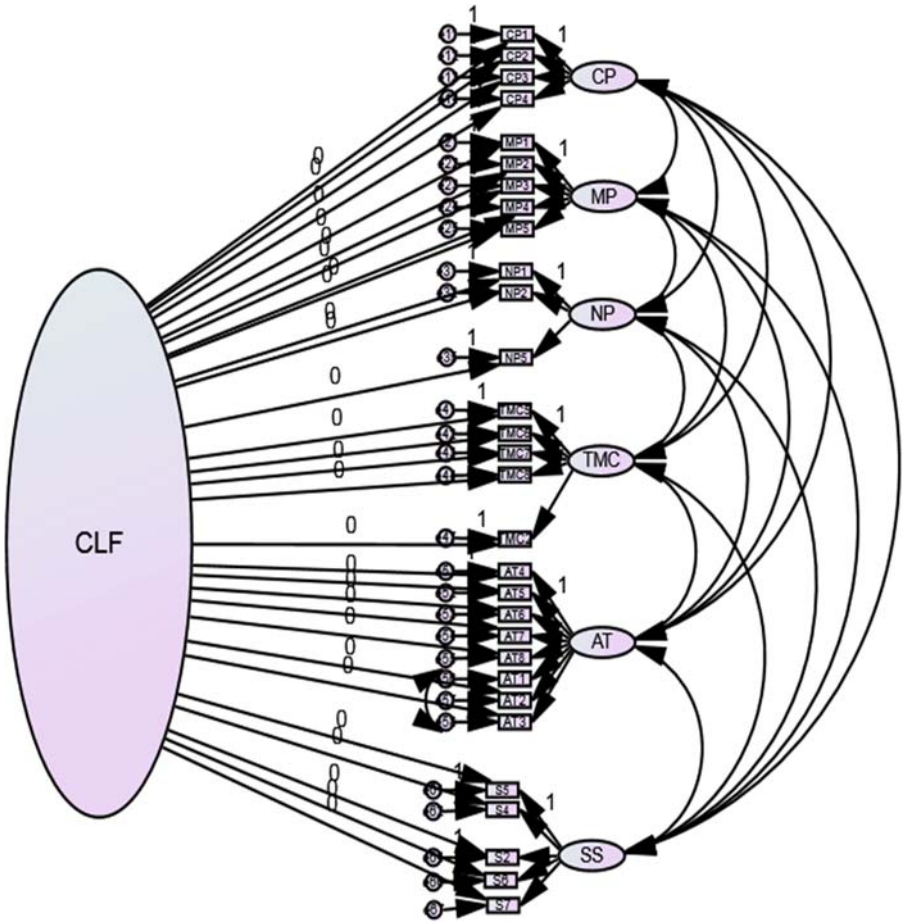

Figure 2.
Constrained model for common method bias test using Amos

pressure, another measures of convergence validity, factor loadings and construct reliability are studied. Both these measures indicate good convergence validity for the constructs (see Table VII).

4.3.2 Discriminant validity. Discriminant validity is the extent to which a construct is actually distinct from other constructs, both in terms of how much it correlates with other constructs and how distinctly measured variables represent only this single

Table VII.
Construct validity

Construct	Number of items	Number of revised items	SCR	AVE	MSV	ASV
Coercive pressure	5	4	0.743	0.50	0.41	0.313
Mimetic pressure	5	5	0.884	0.618	0.421	0.206
Normative pressure	6	3	0.70	0.408	0.055	0.034
Top management commitment	7	5	0.812	0.571	0.53	0.230
Technology adoption	8	8	0.930	0.626	0.60	0.341
Sustainable practices of sugar industrial ecosystem	5	5	0.948	0.785	0.255	0.059

construct (Hair *et al.*, 2010). The low discriminant validity of measured constructs could be because the constructs are theoretically related to each other. Similar reasoning of theoretical relationship between construct, for low discriminant validity is also offered by other researchers (Dion *et al.*, 1998; Teas, 1993). Low discriminant validity scores are very often found in research related to attitude measurement. Low discriminant validity (see Table VIII) can also be because of the presence of other dimensions to be explored (Chen and Quester, 2005).

Confirmatory factor analysis using Amos. Confirmatory factor analysis was also performed using Amos as shown in Figure 3.

Model identification and degrees of freedom. The model has 44 fixed regression weights marked 1 for identification. There are 32 regression weights to be estimated. Seven constructs have a total of 26 covariances with each other (Table IX). Thus, there are total 146 parameters, and 102 are to be estimated. The hypothesized model with indicator variables is presented in Table X.

The formula for distinct sample moments without means and intercepts, and p is the number of observed variables (see Figure 4). Using the formula, the distinct sample moments for the model is 741. The degrees of freedom are the difference between "distinct sample moments" and "parameters to be estimated." CFA has 102 parameters to be estimated and 102 degrees of freedom (Table XI).

After confirmatory factor analysis, the measurement model has been checked by covariance-based structure equation modeling.

Hypotheses testing. The conceptual model is based on these hypotheses test results (see Figure 4). The linkage between NP and TMC (NP→TMC) is found to be insignificant ($\beta = 0.03$, $p = 0.49$) at $p = 0.01$. The results shows that NP do not have a significant impact on TMC in predicting the sustainability of IE. However, the linkage between CP and TMC (CP→TMC) is found to be significant, with estimates of $\beta = 0.88$ and $p < 0.01$. The linkage between MP and TMC (MP→TMC) is also found to be significant, with estimates of $\beta = 0.35$ and $p < 0.01$. TMC has a significant positive impact on SS (TMC→SS) with statistical estimates of $\beta = 0.64$ and $p < 0.01$. Top management commitment explains 87 percent of total variance in the adoption of technology and 68 percent of total variance in sustainable practices of IE constructs. CP explains 61 percent of total variance in top management commitment while mimetic pressure explains 32 percent of total variance (see Table XIII).

Model identification and degrees of freedom. The constructs are reflective in nature (Diamantopoulos, 2010; Diamantopoulos and Siguaw, 2002). The structural model has 46 fixed regression weights labeled 1 for identification. There are 37 regression weights, 0 covariances and 43 variances. Thus, there are total 92 parameters, of which 57 are to be estimated. The summary of parameters for SEM is presented in Tables XII and XIII.

The model has 703 sample moments of which 80 are to be estimated, thus leaving 623 degrees of freedom.

	AT	CP	MP	NP	TMC	SS
AT	0.791					
CP	0.775	0.658				
MP	0.649	0.623	0.786			
NP	0.158	0.189	0.234	0.639		
TMC	0.808	0.532	0.406	0.187	0.686	
SS	0.074	0.505	0.013	0.145	0.120	0.886

Table VIII. Discriminant validity

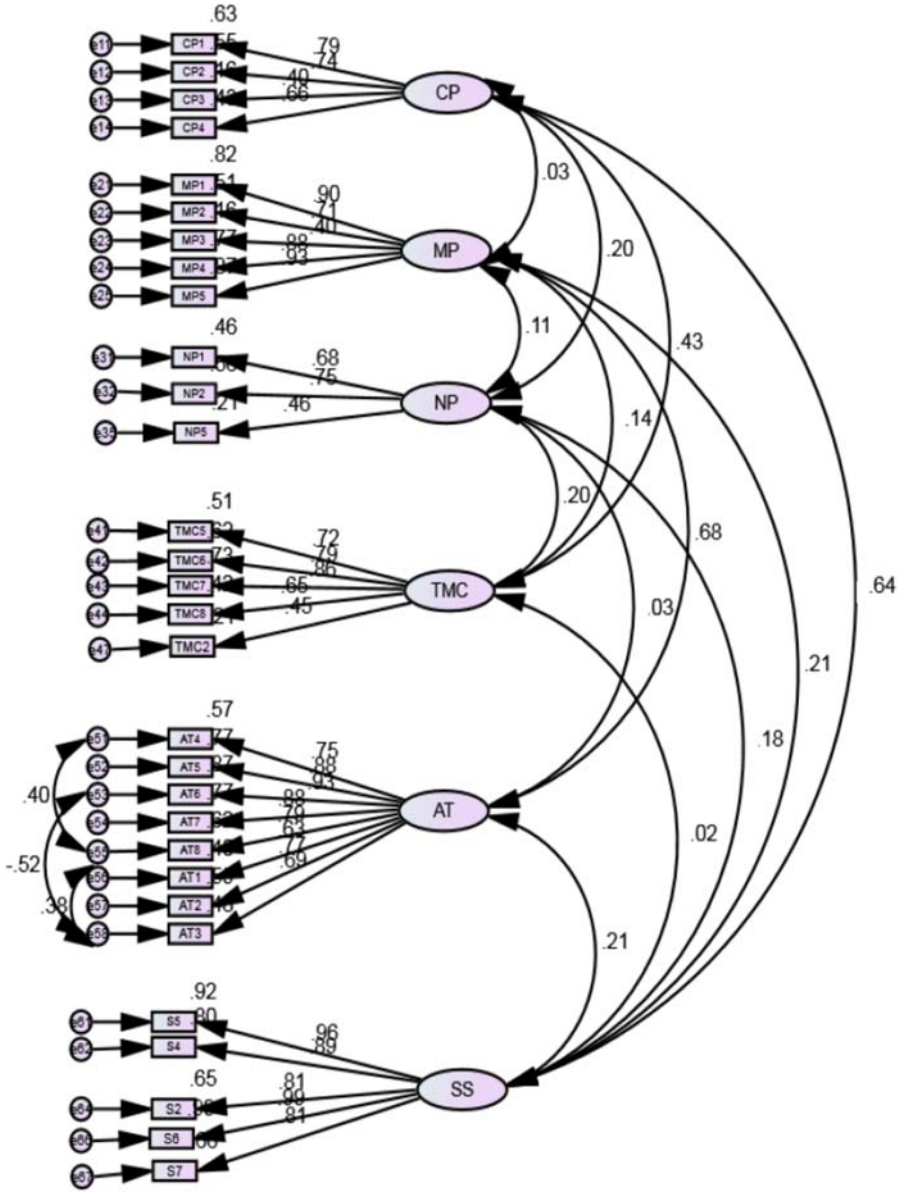

Figure 3.
Final confirmatory factor analysis model after modification

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	44	0	0	0	0	44
Labeled	0	0	0	0	0	0
Unlabeled	32	26	44	0	0	102
Total	76	26	44	0	0	146

Table IX.
Parameter summary: CFA

Modification of SEM. The SEM is further modified using modification indices. Relevant error terms (Diamantopoulos, 2006; Diamantopoulos *et al.*, 1994; Diamantopoulos and Schlegelmilch, 2000) are covariated based on logical theoretical reasoning. The process involved 12 iterations for modification. In SEM modifications, for improving the model fit, iterative process of modifications has improved SEM fitness index CMIN/df from 4.854 to 2.983.

Final structural equation model. The final SEM model, corresponding model fits are presented in Table XIV and standardized weights in Table XIV. It has been found from Table XIII that all the hypotheses are being accepted. Normative pressure has a very low impact on top management commitment. The model fit summary is shown in Table XV.

Mediation effect has been checked in covariance-based structure equation modeling through bootstrapping. The β coefficient in direct effect was 0.64, which dropped down to 0.54 in the indirect effect. The direct and indirect statistics shows that technology adoption has a partial mediation effect (Baron and Kenny, 1986).

5. Practical implications for academics and industry

The study has both academic and industrial implications. The findings of the current study may be used in applying the factors for reducing adverse impacts on economic, social and environment (Singh, 2009). The major implications are discussed below.

5.1 Academic implications

It is important to study and validate the relationship among research variables (Lee *et al.*, 2017) for strengthening the concept of the model. The fundamental principle of the proposed

Number of distinct sample moments	741
Number of distinct parameters to be estimated	102
Degrees of freedom (741-102)	639

Table X.
Degrees of freedom

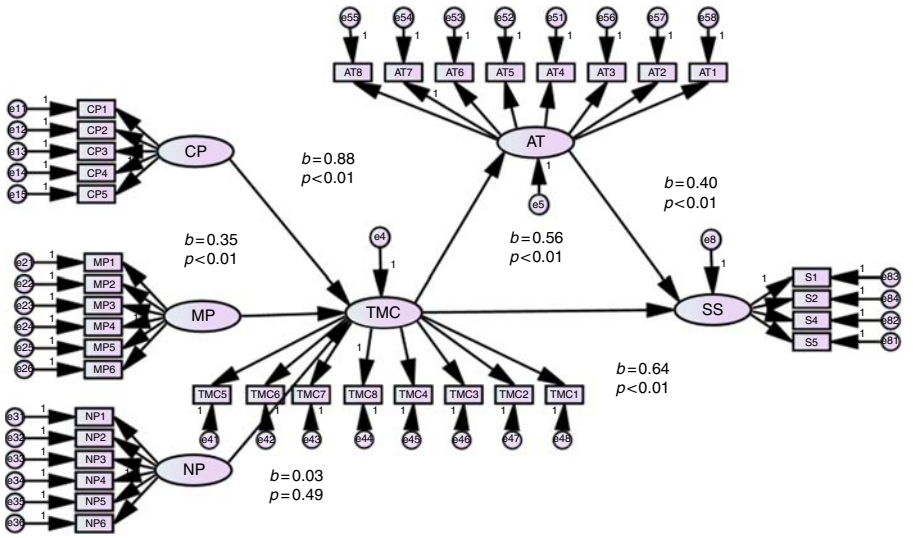

Figure 4.
Structural equation model

Table XI.
Model fit summary after modification

Fit indices	Observed value	Criteria of acceptance (Arbuckle James, 2012)	Result
CMIN/df (minimum sample discrepancy function)	2.237	Below 5 for reasonable fit	Acceptable fit
RMSEA (root mean square error of approximation)	0.07	Below 0.05 for good fit, up to 0.08 for reasonable fit	Acceptable fit
CFI (comparative fit index)	0.89	Above 0.95 for good fit, 0.9 to 0.95 acceptable fit	Acceptable fit
NFI (normed fit index)	0.89	Above 0.9 for adequate fit	Acceptable fit
PNFI (parsimony normed fit index)	0.703	Above 0.5 for good Fit	Acceptable fit
PCFI (parsimony comparative fit index)	0.772	Above 0.5 for good Fit	Acceptable fit
GFI (goodness of fit index)	0.89	Above 0.9 for adequate fit	Acceptable fit

Table XII.
Parameter summary

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	46	0	0	0	0	46
Labeled	0	0	0	0	0	0
Unlabeled	37	0	43	0	0	80
Total	83	0	43	0	0	126

Table XIII.
Degrees of freedom: SEM

Number of distinct sample moments	703
Number of distinct parameters to be estimated	80
Degrees of freedom (703-80)	623

Table XIV.
Standardized regression weight estimates: final SEM

	Estimate	*p*-value	Result
Top management commitment ← coercive pressure	0.61	0.00	Supported
Top management commitment ← mimetic pressure	0.32	0.00	Supported
Top management commitment ← normative pressure	0.05	0.00	Supported
Technology adoption ← top management commitment	0.87	0.00	Supported
Sustainable practices ← top management commitment	0.68	0.00	Supported
Sustainable practices ← technology adoption	0.69	0.00	Supported

Table XV.
Model fit final SEM

Fit indices	Observed value	Criteria of acceptance (Arbuckle James, 2012)	Result
CMIN/df (minimum sample discrepancy function)	2.658	Below 5 for reasonable fit	Acceptable fit
RMSEA (root mean square error of approximation)	0.08	Below 0.05 for good fit, up to 0.08 for reasonable fit	Acceptable fit
CFI (comparative fit index)	0.89	Above 0.95 for good fit, 0.9 to 0.95 acceptable fit	Acceptable fit
NFI (normed fit index)	0.89	Above 0.9 for adequate fit	Acceptable fit
PNFI (parsimony normed fit index)	0.70	Above 0.5 for good fit	Acceptable fit
PCFI (parsimony comparative fit index)	0.737	Above 0.5 for good fit	Acceptable fit
GFI (goodness of fit index)	0.89	Above 0.9 for adequate fit	Acceptable fit

model is to create a research environment linking IE with sustainability. This is for the first time that the simultaneous predictive relationship between factors leading to sustainable IE model was empirically tested. The research goes a step ahead and explains predictive relationships between factors leading to sustainable IE model. One of the important contributions of this research is that it has proposed validity and reliability test, generalized constructs and questionnaire for the measurement of the model using structural equation modeling. The research analyzes and highlights importance of predictive pattern of the institutional theory, top management commitment, technology adoption for exploring and developing a sustainable IE Model. In the light of above facts, the present research work tends to the advancement of knowledge in the area of sustainability, IE/ecosystem/symbiosis, top management commitment, technology adoption and institutional theory. It opens up new possibilities and opportunities for exploring the concept of IE, IS, life cycle assessment and input-output analysis in other sectors/entities.

5.2 Industrial implications

The study provides immense scope to the industry to maximize benefits by clearly understanding the networks, reuse and recycle concept with respect to policy, technology adoption and top management commitment to achieve better social, environmental and economic performance. The study findings suggest that IE is the proper implementation of technology. Technology adoption can be taken by top management. Good and experienced top managers result in the firm's desire to grow for sustainability.

The empirical research predicts that IE requires a good management commitment. Top management commitment comprises of TMP and TMB. TMB refers to the extent to which top managers consider that sustainable consumption and production will have an immense impact on sustainable development. TMP refers to the extent to which top managers translate their beliefs into desirable actions (Liang *et al.*, 2007; UNEP *et al.*, 2010; Zutshi and Sohal, 2004). However, IE is the implementation of technology for reuse, recycling and recovery of the by-products. Therefore, technology adoption acts as a mediator in the model for promoting sustainable practices in IE (Bailey, 2009; Barata, 2009; Brent *et al.*, 2008; Chertow, 1998; Duchin, 1992; Graedel and Allenby, 2003; Myoung *et al.*, 2001).

6. Conclusion and further research direction

The conceptual framework reconciles the independent contributions of the institutional theory, top management commitment and technology adoption. The analyses based on 200 respondents support the hypothesized relationships model. The study is limited to Maharashtra as it is the hub of industries. Last, a very important aspect that may impact the outcome of the study is data collection at one point of time. Consequently, the causality cannot be established without longitudinal data.

The limitations of the present study can further be extended in future. The future research directions are outlined as:

- The research can be replicated by applying the methodology to other concepts with a larger sample size and covering larger location.
- The research can be extended by adopting a qualitative research methodology with few portion of quantitative research. A pure qualitative research methodology like action-based research, case study approach, ethnography or phenomenological research methodology can be adopted.
- The time spent for the research can be extended. The time for studying sustainable practices of IE has an immense scope.

- A longitudinal study by collecting data of input-output from different industries pertaining to sustainable practices in IE can be conducted.
- The scope of the current research is restricted only to sugar factories in Maharashtra.
- The study can also be applied to other industrial sectors which are highly polluting.
- Similar kinds of comparative research can be conducted to other industries from other developing and developed economies.
- Research can be also extended to analyze the other factors contributing to sustainable practices of IE.
- The research can add value if linked with other theories like the resource-based theory, institutional theory and human relations management theory.

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Accounting for environmental costs as an instrument of environmental controlling in the company

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Abstract

Purpose – The purpose of this paper is study the peculiarities of environmental controlling in the context of the implementation of the sustainable development strategy and the systematization of methods, functions and tools, as well as consideration of the possibility of applying environmental controlling methods in the organization through the consideration of environmental costs.

Design/methodology/approach – The authors solved the following problems. The authors defined the essence of the concept of "environmental controlling;" conducted an analysis of methods, functions and instruments of environmental controlling; investigated the possibility of accounting for environmental costs as an instrument of environmental controlling; and systematized approaches of using the tool of accounting for environmental costs at enterprises.

Findings – The approaches to accounting for environmental costs differ in the degree of integration into the existing accounting system and in the frequency of accounts handling (one-time or regular). One-time solutions to accounting for environmental costs (e.g. environmental design calculations) are calculations conducted independently of traditional accounting. Their advantage lies in the fact that they can be formed and used without affecting the existing cost accounting system. However, they generate additional costs and generally receive less recognition than integrated solutions. Accounting for environmental costs is an integrated part of the existing and regularly conducted accounting system.

Research limitations/implications – Accounting of environmental costs has broad prospects for use in enterprises as an environmental controlling instrument for the improvement of management efficiency and quality.

Originality/value – Accounting for environmental costs is necessary as an instrument of environmental controlling in order to obtain information on the enterprise interdependencies between costs, revenues, consumption of raw materials and energy as well as environmental protection measures. In addition, the consideration of environmental costs can serve companies as a source for the identification of the potential to reduce the cost of output products.

Keywords Cost accounting, Sustainable development, Environmental costs, Controlling, Environmental controlling

Paper type Research paper

Introduction

The increasing burden on the environment, the reduction in the reserves of non-renewable natural resources, the pollution of the biosphere and the progressive climate change due to anthropogenic loading lead to a reduction in the rates of economic growth of individual states and territories.

Of particular importance is the economy, which focuses on sustainable development and, consequently, on the preservation of the foundations of the humankind existence. Such an economy is a prerequisite for the long-term economic growth. As part of the tightening of environmental legislation, companies are forced to introduce the environmental component in all areas of the organization: production, logistics and management.

Environmental management and environmental controlling in the enterprise are designed to account for both environmental and economic assessment of changes in financial and energy flows. However, until recently such systems mainly covered the

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physical, quantitative aspects of the problem, without completely affecting the cost characteristics of the process of production management. Such ecological and economic management in the enterprise corresponds to the concept of sustainable development. It is aimed at implementing the principle of ecological efficiency and involves reducing the impact on the environment while increasing the profitability of production.

The practice of management in the field of environmental protection and nature management is improved based on the principles of sustainable development by developing and implementing new management mechanisms aimed at achieving environmental goals and objectives and implementing projects and programs in order to improve the environmental and economic efficiency of economic activities. Currently, such innovative management tools as environmental management, environmental auditing and environmental controlling are actively developed and disseminated. Hence, there is a need for a scientific justification for environmental and economic management in an enterprise based on approaches of environmental costs accounting.

The purpose of this paper is to study the peculiarities of environmental controlling in the context of the implementation of the sustainable development strategy and the systematization of methods, functions and tools, as well as consideration of the possibility of applying environmental controlling methods in the organization through the consideration of environmental costs. To achieve this goal, the authors solved the following problems: they defined the essence of the concept of "environmental controlling;" conducted an analysis of methods, functions and instrument of environmental controlling; investigated the possibility of accounting for environmental costs as an instrument of environmental controlling; and systematized approaches of using the tool of accounting for environmental costs at enterprises.

Environmental controlling

It should be noted that environmental controlling is one of the relatively new informational and analytical tools of environmental management and it devotes itself to internal recording and analysis of environmental aspects of the economic activities of the organization.

This tool is designed to ensure the effective operation of the organization by justifying and applying such information tools that contribute to the coordination (harmonization) of individual management functions. The models of ISO or EMAS systems place emphasis on management processes, and therefore require the formulation of environmental policy, the development of an environmental program and the verification of the management system. On the other hand, eco-controlling puts financial and energy flows at the center of consideration as a basis for reducing the environmental burden. In addition, we identify tools, which allow more efficient analysis and management of these flows.

The central task of environmental controlling, as well as general controlling, is management support. In this case, the focus is on environmental measures and solutions of environmental problems (Baum *et al.*, 2007, p. 108). Environmental controlling, therefore, is a part or a subsystem of general controlling and is aimed at protecting the environment in the enterprise. The main difference between environmental controlling and controlling of financial or any other processes is that it is applied in areas that are directly related to environmental protection, for example, resource consumption, energy use, waste generation, noise, etc. (Tschandl, pp. 4-5).

A single definition of the concept of "environmental controlling" is missing. Therefore, it is necessary to give its definition and characteristics. Environmental controlling was first applied to improve the environmental performance of production activities, to control environmental costs and losses and to implement social responsibility policies. Currently, environmental control is introduced into the overall system of environmental management of enterprises and becomes an important reserve for the improvement of management efficiency.

Kozhukhova (2012) in her studies considers environmental controlling "as a system to support the management of environmental activities" Kirsanova (2004) – "as an informational and analytical tool for eco-management" (p. 4). However, Shliago (2013) believes that "the use of the term of 'environmental controlling' should be considered only as a figurative expression, and not a scientific term that has an independent meaning" (p. 304).

Thus, environmental controlling is an instrument of active, unified and environmentally oriented management of an enterprise. It covers, represents and assesses the physical and financial consequences of an enterprise's activities related to the environment. The main subjects of analysis, therefore, are the volumes and costs of environmentally important flows of materials and energy in the enterprise. Environmental controlling facilitates the identification and reduction of industrial environmental loads, and the achievement of the environmental objectives of the enterprise as an element of (environmental) management.

The main objectives of environmental controlling are the planning, management and control of all environmental objectives of an enterprise or environmental management measures.

Methods of environmental controlling

Methods of environmental controlling can be divided into three groups according to their orientation and practical application:

(1) methods focused on finance: carrying out an environmental differentiation of financial controlling and accounting, i.e. analysis of the financial consequences of environmentally related activities (linear: monetary approach);

(2) eco-friendly methods: the creation and application of environmentally oriented controlling as an extension of financial controlling and accounting, i.e. direction for data collection and management of environmental effects of economic activity (linear: physical environmental load); and

(3) integrated environmental and economic methods: control and management of both the financial consequences of environmentally related actions and the environmental effects of economic activity (two-dimensional measurement: monetary unit per unit of environmental load or unit of environmental load per monetary unit) (Schaltegger and Sturm, 1995, pp. 11-12).

In addition to methods that focus on the environment or the economy, methods of integrated (environmental) controlling are being increasingly considered. It includes an equal accounting of both economic and environmental aspects (Czymmek and Faßbender-Wynands, 2001, pp. 3-4). Helber and some other authors go even further. They consider integrated controlling as an instrument for coordinating the management activities at all levels of the enterprise. Integrated controlling not only forms systems of goals with multiple criteria, but also covers problems that go beyond the boundaries of an enterprise. The purpose of integrated controlling, therefore, is to support management in the formation and communication of enterprise policies that take into account the interests of all strategically important interests (stakeholders) (Helber, 2004, pp. 130-131).

From the definition of environmental controlling and the breadth of its tasks, its close connection with environmental management becomes clear. It prepares the decision-making and implementation process. However, it should not be equated with environmental management (Perl, 2006, p. 35). Environmental controlling supports environmental management especially in matters of improving or enhancing environmental efficiency in an enterprise. DIN EN ISO 14031 defines environmental performance as "(measurable) results arising from the management of environmental aspects of an organization." At the same

time, environmental aspects represent those elements of production activities, products or services of the organization that can have an impact on the environment (e.g. energy, noise, sewage) (DIN EN ISO 14031, 2000, p. 4).

Functions of environmental controlling

The primary goal of environmental controlling, as well as general controlling, is to ensure coordinated actions of the management system. Indirectly, environmental controlling should promote the achievement of environmental objectives in certain areas of an enterprise (Horvath, 2003, p. 143). Environmental controlling results from the need to integrate, process and prepare data/information. Classic controlling aimed at economic outcomes does not meet these requirements.

As well as classical controlling, i.e. the environmental controlling, performs the following main functions:

- functions of system formation: the creation of a basic system of organization and the work order for environmental management;
- intersystem and binding functions: establishing, maintaining and adapting links between systems;
- information function: providing information that is important for decision making with the help of environmental management tools;
- planning function: creation of planned indicators and their comparison with the actual ones;
- function of coordination and management: overcoming the asymmetric distribution of information affecting both functions within an enterprise and the enterprise as a whole;
- monitoring function: conducting actual and future comparisons of planned and actual indicators, preventing deviations and determining the possibility of their influence, monitoring the environmental consequences of enterprise activities, monitoring of planned environmental targets, and early identification of planning errors; and
- adaptation function: the establishment of new development trends important for the enterprise and their coordination with adaptation solutions or their implementation (Bleis, 1996, pp. 85-86).

Instruments of environmental controlling

A special area of environmental controlling is environmental risk (e.g. in case of incompliance with environmental regulations). Environmental risk occupies a large place in the overall risk of an enterprise and plays an important role in the use of materials (especially those that have dangerous properties) and the subsequent appearance of products and wastes (Scherpner and Form, 2003, pp. 548-549). Typical consequences of environmental risk are not only changes in the state of the environment and deterioration in the health of employees or the population, but also economic consequences in the form of creating economic and social hazards, for example, the risk associated with contracts or liability as well as financial risks (Bozek, 2003, p. 386). Timely identification of environmental risks, their reduction and the identification of long-term chances and potentials are central requirements for environmental monitoring.

From the ecological point of view, the use of classical tools can lead to significant mistakes in decision making and even partially block the implementation of environmental protection into management (Schäffer and Jais, 2005, p. 385). Therefore, many such tools have been

modified to meet the requirements of environmental protection and now can be applied in enterprises in an adapted form (e.g. in the form of environmental indicators). Other tools were created specifically for use in environmental management (e.g. environmental compatibility analysis). "The purpose of these tools is to support the systemic and constant environmental protection at enterprises, excluding any environmental or economic damage" (Klenner, 2002, p. 34). Consequently, we are talking about methods for solving specific problems of planning, regulating and stimulating the environmental protection or environmental management at the normative, strategic and/or operational levels.

Tools for supporting environmental management or environmental controlling include the following:

- consistent implementation of the idea of environmental protection by purposeful and systemic processing of environmental problems;
- providing environmentally relevant information that facilitates the process of preparing solutions or supporting the process;
- simplified (i.e. not covering the entire complexity of the problem), but fundamentally intact and relevant description of environmental problems;
- feasibility, practical applicability and possibility of integration into the work of an enterprise; and
- possible clarity and ease of use.

Integrating of environmental accounting into the company's traditional accounting system is a complex problem for several reasons. First, the limited accounting, i.e. funds with no cash equivalent, is not subject to accounting. For this reason, raw materials and materials coming to an enterprise are reflected in accounting documents, and other components of the environment, such as waste air and heat, are absent in the accounting registers – these values can be taken into account mainly in natural meters. The next reason for not including the above categories into accounting reports is the condition, according to which the resource becomes an asset only if it is controlled by the enterprise. The absence of such accounting at the branch enterprises leads to uncontrolled pollution of the environment (water, air, soil, and the appearance of a significant amount of non-recycled waste). The fact that any modern enterprise should be considered and taken into account as part of an integrated system connected with the environment becomes more obvious.

This circumstance predetermines the objective need for a more complete coverage of natural capital in accounting and statistical accounts in order to implement efficient management of the resources flow. At the same time, the important issue is the correct understanding of environmental costs, which includes many different factors.

Accounting for environmental costs as an instrument of environmental controlling

It is advisable to apply the accounting of environmental costs. This tool has proved itself in practice and it is an integral part of environmentally oriented production. This tool concerns the monetary side of pollution and environmental protection in an enterprise. There are many ways to apply the calculation of environmental costs, as each company can find the most suitable option for itself and use it once or permanently.

Depending on the subject and volume of analysis, there are various definitions of the concept of "environmental costs," but a unified one is missing.

BMU/UBA (2003) under environmental costs understand the costs associated with environmental management, with measures to protect the environment, and with impact on the natural environment (p. 45).

Based on this definition, further environmental costs can be differentiated in two ways:

(1) concerning belonging to an enterprise: internal and external environmental costs; and

(2) concerning the emergence of costs: the costs of protecting the environment and the costs of loading the environment (BMU/UBA, 1996, p. 44).

Internal environmental costs are the costs that the generating company must incur (BMU, 2007, p. 127). In contrast, external costs are the outgoings of economic activity, the unreached and unvalued negative impact of the market (i.e. environmental load) on households, enterprises or society in the form of increased costs or expenses (e.g. repair of damaged monuments) or intangible restrictions (e.g. negative impact on human health, loss of recreational function of forests) (Kumm, 1975, p. 40).

The costs of environmental protection (they are also called the costs of environmental discharge) are the consumed goods that are valued and purposefully used by the enterprise for protecting the environment in the enterprise. These include:

- investment and current costs for additive and integrated environmental protection (e.g. personnel costs, repair costs, depreciation charges, interest payments);
- costs for the environmental management system (e.g. maintenance costs of the person responsible for environmental management, literature, registration fees, etc.); and
- costs of external services (e.g. state control, environmental advice) (Jäger and Karger, 2006, p. 52).

The costs of the environmental load are the compensation costs for the damage already caused to the environment. For example, these are:

- environmental taxes, penalties, contributions (e.g. contributions for waste, penalties for violation of environmental legislation);
- contributions to environmental insurance; and
- the costs of regulating the caused environmental damage (e.g. compensation for damage in the context of liability) (BMU/UBA, 1996, pp. 43-44).

In our opinion, accounting for environmental costs is an internal tool of the enterprise that serves to account for all the costs that arise from the impact of the enterprise and its products on the environment. Unlike specific tools of environmental management, the accounting of environmental costs is based on the existing accounting system in the enterprise. It expresses processes related to the environment.

The choice and introduction of a specific system of accounting for environmental costs at enterprises is not accompanied by any legal obligations or standardization in the form of a norm (Bundesministerium für Verkehr, Innovation und Technologie, 2005). Nevertheless, there is a number of instructions that can help in the selection and introduction of an appropriate system. Depending on the individual goal and the initial situation, enterprises can choose an acceptable system from an array of diverse approaches and, if necessary, directly integrate it into the existing accounting system, into the organizational structure, and into the information and communication technology system (BMU, 2007, p. 127).

Any of the selected system of accounting for environmental costs depends on the available traditional cost accounting system, and requires additional collection and provision of specific environmental information. Accounting for environmental costs in this context uses specific environmental management tools that enable full and detailed review of the company's activities impact on the environment (e.g. environmental balances). From the point of view of the methodology, it is also possible to criticize the inevitable ignoring of those environmental aspects that do not have financial consequences for an

enterprise, as well as conceptual drawbacks in the (complete) collection of external environmental costs in general and specifically in the enterprise accounting system (Kottmann *et al.* 1999, p. 7). In this case, indirect environmental impact, i.e. the previous and subsequent one, is not sufficiently taken into account (Jäger and Karger, 2006, p. 55).

Discussion

Although there is no specific statistical material for determining the degree of distribution of environmental cost accounting systems, some conclusions can be drawn from their application in individual enterprises. Therefore, it turned out that small- and medium-sized enterprises rarely use environmental accounting systems. They are more common in large enterprises, primarily in the processing industry. This category of enterprises uses environmental cost accounting systems, for example, to meet UStatG's requirements for presenting their investment, as well as current environmental costs to the Federal Office of Statistics. The EU also recommends that large enterprises take into account environmental aspects when drafting annual reports, i.e. openly report and analyze these data in annual balances and reports on the state of affairs in the enterprise. Finally yet importantly, some environmentally active enterprises appreciate the advantages of the accounting system for environmental costs as an instrument to identify potentials for costs reduce. In order to generate significant and comparable information on environmental protection in the enterprise, the accounting system developed for the specific conditions of the enterprise can be of great importance. However, in the practice of enterprises, the external environmental costs are not taken into account or taken into account insufficiently.

Accounting for environmental costs is, first of all, an internal management tool with an environmental orientation, which can be used for other external purposes. The range of use of this tool is diverse and varies from company to company.

It is possible to name the following aspects of the utility of implementing and applying accounting decisions for environmental costs at enterprises:

(1) Ensuring the implementation of environmental management tasks, for example:
   - compliance with statistical reporting obligations;
   - stimulation of an effective and competitive environmental protection system;
   - purposeful planning and management of environmental costs; and
   - ensuring transparency of costs in relation to their causer as an instrument of internal and external communication.

(2) Ecological effectiveness: simultaneous reduction of environmental load and environmental costs:
   - increasing transparency due to the quantification of environmental costs;
   - supporting synergies between the economy and the environment;
   - identification of the achieved and planned potentials in order to improve the economic and environmental situation; and
   - cause-dependent distribution of environmental costs to centers and carriers of cost emergence.

(3) Protecting the strategy: checking the riskiness of long-term projects:
   - improvement of the basis for making operational and strategic decisions in an enterprise (planning tool); and
   - ability to conduct flexible analyzes (scenario models).

Over the past 30 years, a large number of methodological approaches to accounting for environmental costs have arisen. According to the authors of Loew (2001, pp. 10-11), Bleis and Helling (2002, p. 30), Jäger and Karger (2006, pp. 52-54), existing approaches to accounting for environmental costs can be divided into four groups:

(1) environmental cost accounting, which focuses on environmental protection: determining the amount of environmental costs related to management and communication, for example, accounting for environmental costs by Fleischmann and Paudtke (1977);

(2) accounting for investment and project environmental costs: taking into account environmental aspects in investment decisions, for example, environmental protection calculations by Wagner and Janzen (1991);

(3) process-oriented accounting of environmental costs related to material and energy flows: support for identifying potential savings based on material and energy flow analysis in the enterprise, for example, recording flow costs by Arnd (1995); recording residual costs by Fischer and Blasius (1995); accounting for resource costs by EFA Letmathe *et al.*, 2002; accounting for environmental costs for the life cycle by Fraunhofer-Gesellschaft, 2004); environmentally oriented target-costing (Seidel, 2003, pp. 101-103); and

(4) approaches for external costs determining: analysis of costs for external effects of enterprise production, for example, environmental accounting by Müller-Wenk (1978); accounting for environmental costs by Roth (1992); accounting for costs and flows in the enterprise according to the Wuppertal Institute for Climate, Environment and Energy (MIPS) (Liedtke *et al.*, 1997).

These four groups of approaches and their representatives simultaneously reflect the stages of environmental costs development. Initially, approaches explored environmental costs as costs for the environment "repair." Subsequently, environmental costs began to be understood as costs used to reduce current and subsequent environmental damage. New approaches investigate environmental costs in terms of preventing environmental damage.

This can be demonstrated in the following example. Since the mid-1990s, it became clear that an analysis of the costs of environmental protection would not reveal economically viable environmental protection potentials. A flow record of environmental costs has been formed after the recognition of the need to take into account all the important costs in the context of substances and energy flows. This approach allows tracing the path of individual materials in the enterprise from their receipt to output in the form of a finished product or residual material. In this case, we consider not the spheres and departments of the enterprise, but its processes and flows. Online accounting of environmental costs is constantly being improved from the time of its first use in enterprises (Spath *et al.*, 2003, p. 17). The approach of accounting for external environmental costs has most imperfect concept. Methodological problems and dilemmas arise in the full detection and quantification of external effects and their subsequent monetization.

However, there are two completely different theoretical concepts for monetization: an accident cost approach and a cost avoidance approach, but their application is associated with some shortcomings (e.g. a high degree of uncertainty). The accident cost approach evaluates and analyzes the actual damage caused by external effects (e.g. damage to the monuments material under the external effect – acid rain). The cost avoidance approach defines preventive measures, which concern specific costs on reducing or preventing negative externalities. This approach is applied, for example, in assessing external costs as a result of a greenhouse effect.

In addition, the approaches to accounting for environmental costs differ in the degree of integration into the existing accounting system and in the frequency of accounts handling

(one-time or regular). One-time solutions to accounting for environmental costs (e.g. environmental design calculations) are calculations conducted independently of traditional accounting. Their advantage lies in the fact that they can be formed and used without affecting the existing cost accounting system. However, they generate additional costs and generally receive less recognition than integrated solutions. Accounting for environmental costs is an integrated part of the existing and regularly conducted accounting system.

This topic is more detailed in the research of scientists Gaur and Kumar (2018).

Conclusions

To implement the goals and objectives of environmental management for the improvement of environmental performance of the company, it is possible to use environmental controlling. Environmental controlling (in a broad sense – environmental management) of the company is focused on general production and/or specific environmental instruments, depending on the requirements, conditions or the initial situation in the enterprise.

Accounting for environmental costs, as an instrument of environmental controlling, is necessary to obtain information on the enterprise interdependencies between costs, revenues, consumption of raw materials and energy, as well as environmental protection measures. In addition, the consideration of environmental costs can serve companies as a source to identify the potential for reducing the cost of output products.

The conducted analysis of the existing approaches to accounting for environmental costs in the enterprise shows that the choice of approach depends on the individual requirements of a particular enterprise. The task of creating a specific system of environmental management and controlling tailored to the needs of the enterprise can be interpreted either as a chance or as a challenge. The analysis also shows that accounting of environmental costs has broad prospects for use in enterprises as an environmental controlling instrument to improve management efficiency and quality.

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Is sustainability reporting (ESG) associated with performance? Evidence from the European banking sector

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Abstract

Purpose – Sustainability reporting has been widely adopted by firms worldwide given the need of stakeholders for more transparency on environmental, social and governance (ESG) issues. The purpose of this paper is to investigate the relationship between ESG and bank's operational (Return on Assets), financial (Return on Equity) and market performance (Tobin's Q).

Design/methodology/approach – This study examined 235 banks for ten years (2007-2016) to ends up with 2,350 observations. The independent variable is the ESG disclosure; the dependent variables are performance indicators (return on assets, return on equity and Tobin's Q). Two type of control variables are utilized in this study: bank specific and macroeconomic.

Findings – The findings deduced from the empirical results demonstrate that there is significant positive impact of ESG on the performance. However, the relationship between ESG disclosures is vary if measured individually; the environmental disclosure found positively affect the ROA and TQ. Whereas, the corporate social responsibility disclosure is negatively affect the three models. However, the corporate governance disclosure found negatively affects the ROA, ROE and positively affects the Tobin's Q.

Originality/value – The results of this study can be used to present a successful model for worldwide banks to concentrate on the role of ESG disclosure in performance.

Keywords Performance, Banks, ESG disclosure, European Union countries, Sustainability reporting

Paper type Research paper

1. Introduction

As the worldwide economies are increasingly interconnected through trade and investment, mainly due to the growth of multinational companies from the developed countries (Li and Gaur, 2014), the issues of what to disclose have been playing, and what kind of reporting should be disclosing for national and international stakeholders become more important, not only for stakeholders but also for worldwide policy makers.

Thus, financial accounting is not sufficient to meet the needs of shareholders; further reports have been established such as, intellectual capital statements, value reporting, and sustainability reports (Wulf *et al.*, 2014). However, there is a notable absence of the sustainable discourse that could be a tool for enhancing the performance. The resource-based perspective of firm suggests that firms gain superior performance when they disclose the financial and non-financial resources. These resources help firms develop capabilities and competencies, which are essential for achieving sustainable competitive advantage (Gaur *et al.*, 2011).

According to the United Nations Sustainable Stock Exchange, all listed firms are expected to disclose their impact from environmental, social and governance (ESG) practice by 2030 at the latest (Sustainable Stock Exchanges, 2015). Since ESG information is non-financial disclosure and does not pursue a standard format like the financial disclosure, ESG disclosure tends to vary significantly (Elzahar *et al.*, 2015).

In line with this, there are studies showing that ESG disclosure varies across firms and countries (Ioannou and Serafeim, 2017; Reverte, 2009). This is because of information content freedom and un-unified format being disclosed by the management. Duuren *et al.* (2016) found that the European managers view ESG in substantially different ways.

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Moreover, Baldini *et al.* (2016) argue that country-specific factors such as governance, labor, and economy are significantly affect firms' ESG disclosure. In this regards, it is important to investigate the relationship between ESG and performance within country-specific factors. Therefore, a question about whether or not ESG disclosure prompts current and future value creation within European countries need to be answered.

The European countries are the leading countries when it comes to advocating sustainable development. We selected the listed banks on the European Union countries as our research object as they are supporting the social and economic development. Presently, banking sector plays an important root for development and growth of the European economy by facilitating the financial transactions.

Sustainability reporting performs as a new disclosure philosophy that concentrates on creating future value related to the business policy. In this study, we discuss the prior literature and highlight theories supporting sustainability reporting. This study goes beyond prior researches by considering the current performance (ROA and ROE) and future value (Tobin's Q) that can give us further insights about ESG performance. More comprehensively, the study takes into consideration the effect of macroeconomic variables (governance and GDP) in order to control the relationship between ESG and performance across the countries.

The social, environmental and governance practices are assumed to be significant for all stakeholders; hence the relationship between ESG disclosure and performance need to be highlighted. This study contributes to literature in many ways. First, it sheds the light on the rare prior ESG studies in relation to current (operational and financial performance) and future (market performance). Second, it provides empirical evidence on the level of ESG in European Union banks as leaders in sustainable development. Thus, the results are expected to broaden the understanding of banks sustainability which eventually affects the European country's sustainable development. Finally, this study will help the stakeholders, investors, decision maker, regulators, policy makers and scholars to improve their knowledge about sustainable disclosure practices in relation to current and future performance.

The study is divided into the following sections: Section 1 being introduction, further part of this study is divided into five sections. Section 2 discusses literature review and developing hypotheses. Section 3 presents the design and research methodology. Section 4 shows the descriptive statistics. Section 5 presents empirical analysis results. Section 6 presents the study's conclusion, recommendations and the scope for further research.

2. Literature review and hypothesis development

2.1 The significance of sustainability reporting (ESG)

The sustainability reporting advocators believed that promoting the disclosure of ESG will benefit both the company and stakeholders. Sustainability reporting often enhanced as actions that lead to superior external and internal decision-making, greater transparency, simultaneously enforcing financial stability and contributing to a better social sustainable (Eccles *et al.*, 2015; Eccles and Saltzman, 2011; Krzus, 2011).

Moreover, it shows the full picture of a firm future performance as its shows the financial performances and non-financial performances (Jensen and Berg, 2012). Recently, there are many studies supporting the disclosure of ESG suggesting that sustainable reports bring more transparency by showing the links between financial and ESG (Adams, 2017). Steyn (2014) found that sustainability reporting is contributed to better business with higher financial performance. In addition, the ESG disclosure enhances the corporate reputation and creates significant competitive advantages (Lee Brown *et al.*, 2009; Gardberg and Fombrun, 2006; Simnett *et al.*, 2009).

With the increasing of world economies integration and the growth of large firms, the disclosure of corporate governance has emerged as an important issue for managers as well

as stakeholders all over the world (Singh and Gaur, 2009). The disclosure of governance is a response to the prevailing institutional environment and it affects the stakeholder's decision-making (Singh and Gaur, 2013).

Popli, Akbar, Kumar and Gaur (2017) and Popli, Ladkani and Gaur (2017) found firms that shape their responses in synchronization with the changes in the external environment is in the best position to mitigate the erosion of their profitability. Therefore, the environmental disclosure is necessary to make profit. Moreover, social activities must necessarily be disclosed in the formal and informal way (Hwang and Gaur, 2009), which helps the investors and stakeholders to know the social responsibility of the firm.

2.2 Measurement of sustainable report

Many literatures have investigated the relationship between ESG performance and performance. However, the results have been equivocal, partly because of measurement concerns or data constraints (Li *et al.*, 2017).

Various sustainability reporting methods adopted worldwide to measure the ESG performance of firms. Table I summarized the criteria and methodology used in each method.

2.3 Sustainable report and performance

To answer the question about why ESG should enhanced the performance; a closely accepted theory is the "cost of capital" reduction. The current standpoint is that the costs incurred in a firm by the establishment of a socially responsible structure in a firm are parallel by a reduction in its cost of capital. In regard of this, Mackey *et al.* (2007) suggested that a social responsible behavior is a "product" sold by firms to investors. However, is this product a gainful for a firm? Prior researches tend to confirm that the effect of investors' perception on the cost of capital is not important one. El Ghoul *et al.* (2011) found that lower the cost of capital, the higher is the sustainability reporting score, bringing a renewed interest in the cost of capital theory. Thus, from a marketing view, adopting a sustainable policy would have positive impact on the cost of capital. Waddock and Graves (1997) expounded a significant relationship between a firm's reputation and its social policy. Albuquerque *et al.* (2012) believed that ESG is a strategic product that brings more profits. Another studies looked at the information effect of ESG and firms' performance. Sharfman and Fernando (2008) debated that the disclosure of the non-accounting information gives us an indicator about how the firm controls the business risks. Therefore, higher ESG scores the lower business risks.

Besides, Porter (1991) clarifies the anticipation theory; he assumes two benefits: first, sustainable firms are expected to have lower costs in relation to future regulations. For example, the cash flow stability comparing to other firms increased paying to adapt the new regulations on current years. Second, firms putting established regulations before competitors are leaders in best practices, which promoted its wealth and eventually the wealth of its stakeholders.

Moreover, the instrumental theory of corporate social responsibility developed by Garriga and Melé (2004) which is supported by Eccles *et al.* (2012), who expounds the theory from a management viewpoint; how the innovation in strategy, plans, process and products in sustainable firms leads to superior performance.

On the other hand, we found some theories focusing on the negative side of ESG and firm's performance. In contra to the stakeholder theory, Friedman (1962) stated that the main purpose of a firm is solely to increase the wealth of its stakeholders, and any other non-financial objectives will make the firm least effective. Some researches supported his arguments such as Mackey *et al.* (2007), Zivin and Small (2005); they debate that investors expect from a firm to increase its wealth without sustainable policy, and that sustainable policy should be done by non-profit organization, e.g., charity. The investors investing in a

Number	Method	Purpose	Criteria	Methodology	Reference
1	Kinder Lydenberg Domini (KLD)	Evaluates a firm's environmental, social and governance performance	The criteria are divided into two broad categories: "strengths" and "concerns"	Deducting the "concerns" from the "strengths" to reach at a single net value using a binary values where "1" indicates the presence of a particular issue and "0" indicates the absence of an issue	Hillman and Keim (2001)
2	Ethical Investment Research and Information Service (EIRIS)	EIRIS is an independent, non-profit corporation which act as a global leading provider of research into corporate environmental, social and governance	It covers 87 criteria including climate change, human rights, supply chain, labor standards, relations with customers and suppliers, stakeholder engagement, board practices and risk management	Each item is rated on an interval scale as follows: −3 (High negative), −2 (Medium Negative), −1 (Low Negative), 0 (Neutral), 1 (Low Positive), 2 (Medium Positive), 3 (High Positive)	EIRIS (2011)
3	Sustainable Asset Management (SAM)	SAM provides a set of questionnaires	The questionnaire targeted at CEOs, investor relations, sustainability departments and public affairs	The results of this questionnaires are weighted and included in the Dow Jones Sustainability Index (DJSI)	United Nations Environment Programme (2011)
4	Asian Sustainability Rating (ASR)	ASR provides set of 100 criteria surrounding sustainability	Criteria are grouped into four main criteria: general, environmental, social and governance	Scoring is done by a group of experienced investment analysts in Singapore where one point is awarded for every criterion on the list	Asian Sustainability Rating (2011)
5	Dow Jones Sustainability Index (DJSI)	DJSI provides global sustainability benchmark	The benchmark is based on the top 2,500 firms in terms of market capitalization across sectors	Firms are filtered out as part of the DJSI construction process and then monitored on a continuous basis	DJSI (2011)
6	Morgan Stanley Capital International (MSCI ESG indices)	MSCI provides investment decision support tools to over 5,000 clients on pension funds and hedge funds	MSCI generates scores for each applicable criterion (environmental, social and governance)	These scores are aggregated to form one composite ESG score, where AAA represents the highest sustainability performance while C represents the lowest sustainability performance	MSCI (2011)
7	Financial Times Stock Exchange (FTSE4Good index)	The FTSE4Good was developed to provide investors a means by which they could identify	Five core areas included: environmental sustainability, upholding and	Review of annual reports, research of corporation websites and through written questionnaires and	Financial Times Stock Exchange (2011)

(*continued*)

Table I. Sustainability reporting methods

Number	Method	Purpose	Criteria	Methodology	Reference
		and invest in corporations that meet the minimum requirement of socially responsible practices	supporting universal human rights, ensuring good supply chain labor standards, countering bribery and mitigating climate change	publicly available material	
8	Bloomberg ESG disclosure scores	Encourage corporations to disclose more ESG data, Bloomberg decided to score corporations based on their ESG data disclosure. The Bloomberg ESG Disclosure Score out of a 100 is based on GRI's guidelines	There are four major categories namely environmental disclosure score, social disclosure score, governance disclosure score and ESG disclosure score (overall combination of environmental, social and governance disclosure scores)	Weightings differ by sectors. For example, the omission of the number of fatalities would not be considered significant for a retail corporation but will be punitive for a corporation in the oil and gas sector	Suzuki and Levy (2010)
9	Trucost	Trucost creates environmental profiles of corporations accounting for 464 industry sectors worldwide and monitors about 100 different types of environmental impacts	There are four major steps in the evaluation process	Trucost have developed two environmental indicators namely an absolute disclosure ratio and a weighted disclosure ratio	Trucost (2013)

Table I.

firm with sustainable activities limit the consumption choice where the social and voluntary part is going to the firm, hence he anticipates a lower cost of capital from the firm. Another argument (Hong and Kacperczyk, 2009; Statman and Glushkov, 2009) found that superior ESG performance is not reflected in the share price.

To conclude, building-up an ESG policy within a company has some costs that the firm expects to be compensated by positive performance effect, revenue stability and lower return from investors. The firm also can lower its risk and becomes more effective. In line with the previous literature and the theories supporting the ESG, our first hypothesis is therefore:

H1. There is positive relationship between ESG and operational performance (ROA).

The ESG practices could be seen as portion of the goodwill. Therefore, positive ESG score believed to lead to greater return on assets:

H2. There is positive relationship between ESG and financial performance (ROE).

As noted in the literature, the sustainable action is expected to create higher demand and greater growth for the firms. These firms should realize the ESG added value which lowers the business risks. Margolis *et al.* (2007) found that there is a significant positive relationship between ESG and financial performance:

H3. There is positive relationship between ESG and market performance (Tobin's Q).

Barth *et al.* (2016) found that ESG is positively associated firm value (using Tobin's Q as a measure). The positive relationship between ESG and firm value is driven by the cash flow which leads to higher market prices.

3. Research methodology

3.1 Study population, sample and resources of data

The study depends on the selected sample, which are 2,350 observations derived from 235 listed banks on the European Union countries stock exchange for ten years from 2007 to 2016. The Data used in this study were collected from Bloomberg database.

The rising significance of non-manufacturing sector (i.e banks) to the world economy being the center of this focused issue (Merchant and Gaur, 2008). Banks used in the sample were selected according to data available in the period of 2007-2016 and banks have not been turned off or merged with other banks during the research period (Table II).

3.2 The study variables

The independent variable (sustainable report) was measured using three disclosure indicators (environmental disclosure, corporate social disclosure and corporate governance disclosure) (de Villiers *et al.*, 2017). The dependent variables (bank performance) have been measured using operational performance (ROA), financial performance (ROE) and market performance (TQ) (Buallay, 2017; Hamdan *et al.*, 2017; Buallay *et al.*, 2017). Finally, two types of control variables were utilized in this study; the macroeconomic control variables: in economics-based integrated report research, endogeneity often appears. Endogeneity consist of three problems: correlated variables, reverse causality and simultaneity (Nikolaev and van Lent, 2005; Larcker and Rusticus, 2010). Therefore, we consider macroeconomic specifications as control variables in order to deal with these issues, where those countries are differed in terms of technological capacity, intellectual property regimes, economic development and geography (Contractor *et al.*, 2016). Therefore, our control variables are: gross domestic product (GDP), governance (GOV). On the other hand, we use bank specific control variables such as: total assets (TA) (Gaur *et al.*, 2014; Singh *et al.*, 2018) and financial leverage (FLEV).

3.3 Study model

In order to measure the relationship between sustainability reporting and bank's performance; the study estimates the linear model as follows:

$$\mathrm{Perf}_{itg} = \beta_0 + \beta_1 \mathrm{ED}_{itg} + \beta_2 \mathrm{CSRD}_{itg} + \beta_3 \mathrm{CGD}_{itg} + + \beta_4 \mathrm{ESG}_{itg} + \beta_5 \mathrm{TA}_{itg} + \beta_6 \mathrm{FLEV}_{itg} + \beta_7 \mathrm{GDP}_{itg} + \beta_8 \mathrm{GOV}_{itg} + \varepsilon_{itg}$$

Country	Listed banks	Total observations	Country	Listed banks	Total observations
Austria	7	70	Hungary	1	10
Belgium	6	60	Italy	19	190
Bulgaria	5	50	The Netherlands	4	40
Croatia	12	120	Norway	30	300
Cyprus	2	20	Poland	14	140
Czech Republic	3	30	Portugal	2	20
Denmark	22	220	Romania	3	30
Finland	3	30	Slovakia	6	60
France	17	170	Spain	9	90
Germany	8	80	Sweden	7	70
Greece	8	80	Switzerland	47	470
Total observations					2,350

Table II. Sample selection

where Perf: is a continuous variable; the dependent variable is the Banks' performance measured by three models (e.g. ROA model, ROE model and Tobin's Q model). ROA is the ratio of net income divided by TA of bank (i), in the period (t), in the country (g). ROE is the ratio of net income divided by shareholders equity of bank (i), in the period (t), in the country (g). Tobin's Q is the ratio of current liabilities plus market value of share capital divided by TA of bank (i), in the period (t), in the country (g). β_0: is the constant and $\beta_{1\text{-}8}$: is the slope of the controls and independent variables. ED: is a continuous variable; the independent variable is the disclosure of bank's energy use, waste, pollution, natural resource conservation and animal treatment of bank (i), in the period (t), in the country (g). CSRD: is a continuous variable; the independent variable is the disclosure of the bank's business relationships, bank donation, volunteer work, employees' health and safety of bank (i), in the period (t), in the country (g). CGD: is a continuous variable; the independent variable is the disclosure of corporate governance code of bank (i), in the period (t), in the country (g). ESG: is a continuous variable; the independent variable is the Bloomberg index which combine the ED, CGD and CSRD of bank (i), in the period (t), in the country (g). TA: is continues variable, the bank specific control variable, the TA of the bank, for the bank (i), in the period (t), in the country (g). FLEV: is continues variable, the bank specific control variable, the degree to which a bank uses fixed-income securities such as debt and preferred equity of the bank (i), in the period (t), in the country (g). GDP: is a continuous variable, the macroeconomic control variable, is the GDP of the country, for the bank (i) in the period (t), in the country (g). GOV: is a continuous variable, the macroeconomic control variable, is the public governance level of the country, for the bank (i), in the period (t), in the country (g). ε: random error.

3.4 Model validity

The objective of assessing validity is to see how accurate the relationship between the measure and underlying trait is trying to measure (Gaur and Gaur, 2009).

Linear regression model was used to test the relationship between the sustainability reporting and performance. We, therefore, run several tests to check whether data of this study could meet the conditions of the linearity assumptions.

As presented in Table III, to secure approximation of data to normal distribution, Shapiro-Wilk parametric test and Kolmogorov-Smirnov non parametric were used. The null hypothesis of these tests is that the population is normally distributed. Thus, if the p-value is less than the chosen 0.05 then the null hypothesis is rejected and there is evidence that the data are not normal. As shown in the table the value for all variables was less than 0.05. These un-normal distributed data may not influence the credibility of the study because the size of the sample was big and assuming not distributing the data normally.

However, empirical research that uses time series, like the case of this study, presupposes stability of these series. Autocorrelation might occur in the model because time series on which this study is based is non-stationary (Gujarati and Porter, 2003). To check stationarity of time series, unit root test, which includes the parametric Augmented Dicky-Fuller test (ADF) and non-parametric test Phillips-Perron test were used. As is presented in Table III, we can notice that the (ADF) test and (PP) test are statistically significant at the level of 1 percent which meant that the data of time series (2007-2016) were stationary.

As for the strength of the linear model, basically depends on the hypothesis that every variable from the independent ones is by itself independent. If this condition is not realized, the linear model will then be inapplicable. It can never be considered good for parameters' evaluation. To actualize this, collinearity diagnostics standard used incessant tolerance quotient for every variable of the independent ones. Variance inflation factor (VIF) has to be found afterwards. This test is the standard that measures the effect of independent variables. Gujarati and Porter (2003) stated that getting a VIF higher than 10 indicates that

Table III.
Model validity

Variables	Labels	Measurements	Normality Shapiro-Wilk/ Kolmogorov-Smirnov	Collinearity VIF test	Stationarity ADF/ Phillips-Perron	Autocorelleation Durbin Watson test	Heteroscedasticity Breusch-Pagan test	Koenker test
Dependent variables								
Operational performance	ROA	Net income divided by total assets	0.000		−20.141***	0.403	0.000	0.000
Financial performance	ROE	Net income divided by shareholder's equity	0.000		−18.111***	0.622	0.000	0.000
Market performance	TQ	The (Market value of equity + Book value of short-term liabilities)/Book value of assets	0.000		−9.374***	0.407	0.000	0.000
Independent variable								
Environmental disclosure	ED	Bloomberg index which measure the disclosure of bank's energy use, waste, pollution, natural resource conservation and animal treatment	0.000	3.034	−6.500***		0.000	0.000
Corporate governance disclosure	CGD	Bloomberg index which measure the disclosure of corporate governance code	0.000	1.242	−2.588***		0.000	0.000
Corporate social responsibility disclosure	CSRD	Bloomberg index which measure the disclosure of the bank's business relationships, bank donation, volunteer work, employees' health and safety	0.000	4.941			0.000	0.000
ESG disclosure	ESG	Bloomberg index which combine the ED, CGD and CSRD	0.000	2.440	−4.874***		0.000	0.000
Control variables								
Bank specific								
Financial leverage	FLEV	The degree to which a bank uses fixed-income securities	0.000	4.009	−1.008***		0.000	0.000
Total assets	TA	The total assets of the Bank	0.000	2.814	−4.744***		0.000	0.000
Macroeconomic								
GDP	GDP	The gross domestic product of the country	0.000	3.441	−2.669***		0.000	0.000
Governance	GOV	The public governance level of the country	0.000	2.251	−1.821***		0.000	0.000

Notes: ***Significance at 1 percent level

there is a multicollinearity problem for the independent variable of concern. As presented in Table III, it can be noticed that the VIF values for all independent variables are less than 10 which means that we do not have any collinearity problems in the study models.

To test the autocorrelation problem in the study models, we used Durbin Watson (D-W) test. Table III shows that the D-W values of the models are within the range of 1.5-2.5. This indicates there is no autocorrelation in this model.

Finally, one of the significant assumptions of the regression models is the presence of Homoskedasticity. We test Heteroskedasticity using (Breusch-Pagan and koenker test). As shown in Table III, we find that *p*-value of the three models are more than 0.05 which indicates admitting the null hypothesis; these models not suffer from actual Heteroskedasticity.

4. Descriptive analysis

In this section, we used the descriptive statistics in order to describe the study variables. Thus, we first show the mean, maximum, minimum and standard deviation of the variables. In addition to skewness to measure the lack of symmetry and kurtosis to measure whether the data are heavy-tailed or light-tailed relative to a normal distribution. Then, we adopt path analysis to show more advance results.

4.1 Descriptive statistics

As shown in Table IV, the values for asymmetry and kurtosis between −2 and +2 are considered acceptable in order to prove normal univariate distribution (George, 2011). The median value is lower than the mean value indicating that the distribution is skewed to the right (see Table IV).

The result of the descriptive analysis shows that the mean of governance disclosure has the highest value followed by the social disclosure while the environmental disclosure has the lowest disclosure among the banks. This means that many banks positively encouraged the disclosure corporate governance practices and roles within their reports that ultimately lead to better performance.

4.2 Path analysis

4.2.1 ESG disclosure and bank specific. 4.2.1.1 ESG disclosure based on bank FLEV. In this section, we divided the ESG disclosure into two categories; banks with a high level of leverage and banks with a low level of leverage (see Table V). The study used path analysis based on the value of FLEV median to identify the variance between the means of the two samples *t*-statistic test was used. The analysis using *t*-statistic test showed that the three sustainable report indicators tend to be higher with firms that have high FLEV ratio.

4.2.1.2 ESG disclosure based on bank size. Further analysis, we divided the sustainable disclosure into two categories; banks with high assets and banks with low assets (see Table V). The study used path analysis based on the value of TA median to identify the variance between the means of the two samples *t*-statistic test was used. The analysis using *t*-statistic test showed that the ESG disclosures indicators tend to be higher with banks that have more assets.

4.2.2 ESG disclosure and macroeconomics. 4.2.2.1 ESG disclosure based on countries' GDP. Moreover, the ESG disclosures were divided into two categories; banks located in high GDP countries and banks located in low GDP countries (see Table VI). The study used path analysis based on the value of country's GDP median to identify the variance between the means of the two samples *t*-statistic test was used. The analysis using *t*-statistic test showed that the governance disclosure tends to be higher with banks locating in high GDP countries. However, the social disclosure, environmental disclosure and ESG score tend to be higher in banks that are located in low GDP countries.

	Dependent variables			Independent variables			Bank specific control variables			Macroeconomic control variables	
Variables	ROA	ROE	TQ	Environmental disclosure	Social disclosure	Governance disclosure	ESG	Financial leverage	Total assets	GDP	Governance
Mean	0.111	0.182	2.104	25	35	52.3	34.501	17.304	402,441	3,437,444	80.577
Median	0.08	0.091	1.877	21	34.3	51.8	33.3114	15.777	103,414	16,350,001	81.554
Maximum	0.201	0.417	3.443	91	86	85.7	79.314	116.252	3,649,899	18,037,247	100
Minimum	0.001	0.003	1.406	1.7	3.35	14.1	9.677	2.335	1,766	14,785	40.384
SD	10.114	12.205	12.223	17	18.7	11.2	14.225	9.668	636,393	4,389,144	14.555
Skewness	0.401	0.039	0.72	0.5	0.1	−0.2	0.399	0.59	1.3221	1.822	−1.225
Kurtosis	3.224	2.505	2.832	2.8	2.11	3.21	2.307	1.877	1.83	1.665	1.004

Table IV.
Descriptive analysis

Table V.
ESG disclosure based on bank specific

Variables	Financial leverage: Mean difference by financial leverage High FLEV	Financial leverage: Mean difference by financial leverage Low FLEV	Financial leverage: Difference tests *t*-statistic	Financial leverage: Difference tests *p*-value	Bank size: Mean difference by bank size High asset	Bank size: Mean difference by bank size Low asset	Bank size: Difference tests *t*-statistic	Bank size: Difference tests *p*-value
Environmental disclosure	25.184	24.014	0.610	0.544	31.075	19.008	15.204	0.000***
Governance disclosure	47.140	46.995	0.520	0.623	56.008	45.114	32.101	0.000***
Social disclosure	31.779	22.063	9.308	0.000***	37.174	18.882	27.002	0.000***
ESG disclosure	21.089	16.057	16.138	0.000***	37.766	14.645	62.225	0.000***

Notes: The *t*-statistic is based on parametric test two-independent sample *t*-test. ***Significance at 1 percent level

Table VI.
ESG disclosure based on macroeconomics indicators

Variables	GDP: Mean difference by financial leverage High GDP	GDP: Mean difference by financial leverage Low GDP	GDP: Difference tests *t*-statistic	GDP: Difference tests *p*-value	Governance: Mean difference by bank size High GOV	Governance: Mean difference by bank size Low GOV	Governance: Difference tests *t*-statistic	Governance: Difference tests *p*-value
Environmental disclosure	23.336	26.901	−4.485	0.000***	26.100	24.361	2.505	0.012***
Governance disclosure	47.636	45.495	7.216	0.000***	49.002	42.554	21.089	0.000***
Social disclosure	20.698	34.052	−17.002	0.000***	19.325	35.361	−20.003	0.000***
ESG disclosure	16.015	23.660	−19.551	0.000***	16.990	21.001	−11.191	0.000***

Notes: The *t*-statistic is based on parametric test two-independent sample *t*-test. ***Significance at 1 percent level

4.2.2.2 ESG disclosure and countries' Governance. At last, the ESG disclosures were divided into two categories; banks located in high governance countries and banks located in low governance countries (see Table VI). The study used path analysis based on the value of country's governance median to identify the variance between the means of the two samples *t*-statistic test was used. The analysis using *t*-statistic test showed that the environmental disclosure and governance disclosure tend to be higher with banks located in high governance countries. However, the social disclosure tends to be better in banks located in low governance countries.

5. Empirical analysis

5.1 Panel causality tests

To get better results in investigating the relationship between dependent and independent variables we need to include different methodologies and approaches to data collection and analysis (Gaur and Kumar, 2017). In this stage we tested heterogeneous or unequal coefficients of the interaction variable to find the direction of relationship between sustainable report and performance through answering the question whether the sustainability reporting enhanced the performance or not?

The null hypothesis states that there is no causal relationship between dependent and independent variables if the *p*-value of them is more than 5 percent.

As shown in Table VII, the result shows that Tobin's Q is Granger cause of ESG since the *p*-value less than 5 percent significant level. The result supports the recent recommendations in some various countries to encourage the sustainable practices as best practices of market performance.

5.2 Pearson correlation analysis

Table VIII shows the direction of relationships among all the variables that were examined by adopting Pearson correlation matrix in order to get more insight before testing the hypotheses. The result shows that the correlation coefficients of TQ indicate significant positive associations at 1 percent level with all ESG indicators. However, the ROA is correlated with the governance disclosure at 5 percent. Finally, the ROE is correlated with social and environmental disclosure at 1 percent. In total, the ESG is highly correlated with the dependent variables which could support our study's hypothesis. As expected, the result implies that banks with greater sustainable report disclosure have better performance.

5.3 Regression discussion and findings

Our study can only assume a correlation between error and independent variables of the study sample. "Hausman Test" confirmed this where a null hypothesis assumes that capabilities of fixed-effect approach (FE) and random-effects approach (EF) are the same, but if a null hypothesis is accepted then this indicates that random-effect approach is appropriate, and it is therefore preferable to use random-effect approach. "Hauseman" "χ^2" model shown in Table IX is statistically insignificant as p-value is more than 5 percent, which mean that capabilities of random-effect model (RE) are best representing the relationship confirming our assumption that $\varepsilon,_i$ and Xs are correlated.

We create this model in order to answer the question: could the sustainable report be a proxy for better performance? In other words, is it possible that ESG enhanced operational, financial and market performance?

The results reveal that ROA, ROE and TQ regression models have high statistical significance, as p-value represents the probability of concluding that there is a difference in the sample when no true difference exists (Gaur and Gaur, 2009). In our case, the p-value of F-test is less than 5 percent (0.000) which present high explanatory power of the three models.

As shown in Table IX, the slop coefficient of ESG for ROA, ROE and TQ indicates that the impact of sustainability reporting is significant and has a positive impact on the performance as evident from the coefficient and p-value is less than 1 percent (0.001, 0.000 and 0.004).

Null hypothesis	F-test	Probability	Remark
ESG does not Granger cause ROA	0.221	0.701	Accept – no causality
ESG does not Granger cause ROE	4.505	0.414	Accept – no causality
ESG does not Granger cause TQ	0.600	0.004	Reject – causality

Table VII.
Panel causality test

Variables	ROA	ROE	TQ	ED	CSRD	CGD	ESG
ROA	1						
ROE	0.112	1					
TQ	0.647	0.144	1				
ED	0.332	0.212***	0.601***	1			
CSRD	0.609	0.105***	0.332***	0.525***	1		
CGD	0.042**	0.115	0.010***	0.663***	0.405***	1	
ESG	0.802***	0.499***	0.677***	0.901***	0.607***	0.912***	1

Notes: ROA, Return on Assets; ROE, Return on Equity; TQ, Tobin's Q; ED, Environmental Disclosure; CSRD, Corporate Social Responsibility Disclosure; CGD, Corporate Governance Disclosure; ESG, Environmental, Social and Governance. *,**Significance at 5 and 1 percent levels, respectively

Table VIII.
Correlation matrix

Variables	label	ROA model β	ROA model *t*-statistic	ROE model β	ROE model *t*-statistic	TQ model β	TQ model *t*-statistic
Independent variable							
Environmental disclosure	ED	0.044	1.222	0.003	0.146***	0.146	5.233***
			0.101		0.008		0.000
Corporate social responsibility disclosure	CSRD	−0.120	−2.942***	0.211	4.342***	0.099	2.042***
			0.007		0.000		0.006
Corporate governance disclosure	CGD	−0.279	−1.017***	−0.401	−1.652***	0.345	1.830
			0.002		0.005		0.082
ESG	ESG	0.280	1.019***	0.301	1.611***	0.344	1.827***
			0.001		0.000		0.004
Control variables							
Bank specific							
Financial leverage	FLEV	−0.078	−3.148***	−0.032	−2.101**	−0.033	−2.534**
			0.000		0.033		0.012
Total assets	TA	0.320	13.025***	0.331	20.301***	0.359	29.275***
			0.000		0.000		0.000
Macroeconomic							
GDP	GDP	−0.149	−6.454***	−0.470	−28.545***	−0.101	−7.122***
			0.000		0.000		0.000
Governance	GOV	0.129	5.333***	−0.079	−4.926***	0.246	17.505***
			0.000		0.000		0.000
R^2			0.292		0.451		0.310
Adj. R^2			0.280		0.455		0.312
F-statistic			104.414		302.116		385.005
p-value			0.000		0.000		0.000
Hausman test (χ^2)			3.011		2.077		2.265
p-value (χ^2)			0.216		0.310		0.129

Notes: **,***Significance at 5 and 1 percent levels, respectively

Table IX.
Regression models (random effect)

Therefore, we accept the null hypothesis (*H1-H3*). Disclose more information about ESG enhance company's performance.

Although the ESG results found significant positive impact on the performance, splitting the ESG indicators could give us another direction in the relationship with the performance. First, the environmental disclosure found to be positively associated with the ROE and TQ. This evidences that bank's financial and market profitability have been created more by published information about environmental issues. Based on these results, banks in European Union countries increase their ROE by concentrating more on the environmental disclosure. This means, the stakeholders in those countries are aware and consider the environmental practices in their investment decisions as a main driver for better asset efficiency. This has brought wealth to financial sector of society and led the firms to concentrate significantly on further investment in their physical and financial assets. Also, Tobin's Q results indicate that disclosure of environmental practices is significantly contributed to a physical asset's market value and its replacement value. Considering this result, we believe that environmental disclosure has a significance and usefulness in European Union countries as the nexus between financial markets and markets for goods and services.

Second, we found that the corporate social responsibility disclosure has negative relationship with the three performance indicators. To clarify that, we believed that CSR develops because executive management and boards of directors work in social policies for their own benefit. If so, then three possible outcomes are that these policies result in costs to the banks, costs that are borne by stakeholders which lower the market value (TQ), the equity (ROE) and the efficiency of assets (ROA).

At last, the corporate governance disclosure found to negatively affects the financial and operational performance. However, disclose more information about the governance practices may enhance and positively affect the Tobin's Q. This means that governance disclosure decreases the asset efficiency (ROA) and equity return (ROE). Although this finding of governance is quite different from other recent literature, it is in line with some studies (Core *et al.*, 2006; Gompers *et al.*, 2003).

For the bank specific control variables, bank size found to be positively significant with ROA, ROE and TQ models. As more tangible assets in the banks it positively affects the performance. In theory large firms may perform better, as they have more resources and higher efficiency. For the FLEV, we found that the FLEV has negative and significant relationship with the performance, i.e., more the FLEV lower is the performance. Popli, Akbar, Kumar and Gaur (2017) and Popli, Ladkani and Gaur (2017) stated that firms leverage can be used as an indicator to attain superior long-term performance.

Finally, after testing the effect of macroeconomic control variables, we found that GDP negatively controls the three models. Moreover, the public governance has significant positive relationship with the operational and market models while the financial model was found negatively affected by the governance. This means the greater public governance in the country, the lower market value of assets in the firms locating in this country.

6. Conclusion, recommendations and future research

This study considers the level of ESG in the banks listed on the European Union countries stock exchange to investigates the relationship between sustainability reporting and performance. The data collected are pooled data from Bloomberg database during the period 2007-2016. This study examined 235 banks for ten years to ends up with 2,350 observations.

The independent variable is (social, environmental and governance disclosure). The dependent variables are performance indicators (ROA, ROE and TQ). Two types of control variables utilized in this study; the macroeconomic control variables; GDP, (GOV). And the Bank specific control variables; TA and FLEV.

The finding of descriptive analysis shows that ESG tends to be higher with banks that have high FLEV and high assets. Further, the governance disclosure is better in banks located in high GDP and high governance. However, the social and environmental disclosure is better in banks located in low GDP countries and low governance countries.

Moving to Empirical results, the causality test finding shows that Tobin's Q is Granger cause of ESG. Moreover, regression model was incorporated under random effect; Although the ESG results found significant positive impact on the performance, splitting these indicators may vary when measure individually; the environmental disclosure found to positively affects the ROE and TQ. Whereas, the corporate social responsibility disclosure is negatively affect the three models. Last but not the least, the corporate governance disclosure found to negatively affects the financial and operational performance (ROA and ROE).

We suggest the European banks to focus more on sustainability reporting to assure more transparency of long-term economic situation and non-financial information.

In European Union countries, it is clearly noted that different governmental authorities are moving since years ago to establish and implement sustainability reporting in order to strengthen the relations with societies and business communities and to move toward sustainability. However, the laws associated with the sustainable disclosure is weak, therefore, we recommend the countries regulator to pay more attention to ESG disclosure to assure more transparency in the disclosure.

Added to that, the stakeholders such as investors, shareholders, creditors and debtors recommended to increase their knowledge about the term of sustainable report and its importance in the business to make better investment choices. Furthermore, we suggest that organizers like central bank, external auditors and stock exchange organizer to take the

sustainability reporting into consideration to assure reliable financial information to all business parties. More importantly, the financial authority in European countries should have a clear and mandatory law associated with sustainability reporting.

Finally, we suggest that future research has to be undertaken in sustainable reports and how other factors are affecting the disclosure of sustainable reports. For example, the effect of audit committee characteristics on ESG disclosure, the relationship between earning management and ESG disclosure and the effect of corporate governance practices on ESG disclosure.

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Diversity, corporate governance and CSR reporting

A comparative analysis between top-listed firms in Egypt, Germany and the USA

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Abstract

Purpose – Taken from an institutional theory perspective, the purpose of this paper is to explore the effects of organizational-level factors, specifically diversity and corporate governance structure, on the corporate social responsibility (CSR) reporting practices of corporations operating in developing and developed country contexts, namely, Egypt, Germany and the USA. Since developed countries are exposed to different settings, the paper argues that there is likely to be a difference in the organizational-level drivers of CSR reporting in developed vs developing countries.

Design/methodology/approach – The sample consists of companies listed on the Egyptian EGX 30 index, the German DAX 30 index and the US Dow Jones 30 index. Governance- and diversity-related data are gathered from multiple sources including the BoardEx and Orbis databases. Content analysis is used to analyze the CSR information of sample companies using the software package MAXQDA. To examine the relationship between the explanatory variables of the study and CSR disclosures, multiple regression analysis is used.

Findings – The results are mostly consistent with institutional theory where the effects of diversity and governance structure, observed mainly by foreign BOD, board independence and institutional ownership, are found to be significant on the CSR disclosure levels of sample Egyptian companies only. On the other hand, no significant influence of tested factors was observed on the level of CSR reporting in the USA and Germany. The results thus indicate that the influence of organizational-level factors on CSR is highly dependent on the institutional context where companies operate.

Originality/value – The influence of diversity and corporate governance on CSR has been separately studied in the management literature. Yet, the potential effects of both variables on CSR have received limited attention. In addition, no study combining such explanatory variables of CSR was carried out in the specific context of developing Middle Eastern countries. Also, illustrating how institutional contexts can influence the dynamics of interaction between organizational-level variables and CSR is still understudied. This kind of multi-level research can help broaden the understanding of the drivers and practices of CSR in developing vs developed countries that have distinct institutional environments.

Keywords Diversity, Corporate governance, Developing countries, Corporate social responsibility, Institutional environment

Paper type Research paper

1. Introduction

Corporate social responsibility (CSR) reporting is becoming a common practice nowadays where thousands of companies worldwide issue CSR reports and their number is growing every year (Ernst & Young and Boston College Center for Corporate Citizenship, 2016). A wide range of factors have been identified that contribute to increasing corporate disclosures of CSR information including corporate governance practices (Chau and Gray, 2010; Ezat and El-Masry, 2008; Khan *et al.*, 2013), industry characteristics (Young and Marais, 2012), diversity (Oliver, 1992) and stakeholder pressures (Cooper and Owen, 2007; Golob and Bartlett, 2007), among others. Yet, research studies have revealed wide variations in the extent of CSR reporting among companies ranging from limited disclosures to disclosing detailed information regarding the full CSR "status" of the corporation (Chen and Bouvain, 2009).

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Disclosure variations across countries may be due to differences in underlying environments that include factors like the level of economic development, type of economy and size and activity of stock markets (Adhikari and Tondkar, 1992). While corporate social engagement is spreading globally, the reasons behind such global spread may differ from country to country (Matten and Moon, 2008).

Cross-country heterogeneity of CSR (reporting) practices may be explained by differences in the institutional environments within which corporations operate. Neo-institutional theory indicates that the broad institutional framework in which corporations operate can have immense influences on their strategies (Doh and Guay, 2006). Such institutional framework not only includes formal regulations and laws but also informal social institutions that define societal norms and traditions. Accordingly, the CSR practices of firms operating in different contexts can be better understood considering their institutional framework (Brammer *et al.*, 2012). Although institutional theory has its criticisms (Martinez and Dacin, 1999), Dacin *et al.* (2002, p. 45) argued that it is a "vibrant theory" that can powerfully explain organizational actions. Institutional theory highlights the contexts within which organizational structures and actions take place (Yang and Konrad, 2011). Accordingly, a better understanding of corporate actions becomes more likely when the institutional framework in which corporations operate is examined (Martinez and Dacin, 1999).

The institutional embeddedness of CSR in the societal fabric has great influences on the degree of embracement of social responsibility practices. Countries' political, legal, economic and cultural conditions create the ambience in which businesses operate which reflects on the "social roles" of the participants in the business cycle such as employers, employees, suppliers, etc. The inter-dynamics of macro-environmental factors and the business culture of a given nation can propel or confound the social responsibility agenda. For instance, societal standards regarding corporate citizenship and environmental sustainability can cascade down on firms operating on a micro level (Jones, 1999). In developing countries, where there are weak institutions and low awareness and demand on CSR, undergoing change in corporations operating in such environments may offer them new opportunities and incentives to adopt social responsibility practices.

Diversity in organizations could create new norms and expectations that could be a potent driving force for CSR practices in developing countries. Diversity encompasses new members with diverse experiences, viewpoints and backgrounds (Oliver, 1992). When new norms and practices are expected by new agents in the organization, legitimacy gaps may also occur (Oliver, 1992). Such new norms may pose pressures on organizations to carry out practices that ensure corporate accountability. Beside potential legitimacy gaps and threats that might occur from new agents in organizations, diversity can enhance other areas that can create a competitive advantage for organizations by enhancing creativity, system flexibility and better problem-solving skills. Having a diversity of perspectives can produce better decisions and a more thorough analysis of issues that can directly lead organizations to achieve and enhance their social responsibility goals (Cox and Blake, 1991).

Previous literature in developing countries also provides evidence that corporate governance acts as a significant driving force for CSR disclosures (Siregar and Bachtiar, 2010; Haji, 2013; Chau and Gray, 2010; Khan *et al.*, 2013; Saleh *et al.*, 2010). Its mechanisms include the internal governance structure of organizations such as ownership structures, board composition and independence that can promote the social disclosure practices of corporations (Khan *et al.*, 2013). In developing countries, corporate governance is increasingly viewed as a critical pillar for effective CSR implementation (Jamali *et al.*, 2008). From reviewing previous literature on developing countries, the composition of corporate boards and the ownership structure of corporations represent key variables in boosting organizational change with regard to CSR.

Taken from an institutional theory perspective, this paper explores the effects of organizational-level factors, specifically diversity and corporate governance structure, on the CSR reporting practices of corporations operating in developing and developed country contexts. Since developed countries are exposed to different settings, the paper argues that there is likely to be a difference in the drivers of CSR reporting in developed vs developing countries. This paper thus addresses the following questions:

RQ1. Can corporate governance structure and diversity promote the CSR reporting practices of firms operating in developing country contexts?

RQ2. Do the examined organizational-level variables have significant influences on the CSR reporting practices of companies operating in developed country contexts?

The influence of diversity and corporate governance on CSR has been separately studied in the management literature. Yet, the potential effects of both variables on CSR have received limited attention. In addition, no study combining such explanatory variables of CSR was carried out in the specific context of developing Middle Eastern countries. Although organizational-level variables tend to be the main focus of the CSR literature in developing countries (Jamali and Karam, 2016), illustrating how institutional contexts can influence the dynamics of interaction between organizational-level variables and CSR is still understudied. This kind of multi-level research can help broaden our understanding of the drivers and practices of CSR in developing vs developed countries that have distinct institutional environments.

Egypt is chosen as a representative developing country given its dominating economic activity in the African continent (Rossouw, 2005). On the other hand, the USA and Germany are chosen as developed industrial countries. Germany is specifically chosen from Europe since, unlike other European countries, CSR information disclosure is voluntary and no specific legal regulations exist demanding companies to report on their CSR activities (Gamerschlag *et al.*, 2011). While (institutional) differences exist between the USA and Germany, as a European country (Doh and Guay, 2006), they represent two developed continents that are prominent in CSR practices.

Comparing differences in the CSR disclosure practices of Egypt with that of developed countries helps reduce the gap in the emerging markets literature. In addition, providing empirical evidence that interlinks diversity, governance and CSR would enrich the literature domains of both influencing factors and CSR.

The remainder of the paper is structured as follows: the paper starts with providing a literature review on CSR practices in developed vs developing countries. The paper then moves on to highlighting the organizational-level drivers for CSR with a focus on developing countries. Diversity and corporate governance are specifically tackled in relation to CSR reporting. This is followed by the research methodology, results and conclusion.

2. Literature review and hypotheses development

2.1 CSR in different contexts: developing vs developed countries

The economic environment has particular influence on the level and maturity of CSR practices. In general terms, CSR represents the voluntary contributions of corporations to sustainable development (Gamerschlag *et al.*, 2011). Unlike developed countries, both consumer and financial markets and market dynamics in developing countries are considered largely immature. This reverberates on indicators like higher presence of family businesses and higher unemployment. Developed countries are industrial economies whereas developing countries are "resource based" (Reed, 2002). Such structures and conditions create varying influences on CSR practices. Developing countries are generally more focused on satisfying basic consumer needs rather than being focused on higher-level issues of CSR and sustainability (Jones, 1999).

The economic environment in developed and developing countries also causes differences in the stringency of accounting standards, which, in turn, causes differences in disclosure of information in general, and CSR information in specific. The accounting function matures in conjunction with the level of economic development. The richer economies of developed countries also make corporate expenditures on accounting regulations more justifiable. Whether countries' wealth and economic well-being are based on agriculture or service or industry reflects on variations in sources of financing. For example, agricultural economies rely on governmental subsidies and when they become industrial, the financial structure changes and diversifies toward external financing. A parallel increase in the infrastructural accounting system backing up external financing is observed as external parties look for better corporate disclosures and governance systems (Adhikari and Tondkar, 1992).

Just as an unhealthy economic environment impacts CSR negatively, on a more micro level, companies' financial performance has been shown to have profound influence on their level of interest in CSR. Companies with lower financial performance opt against extensive CSR expenditures for resource constraint reasons. The more companies fear risking shareholder wealth, the less probable they are to spend considerable investments in CSR. Managers in this situation outweigh financial performance over socially responsible behavior (Lee *et al.*, 2013).

Other institutional differences may lead to different practices of CSR between developing and developed countries. For instance, corporations are more likely to act responsibly when regulations are well-enforced and when effective self-regulatory systems and private independent organizations are present. The legal environment and the presence of legal regulations strongly influence firms' propensity to become socially responsible especially when there was a participatory process in developing these regulations that involved the firms, the government, independent parties, etc. The presence of effective self-regulatory systems is also of major importance. The level of enforcement of these systems, including the potential of governmental intervention in case of lack of application, represents an important propeller for corporate CSR behavior (Campbell, 2007).

The presence of an enabling institutional environment also has profound impact on the implementation of CSR practices. Since organizations are part of the external environment, their outcomes are shaped by the institutional framework within which they are embedded (Singh *et al.*, 2018). Parallel with economic development, the institutional environment in developed countries is stronger and more structured than in developing countries (Gaur *et al.*, 2014). These include private independent organizations that monitor corporate behavior (such as NGOs), an interested media and a critical civil society that is able and powerful enough to scrutinize corporate behavior (Campbell, 2007). As such, the CSR enabling environment is more clear in developed rather than developing countries (Idemudia, 2011; Jamali and Mirshak, 2007).

In Germany, for instance, although legal regulations do not play a critical role in encouraging the implementation of CSR (Gamerschlag *et al.*, 2011), corporate acknowledgment of international guidelines and norms such as the OECD and Global Compact Guidelines represents the self-regulatory system that encourages CSR disclosures among German companies. It is also argued that companies undertake the self-regulatory process in order to avoid potential government regulatory intervention (Campbell, 2006). In their study on CSR disclosures in Germany, Gamerschlag *et al.* (2011) concluded that German companies tend to engage in CSR disclosure practices to reduce information asymmetries that may lead to the enactment of additional legal regulations and taxes that may negatively affect firm value. The UK, on the other hand, has a Minister of CSR yet the government has enacted tax laws to facilitate and stimulate CSR (Idemudia, 2011). Conversely, in the USA, the government plays a minor role in encouraging and regulating

corporate social practices. Environmental regulations set by the Environmental Protection Agency affect the CSR practices of firms in some industries. Nonetheless, the US Government promotes CSR behavior by leading a lot of CSR projects. Also, watchdog groups such as Human Rights Watch and Corporate Watch are a source of pressure on US companies to improve their social behavior (Griffin and Vivari, 2009).

The CSR literature is also largely originating from developed countries where the CSR practice and vibrancy in such market economies fuels scholarly interest. The lack of stringency in the regulatory system, the presence of corruption and the lack of a general enabling environment in developing countries give a different direction to CSR behavior, albeit escalating its importance (Dobers and Halme, 2009; Idemudia, 2011; Jamali and Mirshak, 2007).

According to Jamali and Neville (2011), there are unique differences between the face of CSR in developing vs developed countries where CSR in developing countries is less strategic and less political. In developing countries, CSR is focused on fulfilling where "governments fall short" (Jamali and Neville, 2011). The institutional drivers and infrastructure for CSR are weak in developing countries where there is lack of pressure by different stakeholders including governments and NGOs (Jamali *et al.*, 2008).

Overall, since corporations operating in developed countries are exposed to different country settings and pressures, it can be argued that there is likely to be a difference between the drivers of CSR reporting in developing vs developed countries. As mentioned previously, this research focuses on Egypt as an important developing country in transition, and Germany and the USA as developed countries that have well progressed in the CSR agenda. Accordingly, the following is hypothesized:

H1. There is a significant difference between the drivers of CSR in USA/Germany and Egypt.

2.2 Firm-level influencers and organizational change: a focus on developing countries

Hannan and Freeman (1984) argued that organizational change "reflects designed changes in strategy and structure of individual organizations in response to environmental changes, threats, and opportunities" (p. 150). International business literature suggests that diversity represents one factor that can play a role in fostering organizational change (Kondra and Hinings, 1998; Sako, 2006; Stevens *et al.*, 2008). The degree of organizational internationalization is estimated based on three main attributes: performance, structure and attitude (Jaw and Lin, 2009). Diversity represents the attitudinal attribute which reflects the qualitative internationalization of organizations including the heterogeneous origin of board members and top management (Ruigrok and Wagner, 2003). Accordingly, when an organization is faced with a wide variety of origin of board members, executives and stakeholders, it is moving toward increased internationalization. Such internationalization may place pressures on organizations to adopt CSR practices that fit global demands.

Organizational structure can also play an important role in giving strategic importance to CSR issues (Husted and Allen, 2006). Internal governance structure, such as board and ownership structure, represents an internal corporate mechanism that helps ensure the alignments of manager-stakeholder interests (Young *et al.*, 2008). While the adoption of effective international corporate governance codes is still questioned in developing countries (Dahawy, 2007; Jamali *et al.*, 2008; Peng, 2004), corporate governance is increasingly viewed as an important "foundational pillar" for CSR in developing country contexts (Jamali *et al.*, 2008, p. 455). Hence, the need for effective implementation of corporate governance practices to enhance the quality of corporate disclosures and stimulate the economy in developing countries is salient.

2.2.1 Diversity and CSR. The presence of a multinational board and shareholder structure within organizations may place pressures on organizations to integrate CSR issues in their organizational strategies. If social actors within organizations have social norms and expectations that value social responsibility, organizations are more likely to instill social issues in their organizational strategies. Our conceptualization thus suggests that the more corporate norms empower CSR practices, the greater the pressures will be on corporations operating in a developing country setting to adopt CSR.

Previous research studies suggest a link between diversity and CSR practices (Muttakin *et al.*, 2015; Ferrero-Ferrero *et al.*, 2015). From a theoretical standpoint, the diversity of board members enhances the decision-making process inside organizations as a result of diversified knowledge, perspectives and values which, in turn, improves corporate performance (Ferrero-Ferrero *et al.*, 2015). In addition, stakeholders' interests are taken into consideration by diversified board members and social practices are addressed more sensitively leading to improved social responsibility of organizations (Fernández Sánchez *et al.*, 2011). A number of studies support the importance of diversity in developing country contexts. In their study, Muttakin *et al.* (2015) examined the effect of board diversity on the CSR disclosure practices of 116 listed Bangladeshi companies and found that foreign directorship has a positive influence on corporate CSR disclosures. Khan (2010) also argued that the CSR reporting strategies of corporations in Bangladesh are more likely supported by foreign directors. His study provides evidence on a significant positive relationship between the percentage of foreign origins on the board and level of CSR reporting of 30 commercial banks in Bangladesh. Accordingly, having more diversity of board members in developing countries may pressure corporations in developing countries to enhance their CSR disclosures.

Foreign shareholders may also exert pressures on corporations to adopt CSR practices. Young and Marais (2012) argued that shareholders' priorities are also emphasized in CSR reports as an evidence of responsible management practices as a result of normative or mimetic pressures enforced on organizations. In a developing country context, the CSR reporting of corporations may increase to reduce the perceived legitimacy gap between foreign shareholders and corporate management (Khan, 2010). It is also argued that foreign shareholders may demand more CSR disclosures from management given the geographic separation between them (Khan *et al.*, 2013). Oh *et al.* (2011) examined the effect of ownership structure on the CSR practices of 118 large Korean firms and found a positive relationship between foreign ownership and CSR ratings. In the same vein, Khan *et al.* (2013) examined the effect of foreign ownership on the CSR disclosure practices using 580 firm-year observations in Bangladesh. Their study shows a significant positive influence of foreign ownership on CSR disclosures. Based on that, diversity of board members and shareholders represents (internal and external) organizational-level factors that are expected to have a positive effect on the CSR reporting practices of corporations operating in developing countries. Hence, the following are hypothesized:

H2. Foreign BOD has a positive influence on CSR disclosure practices in developing countries.

H3. Foreign shareholders have a positive influence on CSR disclosure practices in developing countries.

2.2.2 Corporate governance structure and CSR. Generally, corporate governance represents the mechanisms in a firm that ensure that the strategic decisions taken by managers serve the best interests of corporate owners rather than their own (Singh and Delios, 2017; Singh and Gaur, 2013). Two important corporate governance mechanisms are the board of directors and corporate ownership structure (Singh and Delios, 2017). The composition of corporate boards can influence the degree to which corporations effectively manage CSR issues (Bear *et al.*, 2010). From a theoretical standpoint, the key functions that the board offers to its corporations

including advice, counsel and management monitoring (Bear *et al.*, 2010) provides the rationale for the critical need of effective board members and board structure if sustainable CSR strategies are sought. Jaw and Lin (2009) also argued that corporate chief executives are the main agents responsible for strategic changes in organizations. The importance of the existence of effective corporate governance mechanisms that may drive change with regards to CSR is also highlighted by studies in developing countries. For, instance, the study of Jamali *et al.* (2008) showed that several managers operating in the Lebanese context view strong corporate governance policies as necessary instruments for the proper implementation of CSR programs. They further communicated that the way corporate governance is applied and structured in a corporation highly influences management emphasis on CSR goals and objectives (Jamali *et al.*, 2008). In an environment where the economic structure is weak, awareness is low and corporate disclosures are not a common practice (Dahawy, 2007), the importance of internal governance mechanisms on enhancing the CSR (disclosure) practices of companies becomes most noticeable.

Empirical evidence exists on the significant influence of corporate board structure on voluntary and social disclosures of corporations operating in developing countries. This includes the influence of the number of board members, chief executive officer (CEO) duality and level of board independence. For board size, it is argued that the larger the number of board members, the less likely they are to be controlled by the CEO (Samaha, Dahawy, Hussainey and Stapleton, 2012), thus increasing the effectiveness of the monitoring process (Siregar and Bachtiar, 2010). Previous studies in developing countries found a positive influence of board size on voluntary and social disclosures (Ezat and El-Masry, 2008; Samaha, Dahawy, Hussainey and Stapleton, 2012; Siregar and Bachtiar, 2010; Haji, 2013). Accordingly, we hypothesize the following:

H4. Corporate board size has a positive influence on CSR reporting practices in developing countries.

Another important element in corporate board structure is the separation of the role of chairman of the board from the role of the CEO. CEO duality exists if the chairman also acts as the CEO (Samaha, Dahawy, Hussainey and Stapleton, 2012). It is argued that conflicts of interests may arise in the presence of CEO duality and that the separation of their roles can lead to higher levels of corporate transparency and disclosure (Lattemann *et al.*, 2009). Studies in developing countries examining the effect of CEO duality on voluntary and social disclosures show a significant negative association between both variables (Lattemann *et al.*, 2009; Li *et al.*, 2010; Samaha, Dahawy, Hussainey and Stapleton, 2012). Accordingly, the following is hypothesized:

H5. CEO duality has a negative influence on CSR reporting practices in developing countries.

Independent board members represent a "balance mechanism" that ensures that the interests of corporate shareholders as well other stakeholders are protected. Based on that, it is argued that independent directors are more likely to pressure companies to perform social disclosures as way of ensuring that corporate actions are aligned with societal values (Haniffa and Cooke, 2005). As such, the existence of independent board members is argued to be a critical corporate governance mechanism that can enhance CSR disclosures (Khan *et al.*, 2013). Previous studies in developing countries support such arguments and show a positive influence of the level of board independence on the CSR reporting practices of firms (Chau and Gray, 2010; Khan *et al.*, 2013). Accordingly, the following is hypothesized:

H6. The level of board independence has a positive influence on CSR reporting practices in developing countries.

The variation in the level of CSR disclosures can also be explained by ownership structure since different types of disclosures could be demanded by different corporate owners (Siregar and Bachtiar, 2010). Previous studies also show a significant influence of ownership structure on corporate reporting practices (Johnson and Greening, 1999; Li and Zhang, 2010; Oh *et al.*, 2011; Saleh *et al.*, 2010; Samaha, Dahawy, Abdel-Meguid and Abdallah, 2012). In a developing country context, Saleh *et al.* (2010) explored the effect of institutional ownership on the CSR disclosures of publicly listed companies in Malaysia. Their results show a significant positive relationship between CSR disclosures and institutional ownership. Also, the results of a study conducted by Oh *et al.* (2011) show a significant positive influence of institutional ownership on the CSR ratings of 118 Korean companies. It can then be argued that internal corporate governance practices can be used as an (internal) organizational-level factor to enhance CSR disclosures in developing countries. Accordingly, the following is hypothesized:

H7. Corporate institutional ownership has a positive influence on CSR reporting practices in developing countries.

3. Methodology

3.1 Sample construction

The sample consists of companies listed on the Egyptian EGX 30 index, the German DAX 30 index and the US Dow Jones 30 index (as of January 1, 2015). CSR reports were gathered from companies' websites and annual reports were gathered from companies' websites and the Thomson Reuters database. Two Egyptian companies had no reports available in year 2014 and were therefore excluded from the analysis. Based on that, the final sample companies examined are 88. All German companies offer their reports in English language while only some Egyptian companies offer their reports in English language. Details about the number of examined annual and CSR reports are shown in Table I.

3.2 Data collection procedures

Content analysis is used to analyze the CSR information communicated through the annual and CSR reports of Egyptian, German and US companies. Content analysis is "a method of

Egyptian reports for year 2014 (N = 28)	
English annual reports	6
Arabic annual reports	3
English financial reports	10
Arabic financial reports	9
CSR report(s)	*1*
Total sample reports examined in Egypt	29
German reports for year 2014 (N = 30)	
Annual reports	25
Integrated reports	5
CSR reports	*23*
Total sample reports examined in Germany	53
US reports for year 2014 (N = 30)	
Annual reports	29
Financial report(s)	1
Integrated report(s)	1
CSR reports	*26*
Total sample reports examined in the USA	*57*
Total sample reports examined	139

Table I. Sample description: total number of examined reports

analyzing written, verbal or visual communication messages" (Elo and Kyngas, 2008, p. 107) and assumes that the importance of the subject matter is indicated by how frequent it is mentioned (Guthrie *et al.*, 2004). Words are used as the unit of analysis since specific term search yields reliable results and can be replicated easily compared to other forms of content analysis such as counting sentences or sections (Gamerschlag *et al.*, 2011). Word count was performed using the software package MAXQDA. Using computer software programs to analyze qualitative data provides many advantages to the analysis process including enhanced systemization, transparency and speed (Crofts and Bisman, 2010). Keywords are used to identify the extent of CSR disclosures in companies. In line with previous comparative studies (Chen and Bouvain, 2009; Gamerschlag *et al.*, 2011; Guthrie and Farneti, 2008), the Global Reporting Initiative (GRI) guidelines are used for keyword identification since they represent global standards for voluntary CSR disclosures. However, manual keyword search was done for the reports of 19 Egyptian companies since such reports were unreadable by the program.

Following the coding framework of Gamerschlag *et al.* (2011), the keywords used reflect only core GRI environmental and social indicators since the majority of stakeholders have interest in them. Table II shows the social and environmental keywords used based on GRI. In the analysis, more than one keyword can be used for the same indicator to account for plural and singular forms as well as British and English differences (Gamerschlag *et al.*, 2011). Also, MAXQDA searches for words that may not be exactly the same as the search string unless otherwise specified. For example, the search results for the word "spill" include spills, spillage and spillover. Also, the search for "discrimination" yields not only the word discrimination but also non-discrimination and anti-discrimination. However, the search for a keyword like "fines" was restricted to the same word to avoid counting a word like "de-fines."

Environmental	Social
Recycled	Employment
Energy consumption	Employee turnover
Biodiversity	Collective bargaining
Emissions	Collective agreements
Effluents	Occupational health
Waste	Occupational safety
Spills	Training
Environmental impacts	Diversity
	Equal opportunities
	Human rights
	Discrimination
	Freedom of association
	Child labor
	Forced labor
	Compulsory labor
	Community
	Corruption
	Public policy
	Compliance
	Fines
	Sanctions
	Product responsibility
	Customer health
	Customer safety

Table II.
CSR Keywords based on GRI

Source: Gamerschlag *et al.* (2011)

Governance- and diversity-related data were gathered from multiple sources. Data on diversity variables for Egyptian corporations were mainly gathered from the General Authority for Investment as well as the BoardEx and Orbis databases. For German and American companies, diversity-related data were gathered from corporate websites, BoardEx and Orbis databases. Data on the corporate governance structures of all sample companies were gathered from corporate websites, BoardEx and Orbis databases as well as other internet sources.

3.3 Measures

The dependent variable in this study is the total quantity of disclosed CSR information. The CSR disclosure score is calculated by adding the number of disclosed social and environmental keywords in the reports of each company. For example, the CSR score of a company that issues a CSR report represents the total number of social and environmental hits disclosed in its annual as well as its CSR report.

Diversity is measured by the multi-nationalities of board members and shareholders (Haniffa and Cooke, 2005). The diversity of board members is calculated as the percentage of foreign members in the board of directors. The diversity of shareholders is calculated as the percentage of foreign shareholders in each company. Four proxies are used to measure corporate governance structure: CEO duality, board size, board independence and institutional ownership structure. Consistent with previous studies (Haniffa and Cooke, 2005; Khan *et al.*, 2013; Liao *et al.*, 2015; Michelon and Parbonetti, 2012; Said *et al.*, 2009; Samaha, Dahawy, Hussainey and Stapleton, 2012), the number of board members acts as the board size measurement, CEO duality is measured as a dummy variable where a value of 1 is given if the CEO also serves as the chairman of the board and a value of 0 is assigned otherwise and board independence is measured as the percentage of independent members in the board. Following Saleh *et al.* (2010), institutional ownership is measured as the percentage of shares held by institutional investors.

A country dummy variable is measured by classifying companies operating in Egypt, a developing country, in one group and companies operating in developed countries in another group. Here, 1 indicates that the company operates in a developing country (Egypt) and 0 otherwise (USA and Germany). Also, firm size is used in this study as a control variable to represent industry characteristics. Since larger firms are faced with greater pressures to legitimize their operations, they are expected to disclose more CSR information (Khan *et al.*, 2013; Muttakin and Khan, 2014). Also firm size is likely to be positively correlated with board structure (Samaha, Dahawy, Hussainey and Stapleton, 2012). Accordingly, firm size is included as a control variable and is measured as the log of total assets in the analysis year[1] (Gamerschlag *et al.*, 2011; Haniffa and Cooke, 2005).

3.4 Empirical model

To examine the relationship between the explanatory variables tested in this study and corporate CSR disclosures, multiple regression analysis is used. A multicollinearity test was first performed to examine collinearity among variables. The core regression model is presented below:

$$\text{CSRD} = \beta_0 + \beta_1 \text{FBOD} + \beta_2\ \text{FShare} + \beta_3 \text{Duality} + \beta_4 \text{Bsize} + \beta_5 \text{Bindep} + \beta_6 \text{Fsize} + \epsilon$$

where CSRD = corporate social responsibility disclosure score index, FBOD = percentage of foreign board members, FShare = percentage of foreign shareholders, Duality = dummy variable; 1 if CEO duality exists, 0 otherwise, Bsize = number of board members, Bindep = percentage of independent board members, Fsize = size of the firm represented by total number of employees and ϵ = error term.

4. Results and implications

4.1 Tests of variances: CSR disclosure levels

Figure 1 presents a graphical representation of the environmental and social disclosures for the three countries analyzed in this study. As shown in the figure, differences between the CSR disclosure scores of Egypt, Germany and the USA are apparent. To determine the statistical significance of the differences in the CSR scores of the three countries, a Kruskal-Wallis non-parametric test is performed given the non-normality distribution of the data. The results reveal a statistically significant difference between the CSR disclosures of the three groups examined ($H = 56.132$, $p < 0.01$), with a mean rank of 15.21 for Egypt, 62.98 for Germany and 53.35 for the USA.

German companies exhibit the highest CSR disclosures scores on both the environmental and social levels. This may be due to the high degree of corporate engagement with investors in Germany compared to the USA (Campbell, 2006). Campbell (2006, p. 934) argued that "corporations will be more likely to act in socially responsible ways if they are engaged in institutionalized dialogue with unions, employees, community groups, investors, and other stakeholders." This is also consistent with previous studies that revealed higher CSR disclosures in Europe than in the USA (Meek *et al.*, 1995; Saida, 2009; Michelon, 2011). Matten and Moon (2008) argued that the institutional reordering in Europe has increased European companies' discretion in areas like education, health, energy and social services. However, it should be noted that this mainly applies on large companies in Europe rather than on small and medium enterprises. The CSR disclosure levels in Egypt are the lowest compared to that of Germany and the USA. This may reflect the fact that Egypt is a developing country (GDP per capital $3,436.3 in 2014) compared to Germany (GDP per capita 47,627.4 in 2014) and the USA (GDP per capita $54,629.5 in 2014) (The World Bank Group, 2015). This is consistent with previous literature that suggests that the social responsibility is practiced more by corporations operating in developed countries since such practices exceed the basic needs of developing societies that need to be fulfilled first (Jones, 1999).

Table III shows the detailed CSR reporting by category for each of the analyzed countries. In all three countries, social-related CSR disclosures combined are higher than environmental disclosures. However, as shown in the table, the social category does not only refer to "society" but also includes social aspects related to labor, human rights and product responsibility. Consistent with previous CSR studies in developing countries (Jamali and Mirshak, 2007; Amaeshi *et al.*, 2006), the society category of CSR is the most disclosed among sample Egyptian companies representing around 63 percent of total Egyptian CSR disclosures.

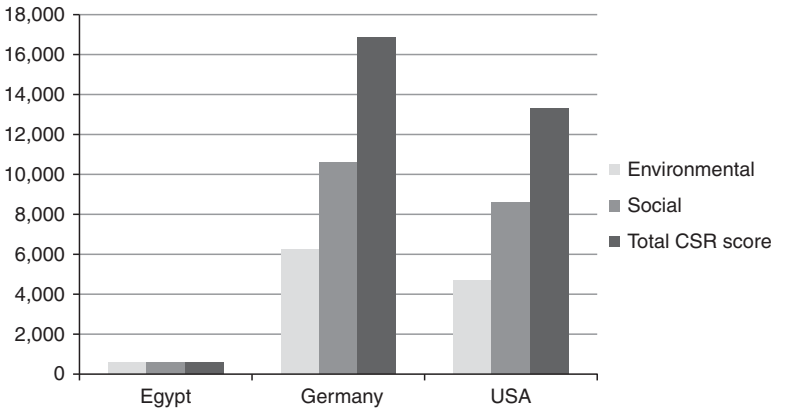

Figure 1.
CSR disclosure levels in Egypt, Germany and the USA

Yet, this finding is inconsistent with Hanafi (2006) who found that employee-related CSR disclosures were the highest among Egyptian companies in the period between 1998 and 2001. This may then indicate a recent shift in CSR initiatives related to community development. The labor practices category represents the second highly disclosed category (around 22 percent), yet still relatively low compared to the society category. Although regulations related to disclosures of employee-related CSR information are the highest as compared to other mandatory CSR disclosures in Egypt, compliance of Egyptian companies with all legally required employee information is highly deficient (Hanafi, 2006). Regulations are important institutional factors that influence the social behavior of companies (Campbell, 2006). However, the enforcement of such regulations depends on the level of economic development (Jones, 1999). Also, the little attention given to the environmental, human rights and product responsibility categories of CSR in Egypt may reflect the weak institutional environment generally present in developing countries (Amaeshi *et al.*, 2006).

In Germany, the highest percentage of CSR hits relates to the environmental category representing around 37 percent of total CSR hits found in sample German corporate reports. This is followed by the society category (around 30 percent) and labor practices (26 percent). These findings are close to the findings of Chen and Bouvain (2009) who showed that German companies placed high importance on social and environmental issues followed by employee-related issues. Accordingly, while environmental issues remain central, a clear emphasis is placed on the environment, society and labor categories of CSR disclosures among sample German companies. American companies show equal high emphasis for the environment and society categories with each representing around 35 percent of total CSR disclosures made by sample US companies. Labor practices are also central representing around 20 percent yet are still relatively less important than environment and society. This finding is partially consistent with Chen and Bouvain (2009) who found that US companies placed relatively higher emphasis on community- and employee-related issues. However, unlike the findings of this study, environmental issues were less focused on by American companies examined in their study.

Overall, although differences appear between the CSR practices of German and US companies, their CSR disclosure levels are adjacent compared to that of Egypt. This can be explained by the presence of institutional factors such as non-government and other independent organizations and industry self-regulation that promote corporate social behavior in such countries.

4.2 Descriptive statistics and correlations

Table IV displays the descriptive statistics of the variables for all sample companies as well as per country. As mentioned in the previous section, the CSR scores in Egypt are the lowest compared to Germany and the USA. This is depicted by the mean scores for sample companies in each country. The table also shows that some Egyptian companies do not have any CSR disclosures as represented by the minimum score value of 0.

	Egypt		Germany		USA	
CSR category	Hits	%	Hits	%	Hits	%
Environment	56	12	6,258	37.1	4,681	35.2
Labor practices	101	22	4,377	26	2,625	19.8
Human rights	13	3	1,130	6.7	1,249	9.4
Society	288	63	4,996	29.6	4,696	35.4
Product responsibility	0	0	101	0.6	32	0.2
Total number of CSR hits	458	100	16,862	100	13,282	100

Table III.
Corporate reporting per CSR category

The mean scores of the corporate governance structure variables also show differences between companies specifically in the percentage of independent board members. The table shows that sample Egyptian companies have the lowest percentage of independent board members (6.2 percent), followed by sample German companies (12 percent). Yet, sample American companies exhibit a high level of board independence representing an average of 91 percent. Also, the leadership structures, as represented by CEO duality, are different between sample companies in the three countries. The percentage of unified leadership structures across the three groups reveals that all sample German companies experience no CEO duality while 60 percent of sample American companies and around 54 percent of sample Egyptian companies have unified leadership structures. The separate leadership structure found in all sample German companies can be explained by the two-tiered system in Germany that strictly separates between the tasks of the executive and supervisory boards (Veen and Albertsen, 2008). Also, the high concentration of CEO power in American companies has led the New York Stock Exchange to add in its listing standards, as a counterbalance, that independent board members should be a majority in listed companies (Aguilera *et al.*, 2006). This is consistent with our findings that reveal a high percentage of board independence in sample American companies compared to Egyptian and German companies.

The mean scores of the diversity variables for sample companies in Egypt, Germany and the USA are also provided. As shown in the table, sample companies in the three countries exhibit low levels of foreign board members. Yet, board diversity in sample Egyptian companies (35 percent) is higher than that of sample German (20 percent) and American (19 percent) companies although sample Egyptian companies have the lowest board size. This finding is inconsistent with previous studies that found that larger boards tend to have more board diversity (Brammer *et al.*, 2007; Carter *et al.*, 2003). On the other hand, the percentage of foreign shareholders is much lower for sample Egyptian companies (25 percent) compared to their counterparts in Germany (69 percent) and the USA (82 percent). This may be due to the high multinationality of German and US companies as opposed to Egyptian ones.

Table V shows the correlations between the tested variables of the study. As shown in the table, the highest correlation between any of the main independent variables is 0.581 which is lower than the cut off value of 0.9. Also, the highest variance inflation factor value is 2.414 lower than the cut off value of 10 (Pallant, 2005). Accordingly, no multicollinearity problems exist between the independent variables. The table also shows strong significant correlations between the control variable, country of origin and the dependent and independent variables.

4.3 Regression analyses

4.3.1 A comprehensive regression analysis of examined CSR drivers for all sample companies in Egypt, Germany and the USA. The first stage of data analysis involved combining

Construct	All sample ($n = 88$) Mean	SD	Egypt ($n = 28$) Min.	Max.	Mean	Germany ($n = 30$) Min.	Max.	Mean	USA ($n = 30$) Min.	Max.	Mean
CSR score	347.78	359.36	0	206	16.43	140	1,237	562.07	33	1,302	442.77
Board size	12.99	4.26	5	23	10.89	6	22	15.8	8	16	12.13
Board independence	0.37	0.42	0	0.44	0.062	0	0.76	0.12	0.71	1	0.91
Foreign BOD	0.25	0.17	0	0.70	0.35	0	0.5	0.20	0	0.71	0.19
Foreign shareholders	0.59	0.29	0	0.91	0.25	0.25	0.93	0.69	0.49	1	0.82

Table IV.
Descriptive statistics of variables in total and per country

Note: The table does not include the CEO duality categorical variables; however, a brief description of the differences between sample countries regarding this variable is provided in this section

	1	2	3	4	5	6	7	8	9
(1) Foreign BOD	1								
(2) Foreign shareholder	−0.3314***	1							
(3) CEO duality	0.2162**	−0.1275	1						
(4) Board size	−0.2022*	0.1536	−0.2456**	1					
(5) Board independence	−0.2009*	0.5808***	0.2636**	−0.1216	1				
(6) Institutional own	−0.1857*	0.2541**	−0.0464	0.1206	0.2676**	1			
(7) Firm size	−0.2716**	0.6543***	−0.0952	0.2029*	0.5806***	0.3785***	1		
(8) Country of origin	0.4218***	−0.7983***	0.2596**	−0.3378***	−0.5080***	−0.3715***	0.7770***	1	
(9) CSR score	−0.2982***	0.4399***	−0.2598**	0.3293***	0.2012*	0.1532	0.4837***	−0.6335***	1

Note: *,**,***Significant at the 10, 5 and 1 percent levels, respectively

Table V.
Correlation matrix for constructs

Egyptian, German and US companies in one regression model and testing the effects of diversity and corporate governance variables on CSR reporting while controlling for country effects[2]. As shown in Table VI, the results of Model 1 reveal insignificant effects of all explanatory variables examined on CSR reporting except for the country variable. This general analysis shows that the country variable is the only relevant variable explaining variations in the CSR disclosure scores of the three countries examined. This provides support for *H1* and implies economic and institutional differences between developing and developed countries, specifically Egypt, Germany and the USA. Accordingly, separate regression models were run for Egyptian and US/German companies.

4.3.2 Test of separate models: diversity and corporate governance structure as drivers of CSR reporting for German/US vs Egyptian companies. The results of the separate regression models are shown in Table VII[3]. Model 2 examines the effects of the diversity and corporate governance variables on the CSR reporting of sample US and German companies. The results show insignificant influences of all explanatory variables on CSR reporting. This indicates that organizational-level factors, specifically diversity and corporate governance structure, may exhibit distinct roles in promoting CSR disclosures in different institutional contexts. In industrial countries, such as the USA and Germany, these factors may play only a minor role (if at all) in influencing CSR disclosures in the presence of well-established institutional systems, strong economies and high levels of awareness.

	Model 1 (all countries)
Constant	408.301
Foreign BOD	−70.188 (0.723)
Foreign shareholders	−150.352 (0.417)
CEO duality	−29.514 (0.688)
Board size	6.730 (0.411)
Board independence	−77.649 (0.485)
Institutional ownership	−146.880 (0.283)
Firm size	10.258 (0.573)
Country of origin	−536.303 (0.000)***
No. of observations	88
R^2	0.4418
Adj. R^2	0.3853
p-value	0.000***

Note: *,**,***Significant at the 10, 5 and 1 percent levels, respectively

Table VI.
Regression analysis: comprehensive model

Table VII.
Regression analysis: separate models

	Pred. sign	Model 2 (US/Germany)	Model 3 (Egypt)
Constant		304.879	−205.619
Foreign BOD	*H2* (+)	−135.348 (0.644)	147.743 (0.000)***
Foreign shareholders	*H3* (+)	−169.763 (0.580)	−36.515 (0.199)
CEO duality	*H5* (+)	−52.066 (0.701)	12.993 (0.256)
Board size	*H4* (+)	12.173 (0.400)	−0.352 (0.753)
Board independence	*H6* (+)	−45.458 (0.783)	172.475 (0.001)***
Institutional ownership	*H7* (+)	−341.131 (0.237)	−49.138 (0.006)***
Firm size		16.856 (0.599)	8.535 (0.002)***
No. of observations		60	28
R^2		0.093	0.738
Adj. R^2		−0.029	0.646
p-value		0.620	0.000***

Note: *,**,***Significant at the 10, 5 and 1 percent levels, respectively

While the study done by Harjoto *et al.* (2015) shows that the diversity of board members of 1,489 US companies increased their overall CSR performance, this variable played a role in reducing CSR concerns rather than increasing CSR strengths. Also, the findings of Boesso and Kumar (2007) support our corporate governance findings in the USA and Germany. Their study examined the influence of corporate governance structure on the voluntary disclosures of companies operating in Italy and the USA and found that voluntary disclosures are not driven by internal governance mechanisms. Rather, corporate emphasis on stakeholder engagement represented the only within-company factor influencing voluntary reporting in both countries.

Model 3 tests the effects of diversity and corporate governance structure on the CSR reporting practices of Egyptian companies. As shown from Table VII, the explanatory power of Model 3 is high (adjusted $R^2 = 0.646$). This indicates that 64.6 percent of the variance in the CSR reporting practices of sample Egyptian companies can be explained by the model. The results of the model show insignificant influences of foreign shareholders, CEO duality and board size. Accordingly, *H3-H5* are not supported. Yet, the results suggest that higher levels of board diversity, board independence and firm size lead to more CSR disclosures providing support for *H2* and *H6*. Consistent with previous studies on board diversity and CSR (Muttakin *et al.*, 2015; Khan, 2010), the results indicate that foreign directors can play an important role in supporting the CSR reporting strategies of companies operating in a developing country context. The results also support previous studies in developing countries that show significant positive influence of board independence (Chau and Gray, 2010; Khan *et al.*, 2013). This may indicate that companies are more likely to emphasize societal interests when boards are dominated by independent directors (Khan *et al.*, 2013; Haniffa and Cooke, 2005). The study also supports previous studies that show that larger firms tend to disclose more CSR information (Khan *et al.*, 2013; Muttakin and Khan, 2014).

The results of Model 3 also show a significant negative influence of institutional ownership on CSR reporting in Egypt. Hence, *H7* is not supported. This is inconsistent with previous studies in developing countries that suggest a positive association between both variables (Oh *et al.*, 2011; Saleh *et al.*, 2010). Yet, the institutional ownership variable includes not only the percentage of shares owned by banks, mutual and pension funds and financial companies but also corporate groups and the government. While, government equity holdings in sample Egyptian companies were mild, corporate groups acted as controlling or substantial shareholders of more than 50 percent of the Egyptian companies examined. Based on that, the institutional ownership variable was subdivided into two separate variables: one representing the institutional ownership of corporate groups and the

government and the other representing the institutional ownership of the remaining institutions. When the regression model was run again, the effect of the ownership of corporate groups and the government remained significantly negative ($\lambda = -57.823$, $p = 0.007$) while the effect of the other institutions became insignificant ($\lambda = -37.680$, $p = 0.111$). This indicates that institutional ownership of corporate groups and the government drives the general significant negative influence of the institutional ownership variable while the effects of the other institutions are insignificant. In many developing countries, having companies with family dominance or controlling/substantial shareholders is commonplace. Accordingly, the influence of other institutional investors is secondary and almost lacking (Khan *et al.*, 2013; Reed, 2002). Such an institutional weakness may represent a potential restriction to genuine CSR reporting strategies in Egypt.

5. Summary and conclusions

This study contributes to the CSR research field by comparing differences in the CSR disclosure practices and drivers of Egypt, as a developing country with that of developed countries, namely, the USA and Germany. Taken from an institutional perspective, the paper also examines the role of organizational-level factors, specifically diversity and corporate governance structure, in driving the CSR disclosure practices in a developing country context. The results are mostly consistent with institutional theory where the effects of diversity and governance structure, observed mainly by foreign BOD, board independence and institutional ownership, are found to be significant on the CSR disclosure levels of Egyptian companies only. This indicates that the influence of organizational-level factors on CSR is highly dependent on the institutional context where companies operate.

Differences in the environmental and social disclosures of sample companies in the three analyzed countries are also compared. The test of variances shows a statistically significant difference in the level of CSR disclosures in Egypt, Germany and the USA. The disclosure levels of sample Egyptian companies are found to be the lowest. This may reflect the weak economic and institutional conditions in Egypt compared to Germany and the USA. A country's level of economic development may influence the level of information disclosed in corporate reports as less CSR disclosures are expected when basic economic needs are not fulfilled. Also, the weak institutional environment represented through low enforcement of regulations, weak self-regulatory systems and the like hinder businesses in developing countries from actively pursuing social responsibility practices. German companies, on the other hand, exhibit the highest CSR disclosures scores.

The results of the comprehensive regression model (Model 1) show that corporate governance structures are driven by country effects. This may indicate differences in the organizational-level factors driving CSR reporting in developing vs developed countries. The results of the separate models further support that argument and imply that corporate governance structure and board and shareholder diversity drive CSR (disclosure) practices in neither the USA nor Germany (Model 2). On the other hand, the percentage of foreign board members, independent directors, institutional ownership and firm size was significant predictors of CSR disclosures of sample Egyptian companies (Model 3). It could then be argued that the level of Egyptian corporate social reporting can be enhanced by integrating more foreign and independent board members in corporate board structures and by reducing the percentage of corporate and government ownership.

This study has a number of limitations. First, the results of the study are based on a one-year observation of the governance and CSR disclosure practices of sample companies in Egypt, Germany and the USA. Longitudinal studies would provide more insight into how changes in diversity and governance structures may influence the development of CSR reporting over time. Second, the sample size of the study is limited, specifically for the separate models examined, and is mainly focused on large listed companies. A larger sample

size can be considered in future research. Also, to improve the generalizability of the study, further research can explore cross-country differences in CSR disclosures of large and small and medium corporations. Third, although annual reports are considered as the main communication tool used by corporations, other corporate communication media, such as corporate websites, should be considered in future research. This is particularly important for developing countries, such as Egypt, where incidences of CSR disclosures on websites only have been found in sample Egyptian companies. This may indicate that corporate websites in Egypt may be a major means of communicating corporate CSR information. Finally, the content analysis approach used in this study provides only quantities of CSR disclosures. A more detailed content analysis approach can be utilized by future research that determines not only the quantity but also the quality of CSR information disclosed including the nature of information and type of CSR news disclosed.

Notes

1. The currencies of total asset values were unified to the Egyptian pound then the log of total assets was computed.
2. The standardized residuals of the comprehensive model are not normally distributed according to the Kolmogorov-Smirnov normality test ($z = 1.550$; $p = 0.016$).
3. The standardized residuals of the two separate regression models are normally distributed according to the Kolmogorov-Smirnov normality test ($z = 1.195$; $p = 0.115$ for Model 2 and $z = 0.548$; $p = 0.925$ for Model 3).

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Further reading

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Eco-capability role in healthcare facility's performance

Natural-resource-based view and dynamic capabilities paradigm

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Abstract

Purpose – With the exponential growth of problems linked to the natural environment, healthcare facilities are increasingly faced with ecological challenges in their operations. In this regard, they progressively need to improve their environmental performance like other industries in recent years. Applying the natural-resource-based view (NRBV) and dynamic capabilities literature, the purpose of this paper is to investigate this eco-capability which fully leverages human, relationship, and technology resources.
Design/methodology/approach – Applying the NRBV and dynamic capabilities literature, this paper investigates this eco-capability which fully leverages human, relationship, and technology resources. Using survey data from staffs across 15 hospitals in north of Iran, researchers estimated a latent moderated structural model that provides support for these three resource components.
Findings – Results obtained from structural equation analysis revealed that human, technology, and relationship resources have positive impact on eco-capability. Also eco-capability has positive impact on market and financial performance and the perceived quality of the hospital's offering.
Research limitations/implications – As the model consist just of three kinds of resources, future studies could include examining the effect of additional resources and other internal and external factors on eco-capability.
Practical implications – This paper includes suggestions for facility's managers to develop environmental strategy in three areas: human, technology, and relationship resources.
Originality/value – The role of eco-resources has been used only rarely to investigate organization capability and performance. This paper includes suggestions for facility's managers to develop environmental strategy in three areas: human, technology, and relationship resources.

Keywords Dynamic capabilities, Eco-capability, Human resource, Natural-resource-based view, Relationship resource, Technology resource

Paper type Research paper

1. Introduction

Organizations currently symbolize a major threat to the natural environment due to the great quantity of waste generated, and their increased consumption of resources. However, they are also key players in environmental protection (Fraj *et al.*, 2015). Attention to natural environment in the last few decades has changed the way service and manufacturing organizations operate in domestic as well as international markets (Miles and Covin, 2000; Maleki Minbashrazgah *et al.*, 2017). For example, governments imposed more regulations that protect the natural environment; market segments sensitivity to ecology matters rises; the competition based on green and other socially responsible elements becomes means for differentiation (Varadarajan, 2014); many companies began viewing environmental problems as potential opportunities to exploit by incorporating into their products and practices the actual environmental attributes and ethical qualities and information about firm's performance by social network spreads rapidly (Varadarajan, 2014).

In response to this new era, academic research on environmental marketing/management has expanded to cover subjects like environmental resources and capabilities, environmental product development, and performance effects of environmentally driven strategies

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(Dangelico, 2015; Gabler *et al.*, 2015; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015; Singh *et al.*, 2014; Leonidou *et al.*, 2013; Ozturk and Eraydın, 2010). But the related literature has been silent on two critical matters surrounding environment-related phenomena.

First, environmental studies have focused mainly on manufacturing firms, while the health industry is receiving much less attention. However, investigating the green practices of healthcare facilities is of paramount importance because they are usually major consumer of resources with potential harmful effects on the environment. Hospitals in the process of treating patients operate 24 hours a day, 365 days a year, and they consume a lot of water and energy and generate a lot of waste from medical products, protective drapes, and packaging. Many newly built or renovated healthcare facilities around the world do not just look after their patients, they look out for the environment as well; they rely on ecological aspects of their services offering to influence the level of satisfaction in patient experience (Saidur *et al.*, 2010) and they increasingly confront stricter environmental regulations, requiring greater incorporation of sustainability elements in their operations (Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015).

Second, only by improving competitiveness can a development be sustained in the volatile economic conditions imposed by globalization, necessitating both economic efficiency and high environmental quality among the different actors involved in (Ozturk and Eraydın, 2010), but the factors leading to the creation of an eco-capability and performance remain vague. Researchers have examined the performance outcomes of the firm's environmental behavior to some extent (Gabler *et al.*, 2015; Singh *et al.*, 2014), as regarding knowledge of how eco-capability can enhance the firm's overall performance is limited (Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015).

This study aims to clarify these crucial issues by developing and testing a model of organizational resources driving an eco-capability and performance grounded on resource-based view (RBV) and dynamic capabilities paradigm in healthcare industry. The natural-resource-based view (NRBV) of firms states that firm's ability to implement strategies successfully depends on its capacity to build and operate resources better than competitors (Andrews, 1971; Chandler, 1962; Penrose, 1959). Dynamic capabilities paradigm posit that over time organizations can complement, create, and reshape internal and external ability to address environmental volatility and generate new forms of advantage (Teece *et al.*, 1997). The dynamic nature of these capabilities provide the firm to acquire, combine, and transform resources in various ways, so as to adjust constantly changing market conditions and bid values of strategic intent (Morgan *et al.*, 2012). In essence, dynamic capabilities are alternatives for exercising organizational resources, upgrading their status, and even safeguarding their strict existence. In short, they act as connecting means that help the firm effectively adjust to changes in the overall environment, boost its competitive edge, and improve its performance (Krasnikov and Jayachandran, 2008). To reach these aims, the study specifically focuses on two key research questions:

RQ1. How can different organizational resources of a healthcare facility, namely human, technology, and relationship resources, help create an eco-capability?

RQ2. How can such capability, which is derived from the adoption of an eco-based behavior (such as pollution control, energy saving, and recycling), enhance the healthcare facility performance?

This research integrates theory and findings on organizational resources to better understand the drivers of healthcare facility success associated with environmental initiatives. It posits that by leveraging these three key resources, healthcare facilities can create an eco-capability which has the potential to reinforce firm market and financial performance, as well as the

perceived quality of its offerings. Then it presents the conceptual model of the study and formulates a set of research hypotheses. The next section addresses the research methodology adopted, followed by an explanation of the data analysis undertaken and discussion of the results related to each of the hypotheses tested. Finally, it concludes with practical implications for management as well as directions for future research.

2. Review of literature and research hypotheses

2.1 RBV of the firm

In proposing our model, we use the NRBV of the firm as our theoretical foundation (Hart, 1995), which is itself based on the RBV of the firm. The RBV posits that when firm resources are economically valuable, relatively rare, difficult to imitate, and imperfectly mobile across firms, they can explain the differences in firm performance (Ruivo *et al.*, 2015) and be the basis of enterprise competitiveness and economic rent (Lin and Wu, 2014).

RBV is always the base for marketing strategy research because of the relationship between resource deployment and performance (Lin and Wu, 2014; Kim *et al.*, 2015). It is particularly well suited to investigations involving green strategy and sustainability (Hult and Tomas, 2011). Newbert (2007) also suggests that value and rare resources are linked to competitive advantage and that competitive advantage is linked to performance.

Resources contain basic resources and higher-order resources (Madhavaram and Hunt, 2008). Higher-order resources are understood as package of basic resources and are made up of compound of tangible and intangible basic resources that work together coherently in a synergistic manner to empower organizations to meet their goals. They are also usually named as competences or capabilities (Evans *et al.*, 2006).

Hart (1995) extends the definition of RBV, recognizing that firms that are overcommitted to a specific pack of resources may find it difficult to obtain new resources or capabilities. Firms must be competent to react to changing environmental imperatives by development of new resources. Hart argues that "one of the most important drivers of new resources and capability development for firms will be the limitations and challenges posed by the natural (biophysical) environment." So, the NRBV of the firm is an adaptation of the RBV of the firm, made essential because of the demands burdened by the natural environment.

2.2 Dynamic capabilities and building eco-capability

Expanding from RBV, dynamic capabilities research concentrates not on firm resources *per se*, but on how well firms make new resources or improve existing ones to meet their goals (Eisenhardt and Martin, 2000; Helfat and Peteraf, 2003). A capability is supposed dynamic when it boosts a firm's ability to make decisions, solve problems, recognize opportunities and threats, and alter existing resources (Barreto, 2010). Pursuant to prior literature, Helfat *et al.* (2007) offer a simple but integrated definition that dynamic capabilities are the capacity of an organization to purposefully create, expand, or improve its resource base.

D'Aveni *et al.* (2010) also emphasize the importance of dynamic arrangement capability for short-term competitive advantages to face with a hyper-competitive environment, in which resources are hard to obtain. Liboni *et al.* (2017) conduct a systematic review and a future agenda toward sustainability as a dynamic organizational capability. Research highlights current lack of research integrating both themes. Nidumolu *et al.* (2009) forecasted that sustainability would be the stimulus of new product development for the predictable future. Indeed, there is enhancing innovation and new product development in green areas such as recycling and remanufacturing, energy conservation, pollution reduction, and renewable energy (Bing *et al.*, 2013; Lubin and Esty, 2010; Pujari *et al.*, 2004), But for most firms, these resources have not interpreted to capabilities (Nidumolu *et al.*, 2009), which demonstrated a significant gap and a pressure challenge for marketing scholars. Hart (1995) proposes that a

firm can foster a capability based on its interplay with the natural environment. Drawing from the literature, an eco-capability would set the environmental resources within the firm so that they are innate from the firm itself (Teece, 2009), and use these resources to raise the productivity of other firm resources (Helfat and Peteraf, 2003). Then, an eco-capability is a multidimensional construct depending on the possession, application, and utilization of suitable resources that decreases ecological impact while creating value and improving firm performance (Ngo and O'Cass, 2009). Environmental vision about planning and organization can aid firms to develop an organization-wide approach to unify sustainability in all organizational mechanisms. Administration of such formalized criteria for environmental management assists firms to attain higher environmental and economic performance (Singh *et al.*, 2014). Building upon the aforementioned studies and the work of Gabler *et al.* (2015), Leonidou, Leonidou, Fotiadis, and Aykol (2015), and Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas (2015), we define an eco-capability as a firm's capacity to deploy environmental human, relationship, and technology resources to enhance firm performance and conserve the natural environment.

2.3 Human resources

2.3.1 Top management green sensitivity (MGS). A vital driving force behind crafting an eco-capability is top management's sensitivity to green issues (Banerjee *et al.*, 2003; Pujari *et al.*, 2004). The reason being managers are accountable for setting objectives, policies, and procedures that smooth the way toward proper adoption of green initiatives in the corporation, and even more embarking on a more proactive method of ecological problems that typically involves significant investments in both resources and capabilities (Drumwright, 1994); cultivating organizational values that facilitate actions such as collecting environmentally related information from the market and industry, encouraging a shared diagnosis of ecological subjects among employees, and effectively answering to the ecological needs of buyers/patients (Stone *et al.*, 2004); depicting environmental elements in key processes critical to achieving a market-oriented organization (Pujari *et al.*, 2004); and coordinating environmental initiatives, backing these initiatives by appointing the proper individuals to supervise the firm's green activities, training employees to consider about environmental topics, and motivating personnel to becoming more ecologically conscious through the provision of incentives (Banerjee *et al.*, 2003). Indeed merging environment management and human resource management to explain the role that green human resource management process plays in people management practice (Renwick *et al.*, 2012) involves both traditional human resource practices (recruitment, selection, performance evaluation, training, and rewards) aligned with environmental goals and "strategic dimensions for HRM" (Jabbour *et al.*, 2010) or "new forms of work organization" (Longoni *et al.*, 2014), such as organizational culture (Gupta and Kumar, 2013), teamwork (Jabbour *et al.*, 2013), and employee empowerment (Daily *et al.*, 2012).

2.3.2 Organizational learning. Researchers have figured that organizational learning is related to the development of new knowledge, which will be crucial for a firm's capability and performance. Some researchers have dedicated to the commitment to learning, shared vision, and open-mindedness in organizations (Renwick *et al.*, 2012; Jabbour and Jabbour, 2016), while other researchers have emphasized interactions with other customers, firms, and institutions (Capello and Faggian, 2005; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015; Fraj *et al.*, 2015).

Organizational eco-learning capability refers to the firm's ability to acquire, process, and make use of information to better sense environmentally related issues such as new green technologies, evolving regulatory frameworks, and changing consumer ecological needs (Sharma *et al.*, 2004). This knowledge is critical in adopting new approaches in decision

making, executing specialized duties, and extension resources backing the organization's ecological initiatives (Russo and Fouts, 1997). Such initiatives may include, for instance, the development of eco-friendly innovations, training employees to be more ecologically oriented, and promoting a proactive green thinking (Sharma and Vredenburg, 1998). Additionally, it helps the firm achieve a competitive advantage, by better understanding how to deal with ecological risks, comply with environmental regulations, and adopt new green advanced technologies (Sharma *et al.*, 2004). This is critical for operating in multiple markets due to the high uncertainty, volatility, and diversity of the business enterprise environment, which can make decisions regarding green-related issues more complicated, costly, and risky (Christmann, 2004; Pinkse *et al.*, 2010):

H1. The human resources (composed of (a) top MGS and (b) organization learning) have impact on hospital eco-capabilities.

2.4 Technology resources

2.4.1 Eco-innovativeness. Kemp and Pearson (2008) explained eco-innovation as the production, application, or exploitation of a merchandise, service, organizational structure, production process, management, or business method that is pioneer to the firm or user and which results, throughout its life cycle, in a reduced amount of environmental risk, pollution, and the negative impacts of resource use in comparison to relevant alternatives. It identifies to wide variety of innovations like renewable energy technologies, waste management equipment, pollution prevention schemes, eco-design buildings, and the adoption of biological materials (Kemp, 2010). For instance, to prevent improper disposal of waste materials, hospitals are adopting new dumping technologies. Many hospitals are sterilizing items and installing waste disposal systems to minimize the effect on environment (Çakir *et al.*, 2012).

Developing a capability from resources involves making those resources dynamic or affecting some "action" for their possession (Teece, 2007). Indeed, in a commerce landscape dominated by innovation, capabilities also necessitate the integration of technology into resource deployment (Powell and Dent-Micallef, 1997; Teece *et al.*, 1997). Therefore, organizational innovativeness can reflect something that is new to the industry and/or the client, and is an important dynamic capability itself (Gebauer, 2011). These capabilities become evident when firms learn to accomplish something well, such as designing new services or developing effective policy (Spring and Araujo, 2013). Moreover, these capabilities become dynamic once they connect with the environment and/or change over time to accommodate the requirements of stakeholders. Thus an institute must persistently be innovative by upgrading its capabilities to keep competitive (Mahoney, 1995).

2.4.2 Eco-technology sensing/response. Eco-technology sensing/response mirrors the extent to which a firm is aware of new technological developments linked to ecological matters and the speed of adopting such technologies (Sharma *et al.*, 2007). A firm's capability to sense and answer to external technology developments is crucial in the present turbulent technology environments for several reasons: First, technological change is really a principal driver of competition destroying monopolies, creating new industries and delivering products and services in obsolete markets (Day and Schoemaker, 2000). Second, in the current environments of digitally networked, market and technologies may move too quickly for a firm to succeed with a technique that counts only on in-house technology development. Third, intrinsic to the procedure of technology development is the fact that it is difficult to predict which of several different technology options under development will ultimately succeed commercially (Utterback, 1994).

Additionally, eco-friendly technologies are unique since they change rapidly, involve significant investments, and vary from conventional technologies, while their application

cuts across many areas, including energy/water conservation and waste reduction to new green service development and recycling materials (Shrivastava, 1995). Rapid adoption of new eco-friendly technologies helps firms reduce the degree of uncertainty surrounding green-related investments and gain differentiation and low-priced advantages against rivals (Sharma *et al.*, 2007):

H2. The technology resources (composed of (a) eco-innovativeness and (b) eco-technology sensing/response) have impact on hospital eco-capabilities.

2.5 Relationship resources

2.5.1 Internal factors. 2.5.1.1 Organizational green culture/shared vision. Shared vision, that is the existence of common ideas, commitment, and dedication between the firm's employees toward the achievement of eco-organizational objectives (Aragon Correa *et al.*, 2008), implies that members of the institute hold a collective belief in the strategic role of environmental issues in creating a sustainable enterprise model (Ramus and Steger, 2000). Cultivating green values and norms among employees, such as social accountability, environmental supervision, and sustainable expansion, is a key capability that helps the firm to better gather, organize, and use organizational resources to develop sustainable practices (Sharma *et al.*, 2004). The adoption of eco-friendly practices necessitates radical changes in new technologies, equipment, and procedures, which are doomed to fail without the entire comprehension of and support from everybody in the organization (Russo and Fouts, 1997). Via shared diagnoses and discussions of varied ecological trade-offs, employees can develop collective thinking and commitment to these matters more effectively and efficiently than competitors (Aragon Correa *et al.*, 2008).

2.5.1.2 Cross-functional integration. Environmental issues because of their complex, dynamic, and costly nature requires cross-functional integration in the institute, expressed in the shape of intensive interactions among employees from different functional areas (Stone *et al.*, 2004).This interaction facilitates the ongoing exchange of ideas/knowledge, the quick sharing of information, and the joint collaboration in activities that may help exploit opportunities and avoid threats linked to ecological issues (Stone and Wakefield, 2000). Specifically, cross-functional coordination in a global chain is vital in attaining a benefit in sensing and accommodating green customer requirements; perception competitors' movements that incorporate green elements; extending new eco-friendly products and services; accepting innovative environmental management technologies; and conforming to existing and new environmental legislation (Sharma *et al.*, 2004). In eco-friendly healthcare facilities, the goal of medical integration is to announce higher quality, more cost-effective client services by much better collaborating care throughout a continuum of conditions, service providers, setups, and time toward environment. By exercising medical integration, medical facilities can attain compliance with healthcare reform regulation, serve clients better, and run more successfully in a world where lasting sustainability will count on regularly accomplishing much better results at lower expenses (Çakir *et al.*, 2012).

2.5.2 External factors. 2.5.2.1 Environmental public concern (EPC). A crucial relationship resource determining a firm's responsiveness to the environment is people's growing concern about green matters (Banerjee *et al.*, 2003). Various parties have become interested in protecting the environment, including political stakeholders, pressure groups, economic entities, and other members of the community (Banerjee *et al.*, 2003). These factors will also be subject to stakeholders' propensity to exert authority to punish the firm's environmental insensitivity and to the severity of the punitive measures that may potentially be imposed consequently of environmental misconduct (Schlegelmilch *et al.*, 1996). Public environmental subjects motivate firms to more ecologically conscious in their business strategies to emphasize their socially responsible behavior to various interested parties, such as government power, shareholders, and

citizens; present a green corporate image in order to attract customers that are environmentally sensitive; and prevent the negative impact of measures such as paying green penalties, suffering client boycotts, and facing government intervention (Banerjee *et al.*, 2003).

2.5.2.2 Building relationships. Building relationships with suppliers, clients, and other parties can also be a vital organizational capability because it can help the firm to better understand and effectively accommodate the green requirements of varied environmentally sensitive groups well before the competition (Rodriguez-Diaz and Espino-Rodriguez, 2006). Businesses with this specific capability are often in a much better position to monitor and swiftly answer the demands of green consumers through their wide network of partners (Banerjee *et al.*, 2003). They likewise have the chance to create strategic alliances with other firms to collectively handle ecological matters, share investment expenditures, exchange expertise and knowledge, and better face pressures from different stakeholders (Ozturk and Eraydin, 2010). In fact cultivating links with various stakeholder groups (e.g. insurance) and responding to their ecological requests are particularly crucial in the healthcare systems because they directly modify the degree and nature of demand (Shaalan, 2005):

H3. Relationship resources (composed of (a) internal factors and (b) external factors) have impact on hospital eco-capabilities.

3. Eco-capability and firm performance

Finally, we investigate how an eco-capability pertains to two interrelated outcomes – market and financial performance (Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015). These performance metrics are particularly relevant in this study because firms in many cases are enthusiastic about assessing whether their environmental investments supply a worthwhile financial return, and help to accomplish a more substantial part of the market. Furthermore, because green offerings can occasionally carry a stigma of lowness (Lin and Chang, 2012), we also investigate quality of the firm's offerings (Gabler *et al.*, 2015). Quality is really a multidimensional concept with various definitions across disciplines (Garvin, 1984). In this study, we utilize managerial perceptions of the entire quality of their products and services, suggesting that the first phase to changing general opinions is to assess the perceptions of those in the firm. An optimistic relationship between eco-capability and perceived quality of the offering would indicate that managers see value in their environmental initiatives that could then be passed along to business partners. An adverse or nonexistent relationship would signal that an internal change must precede any improvements in external perceptions. Generally, properly deployed capabilities have an optimistic influence on performance (Singh *et al.*, 2014; Leonidou *et al.*, 2013; Teece, 2007). Morgan *et al.* (2009) demonstrate that marketing capabilities, specifically, can increase a firm's return on assets in addition to overall performance. We build using this logic and predict that a firm's eco-capability should positively influence performance and perceptions of quality (Figure 1):

H4. Eco-capability has impact on hospital performance (composed of (a) financial performance, (b) market performance, and (c) quality of the offering).

4. Research methodology

4.1 Data collection research methodology

Based on the research model, an English-language questionnaire was obtained and reviewed for content validity by a group of academics. Eco-capability was, following Banerjee *et al.* (2003), defined as a multidimensional construct hinging on the possession, application, and utilization of proper resources that reduces ecological impact while creating value and

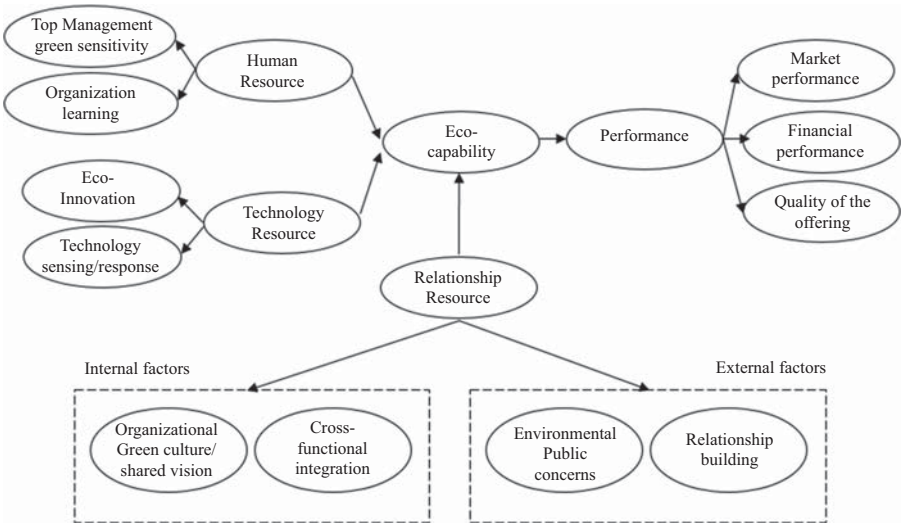

Figure 1.
Conceptual model

increasing firm performance (Ngo and O'Cass, 2009). The human resources were described according to the work of Leonidou, Leonidou, Fotiadis, and Aykol (2015), Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas (2015), and Sharma *et al.* (2004). The measurement of the technology resources was adopted from the work of Hurley and Hult (1998) and Srinivasan *et al.* (2002). According to Aragon Correa *et al.* (2008), Aragon Correa (1998), Leonidou, Leonidou, Fotiadis, and Aykol (2015), Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas (2015), and Morgam *et al.* (2004), the relationship resources scale is considered a second-order reflective construct. Market and financial performance were measured using the scale adopted from Gabler *et al.* (2015) and for the quality of offerings we selected items from Sprott and Shimp (2004). All indicators were measured through a seven-point Likert-type scale. As the data were collected in Iran, the questionnaire was then translated to Persian, submitted to local Iranian academicians to review it and correct wherever necessary according to local speech characteristics, and translated back again to English, by others, in order to validate the translation and ensure consistency. The sample size needed was defined before delivering the survey instrument. The overall target number was defined according to the research theoretical model and based on a minimum expected rate of answers of 15 percent. The target population comprised of 15 hospital's staff from Guilan Province in north of Iran. The survey was pilot tested among a group of 50 staff from the target population who were not included in the final sample. Preliminary evidence showed that scales were reliable and valid. Then after a period of 16 weeks, 311 valid answers were collected from 400 distributed questionnaires, achieving a final response rate of 77 percent which was considered adequate (Aaker *et al.*, 2004). The item skewness check indicated that all values ranged from –1.35 to −0.79. Most kurtosis values were between – 1.52 and −0.34. Only three items pertaining to satisfaction have kurtosis values of 2, 3.32, and 3.39. These values were deemed as not threatening normality (Ory and Mokhtarian, 2010). Table I shows the characteristics of the participants.

5. Analysis and results

The research model was tested using partial least square (PLS), a variance-based technique, with Smart PLS 2 software (Ringle *et al.*, 2005). PLS-SEM is a more "regression-based"

Hospital wards	Physicians	Experts	Administrative personnel	Others
Obstetrics and gynecology surgery	5	6	4	2
Pediatric and neonatal	4	6	2	2
Post ANGIO	5	7	3	2
Post CCU	7	7	2	4
Internal ward	8	6	3	6
Dialysis	4	6	4	5
Chemotherapy	2	6	4	4
General surgery	3	8	5	2
Polyclinics	5	8	2	9
Para clinics	5	6	4	8
Emergency	4	9	3	8
Orthopedic	3	10	5	3
Neurology	2	4	2	2
Neurosurgery	4	6	3	4
Dermatology	5	4	2	3
Nephrology	6	3	4	2
Heart surgery	2	3	2	4
Pulmonary	1	3	2	2
Sum	75	108	56	72
Percentage	24	35	18	23

Table I.
Characteristics of the participants

approach that minimizes the residual variances of the endogenous constructs. Compared to CB-SEM, it is more robust with fewer identification issues, works with multivariate normality of data, minimum sample size, and readily incorporates formative as well as reflective constructs (Hair *et al.*, 2011). So it was selected for its advantageous which corresponds to the relatively small sizes ($n = 311$) of this research as well as complex causal-effect relationships.

5.1 Evaluation of measurement model

After designing the different scales and capturing the corresponding information, we analyzed the data. Because models in PLS Software are analyzed and interpreted in two stages, we evaluated the measurement model first and then the structural model. This sequence certified that the measurement scales proposed were valid and reliable before demonstrating conclusions about the relationships among the constructs. For the reflective scales, the factor loadings were all above the recommended 0.7 score (Agan *et al.*, 2013). The composite reliability and average variance extracted (AVE) values also exceeded the recommended values of 0.7 and 0.5, respectively (Fornell and Larcker, 1981). Thus, the results prop the convergent validity of the reflective scales considered in this study (Table II). Then, to assess the reflective constructs' discriminant validity, we confirmed that the AVE did not exceed the variance shared with any other construct in the model (Barclay and Ronald, 1995). Furthermore, inter-correlations between constructs were significantly different than 1 for all the study variables, which provides additional evidence of discriminant validity (Table III).

5.2 Testing hypotheses: parameters of the structural model

After having guaranteed the convergent and discriminant validity of the measurement model, the relationships between the variables were analyzed. Using the bootstrap method, the different statistical parameters were calculated (Table IV). The hypothesis tests weighed the sign and significance of the *t*-values in each relation (β coefficient). All of four hypotheses considered are confirmed in the direction proposed (Table III).

Table II. Evaluation of measurement model

Construct	α	Factor loading	CR	AVE
Eco-capability	0.78	Keep all that were more than 0.7	0.79	0.55
Human resource	0.88	Keep all that were more than 0.7	0.90	0.57
Top management green sensitivity	0.83	Keep all that were more than 0.7	0.87	0.54
Organization learning	0.84	Keep all that were more than 0.7	0.88	0.57
Technology resource	0.89	Keep all that were more than 0.7	0.85	0.61
Organizational eco-innovativeness	0.76	Keep all that were more than 0.7	0.86	0.67
Technology sensing and response	0.77	Keep all that were more than 0.7	0.87	0.69
Relationship resource	0.91	Keep all that were more than 0.7	0.91	0.53
Organizational green culture	0.86	Keep all that were more than 0.7	0.90	0.60
Cross-functional integration	0.74	Keep all that were more than 0.7	0.85	0.66
Environmental public concern	0.78	Keep all that were more than 0.7	0.87	0.69
Relationship building	0.78	Keep all that were more than 0.7	0.87	0.70
Firm performance	0.87	Keep all that were more than 0.7	0.93	0.70

Table III. Correlations between constructs

Construct	1	2	3	4	5
1: human resource	0.75				
2: technology resource	0.59	0.78			
3: relationship resource	0.41	0.44	0.72		
4: eco-capability	0.39	0.32	0.55	0.74	
5: performance	0.45	0.41	0.49	0.42	0.83

Table IV. Parameters from hypothesis tests

Hypothesis	β	t-Value	Supported	R^2
H1: human resource → eco-capability	0.58	10.82	Yes	0.53
H2: technology resource → eco-capability	0.24	6.11	Yes	
H3: relationship resource → eco-capability	0.17	3.85	Yes	
H4: eco-capability → performance	0.61	12.73	Yes	0.36

6. Discussion and implications

6.1 Academic implications

The conceptual model explains 0.53 of variation in eco-capability and 0.36 in performance. So compared to chain standard (19, 33, and 67 percent) (1998), the conceptual model offered has been validated. This study examines the antecedents and outcomes of an eco-capability in hospitals, an issue of strategic importance in light of amplifying stakeholder pressures to protect the natural environment. With regard to antecedents, the emergence of human resources, technology resources, and relationship resources as instrumental capabilities in the creation of an eco-capability in hospitals is in harmony with the findings of other empirical studies in the wider environmental management field (Gabler *et al.*, 2015; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015; Singh *et al.*, 2014; Leonidas, 2013; Sharma *et al.*, 2004). These capabilities comprise important ingredients of the hospital's market orientation process, which means that they are also vital in becoming an environmentally oriented organization (Day, 1994).

With regard to human resources, *H1*, which connects top MGS and organizational learning with eco-capability, was confirmed ($\beta = 0/58$, $t = 10/82$). This confirms previous

results that managers are accountable for determining objectives, plans, and policies in the organization, their sensitivity and commitment to ecological matters are probably be implanted in the firm's eco-capability (Banerjee *et al.*, 2003; Stone and Wakefield, 2000; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015). Such managerial sensitivity is also critical in sending a message to all employees about demonstrating commitment to environmental matters across all levels and functional areas of the hospitals (Menon *et al.*, 1999). Specifically, the study confirmed the vital role of the staff's ability in information acquisition, processing, and dissemination to decrease the uncertainties and overcome the complexities in building a competitive advantage based on ecological issues (Sharma *et al.*, 2004).

The positive impact of technology resources on eco-capability (*H2*) was also verified ($\beta = 0/24$, $t = 6/11$), confirming previous research (Gabler *et al.*, 2015) which finds that adopting environmental technology is inherently risky, but firms that are eager and able to admit that risk put themselves in a position to gain the most from their environmental resources. Innovative firms not merely become the pioneers of green technology, additionally they dynamize their static green resources, making these resources more challenging to imitate and harder to separate from the firm itself. In the same way innovativeness amplifies the influence of market orientation on firm performance (Menguc and Auh, 2006), we realize that eco-oriented firms which are also innovative are best suitable to expand and optimize the human and relationship resources necessary in the forming of an eco-capability, and ultimately achieve a competitive advantage in a green-washed marketplace.

The verification of the hypothesis linking relationship resources and eco-capability (*H3*) ($\beta = 0/17$, $t = 3/85$) is in harmony with previous studies (Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015; Leonidou *et al.*, 2013; Bohdanowicz *et al.*, 2011; Sharma *et al.*, 2004; Stone *et al.*, 2004) manipulated in internal and external contexts that highlight the instrumental role of organization green culture/shared vision, cross-functional integration, EPCs, and relationship building in the hospitals to guide environmental initiatives and practices. Organization green culture is effective because all departments and wards in the hospitals acknowledge the significance of preserving the environment, usually codified with regard to mission statements, policies and procedures, and training and information programs (Banerjee, 2002). This intuition also confirms the dominant notion in the wider business literature that the development of the proper organizational climate is vitally essential for the deployment of successful strategies (Cravens and Piercy, 2005). Shared vision, which capitalizes on such knowledge to develop a collective comprehension of environmental aspects, promotes a collaborative spirit to ceaselessly support green initiatives (Russo and Fouts, 1997) and helps firms identify and organize the resources which can be vital for adopting sustainable business practices (Bohdanowicz *et al.*, 2011).

Cross-functional integration is also necessary to coordinate everybody in the organization to raised exploit environmental opportunities in order to stay prior to the competition in healthcare markets (Sharma *et al.*, 2004; Stone *et al.*, 2004).

The relationship between EPC and eco-capability is consistent with other academic findings (Kassinis and Vafeas, 2006; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015) that highlight the driving role of public opinion for making organizations more sensitive to ecological issues. Survey result revealed that EPC is more evident in hospitals because they have stringent regulatory systems, along with multiple stakeholder groups, advocacy groups, and other pressure groups with an interest in protecting the environment.

Finally, a hospital's service differentiation advantage, that is built on green dimensions, had a positive impact on both market performance and financial performance ($\beta = 0/61$, $t = 12/73$), thus confirming *H4*. Our survey revealed that this kind of ecological differentiation

helps hospitals and other healthcare facilities cultivate a definite positioning in the market, which in turn results in attracting and retaining clients, in addition achieving greater profits. This really is congruent with findings of prior research (Gabler *et al.*, 2015; Leonidou, Leonidou, Fotiadis, and Aykol, 2015; Leonidou, Fotiadis, Christodoulides, Spyropoulou, and Katsikeas, 2015; López-Gamero *et al.*, 2011; Ahmadi and Bouri, 2017; Rebelato *et al.*, 2017) that indicate that a service differentiation advantage can improve performance levels, especially when the firm's environmental efforts are proactive, market driven, and target specific environmentally sensitive clients (Miles and Covin, 2000).

6.2 Managerial implications

While scholars work to uncover theoretical explanations for the slow adoption of green services, managers simply want implementable solutions. Our analysis demonstrates that the RBV provides a sound theoretical platform for explaining the antecedents and outcomes of the adoption of an eco-capability in the healthcare sector. Our study demonstrates that certain organizational resources and capabilities can cause increased performance. When these capabilities are formed and implemented, a distinctive competitive advantage will follow.

Hospital's managers must understand that though environmental strategies require the deployment of significant resources and the utilization of specific capabilities, their proper handling will probably pay off ultimately, while enabling them to work in an eco-friendly manner and fulfill their societal responsibilities. In light of today's realities, characterized by cut-throat competition, growing public concern, and strong regulatory systems, the astute manager should adopt an even more proactive stance toward environmental issues and implement eco-friendly strategies. In accordance with the plan of the hospital's business strategy, the concept of eco-capability is needed in the development of facilities, consisting of aspects of human, technology, and relationship resources.

6.2.1 Human resources. Top management is the driving force behind the changes made in any organization, and adopting an environmental stance in the facility's green strategic activities is a serious change that needs constant support, commitment, and coordination to be effective. Our study highlights the critical role of managerial sensitivity to green issues in enforcing such a change, through the crafting of sound environmentally friendly business strategies. However, management efforts should be aided by the right organizational climate, in which all employees adhere to certain core values and norms conducive to protecting the environment. The adherence of both management and employees to green issues is therefore a key prerequisite to successfully implementing environmentally friendly strategies.

Green managers should also develop a common mental frame of reference among employees (through, e.g., seminars/workshops, assimilation exercises, and on-site visits to markets) to help them interpret and face environmental challenges in a consistent manner. One of the first things a facility has to do before implementing a sustainability program is to make a team tasked with leading the entire initiative. For example, the team might concentrate on increasing the quantity and form of recycling practiced at the medical facility; sorting waste streams to minimize the hospital's contribution to landfills; and increasing awareness of how employees can positively impact the environment. The team ought to be both empowered and supported by leadership to execute initiatives but additionally be held to specific goals.

6.2.2 Technology resources. Healthcare facilities should foster their eco-innovative culture. Adopting environmental technology is inherently risky, but facilities that are willing and able to accept that risk put themselves in a position to gain the most from their environmental resources. Innovative facilities not only become the pioneers of green technology, they also dynamize their static green resources, making these resources more difficult to imitate and more difficult to separate from the firm itself. Just as innovativeness

amplifies the influence of market orientation on firm performance, we find that eco-oriented facilities that use their technology resources correctly are best suited to develop and optimize an eco-capability, and ultimately achieve a competitive advantage in a green-washed marketplace.

6.2.3 Relationship resources. EPC and relationship building are key issues that need to be taken into consideration when designing environmental strategies, because they can seriously affect facilities' operations in markets. Catering to the needs of green clients, accommodating people's environmental complaints, anticipating and swiftly responding to competitors' movements, and finding points of difference from competitors all necessitate the adoption of ecological strategic thinking. Facilities also need to synergy with other members of the supply chain, such as suppliers and insurance company to improve environmental protection arrangements, along with attempt promotional and communication efforts that will highlight their green efforts.

In addition, to achieve maximum effectiveness and efficiency in the way green issues are handled, it is crucial to maintain a high level of coordination among the various functional areas of the organization. This is because all departments and levels in healthcare facility should acknowledge the importance of preserving the environment, usually codified in terms of mission statements, policies and procedures, and training and information programs. This finding also confirms the prevailing notion in the wider business literature that the development of the right organizational climate is vitally important for the deployment of successful business strategies.

One final implication arises from our outcome variables. The positive relationship between the eco-capability and the performance measures indicates that not only are environmental strategies sound investments, they also help garner a larger segment of the market. This finding suggests that the prioritization of an eco-friendly business model has an appreciable impact on a firm's bottom line. The "quality of the offering" measure, on the other hand, allows us to advance the simple idea that managers do place value in their green strategies. This is not a trivial finding. If managers perceive higher quality in their facility's environmental services/products, this represents an important first step in conveying that message to partners and refuting the low-quality myth that has followed green services/products.

6.3 Limitations and future lines of research

This study makes some contributions to the eco-capability literature but is suffering from limitations which should constitute the beginning point for further research.

Future studies could include examining the effect of additional resources (e.g. scale/scope resources, new product/service development) on the formation and implementation of an eco-capability.

Research must also investigate the role of temporal effects on the associations between the constructs of the model through the execution of longitudinal studies. Although this is a time-consuming and expensive task, it would yield valuable insights into the interactions between the constructs of the model.

The effect of other external (e.g. regulatory forces, environmental complexity, and market dynamism) and internal (e.g. strategic pro-activity) factors on eco-capability could also be examined.

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Appendix

Construct	Item	Item description
Eco-capability	ECM1	Our hospital has realized eco-capability by experimenting with ways to improve the green quality of our services
	ECM2	By regularly investing in new eco-friendly technologies/processes/ strategies, we have gained more client/patient and leading market position
	ECM3	Our hospital has managed to enter lucrative new markets by adopting environmental strategies
	ECM4	Our hospital has managed to increase service quality by making its current processes more eco-friendly
Top management green sensitivity	TMGS1	Our managers keep us away from the risks involved in relation to ecological issues (R)
	TMGS2	Our managers pay attention to ecological issues
	TMGS3	In our hospital, managers have clear instructions to implement environmental goals
	TMGS4	Our hospital has managers who understand issues of ecological development in markets
	TMGS5	Our managers make sure that our equipment is well maintained and operated in an eco-friendly way
	TMGS6	Our managers put a lot of effort in understanding the green aspects of our activities
Organization learning	OL1	We continuously update our knowledge of the forces affecting the healthcare industry with regard to green issues
	OL2	We try to look at solutions to environmental problems regarding the healthcare industry from fresh angles
	OL3	We use both formal and informal channels for exchanging information regarding environmental issues
	OL4	In our hospital, both line and staff managers are involved in developing new eco-friendly practices, processes, systems
	OL5	In our hospital, there are incentives and rewards for those employees who find solutions to green problems (D)
Organizational innovativeness	OI1	Innovation is readily accepted in our hospital
	OI2	Management actively seeks innovative ideas
	OI3	Technical innovation is readily accepted in process
Technology sensing and response	TS/R1	We are often one of the first in the industry to detect technological developments that may affect our green efforts
	TS/R2	We actively seek intelligence on technological changes that are likely to affect our environmental efforts
	TS/R3	We generally respond very quickly to technological changes that have to do with environmental issues
	TS/R4	Our hospital lags behind the industry in responding to new technologies that have to do with environmental issues (R) (D)
Organizational green culture/shared vision	OGC/ SV1	All our employees have a very clear idea about our hospital's environmental objectives
	OGC/ SV2	All our employees make significant efforts to reach our hospital's environmental objectives
	OGC/ SV3	Managers and employees always agree on the right environmental procedures for our hospital
	OGC/ SV4	Employees often offer valuable ideas for improving our hospital's ability to achieve its environmental objectives

(*continued*)

Table AI. Research questionnaire

Construct	Item	Item description
	OGC/SV5	In our hospital, there is cooperation between departments to cultivate environmental consciousness
	OGC/SV6	In all functional areas in our hospital, we have incorporated environmental issues
Cross-functional	CFI1	We have informal systems for better coordinating environmental issues among departments in our hospital
	CFI2	We have formal systems (healthcare information system: HIS) for better coordinating environmental issues among departments in our hospital
	CFI3	We work around projects (not departments) with multi-disciplinary teams regarding environmental issues in our hospital
Environmental public concern	EPC1	The public expresses its concerns for damaging which hospitals the environment
	EPC2	The public increasingly demand eco-friendly services
	EPC3	The public expresses more concern for issues other than environmental (R)
	EPC4	The public expect our hospital to be environmentally sensitive
Relationship building	RB1	We fully understand patient's requirements regarding environmental issues
	RB2	We fully understand requirements of other stakeholders (e.g. health insurance, healthcare providers, government) regarding green issues
	RB3	We fully establish and maintain close relationships with suppliers (e.g. food and clinical equipment) regarding green issues
Market performance	FP1	Our market share is much better than our main competitor
	FP2	Our patient retention is much better than our main competitor
	FP3	Our retention rate is much better than our main competitor
Financial performance	FP4	Our current ROI is much better than our main competitor
	FP5	Our anticipated average profit per client is much better than our main competitor
	FP6	Our anticipated ROI is much better than our main competitor
Quality of offering	EF7	Overall I would say our products/services have excellent overall quality
	EF8	The products/services we sell have very good quality
	EF9	Overall, the products/services we sell are excellent

Table AI.

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Institutional pressures and corporate environmental management maturity

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Abstract

Purpose – The purpose of this paper is to examine how corporate environmental management strategies at different environmental management maturity (EMM) stages are influenced by institutional forces in the service sector organizations of a developing country.

Design/methodology/approach – The authors used a multiple case study approach in this study. Institutional isomorphic pressures (coercive, mimetic and normative) at different EMM stages were used as the analytical framework.

Findings – The study finds coercive pressures largely shape the corporate environmental management strategies at the reactive stage while mimetic pressures have the greatest influence on the internal integration stage. Combined mimetic and normative pressures influence the environmental strategies at the external integration stage. Further, it emphasizes the importance of various institutional pressures in propelling the organizations in the developing countries to benefit from higher levels of EMM.

Originality/value – This paper offers a new theoretical approach that highlights the importance of considering the institutional influence of the top-down process of diffusion and simultaneous counter-process of invention by which the lower level organizational actors shape and change their environmental management practices for corporate EMM.

Keywords Corporate environmental management maturity, Developing countries, Institutional theory, Service sector, Sustainable management strategies

Paper type Research paper

1. Introduction

There is growing attention to current global environmental problems whose scope and scale have expanded considerably over the past decades (Jabbour, 2010; Mysterud, 2017; Welford, 2013). Since many researchers consider companies to be responsible for many of these environmental and social problems (Herold and Lee, 2017; Schaltegger and Wagner, 2011; Schaltegger *et al.*, 2016; Sonenshein, 2016), there is growing regulatory and social pressure on businesses expanding their corporate responsibility to include environmental and social issues at all levels of operation (El-Kassar and Singh, 2018; González-Benito and González-Benito, 2006; Judge *et al.*, 2010; Maialle and Jabbour, 2014; Lee *et al.*, 2017; Ormazabal and Sarriegi, 2012; Schaltegger and Wagner, 2011; Sonenshein, 2016). These demands have taken environmental sustainability into the boardrooms of corporations worldwide (Calza *et al.*, 2016; Dixon-Fowler *et al.*, 2017; Landrum, 2017) while making corporate environmental management an important function of companies in contributing toward sustainable development (Buysse and Verbeke, 2003; Fujii and Managi, 2016). This has further been influenced by shareholder activists who are motivated not only by financial drives but also by social reasons (Judge *et al.*, 2010). Alongside this practical importance, corporate environmental management has also been subject to extensive research over the decades covering a wide spectrum. An important strand of research that still interests academics and practitioners alike is the taxonomies of the development of corporate

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environmental management practices (Ferreira *et al.*, 2017; Hunt and Auster, 1990; Jabbour *et al.*, 2010, Jabbour and Santos, 2006; Kolk and Mauser, 2002; Ormazabal *et al.*, 2017; Ormazabal and Sarriegi, 2012; Shrivastava and Hart, 1995). Most of these studies attempt to systematize and classify corporate environmental management practices into different phases of development based on the level of environmental management integration. These phases, referred to as maturity, development or evolutionary stages, reflect a higher level of environmental management integration over time encompassing a wide range of organizational activities while investing substantial organizational resources in them. Despite the global importance of corporate environmental management, most of the environmental management maturity (EMM) studies so far have focused only on developed countries, except Brazil (see Ferreira *et al.*, 2017; Jabbour *et al.*, 2010; Jabbour, 2010). This is an important factor to consider since developing countries face greater difficulties than developed countries in dealing with environmental (and social) problems due to inadequate environmental legislation, weak governance systems, widespread poverty, institutional capacity for the purpose and social infrastructure (Christmann and Taylor, 2002; Gunarathne *et al.*, in press; Herzig *et al.*, 2012; Lee *et al.*, 2017; Patnaik *et al.*, 2017; United Nations, 2017). Further, developing countries are under immense pressure to deal with a variety of environmental problems while achieving economic growth (Hiroyuki, 2001). This is important in a context where the emerging economies or developing countries the world over have undertaken many market reform activities to facilitate the integration of domestic markets with global markets (Singh *et al.*, 2018). The institutional context and the pressures exerted by these institutions for sustainability in these countries are different to those of developed countries but so far they remain largely unexplored (Lee and Schaltegger, 2018). Thus, this study aims to address how the institutional pressures on companies in developing countries influence the adoption of environmental management practices at different stages of EMM taking Sri Lanka as the focus.

The importance of this study can also be grounded on its focus on the non-manufacturing sector, and service sector in particular (Merchant and Gaur, 2008). Owing to their visible impact, most research on corporate environmental management practices has focused on manufacturing industries (Foster *et al.*, 2000; Gunarathne and Lee, 2015; Lucas and Wilson, 2008; Moreno *et al.*, 2004). Therefore, environment-related questions in service sector firms have not yet been addressed adequately though they play a significant role in both developed and developing countries (Foster *et al.*, 2000; Moreno *et al.*, 2004; Salzman, 2000). On the other hand, understanding the environmental impact of the service sector is much more difficult as it covers a much more heterogeneous collection of economic activities (Moreno *et al.*, 2004) than manufacturing firms. Similarly, understanding the sources of competitive advantage of service firms is still an important area for empirical research (Merchant and Gaur, 2008). For instance, how service firms can embed environmental sustainability in generating competitive advantage has not yet been subject to investigation. This paper aims to contribute to filling this lacuna in knowledge by focusing on the hotel sector in Sri Lanka.

Important contributions of the paper are as follows: first, the paper offers new theoretical insights into how various institutional pressures influence EMM. Although EMM and institutional influence on corporate environmental and sustainability management has been discussed widely, albeit in isolation (Bansal, 2005; Campbell, 2007; Jabbour *et al.*, 2010; Kolk and Mauser, 2002; Ormazabal and Sarriegi, 2014; Primc and Čater, 2016; Windolph, Schaltegger and Herzig, 2014), how various institutional pressures shape the environmental management practices of the organizations at different intensity levels of environmental management (as identified by their maturity stage) has not yet received academic attention. Second, the study offers insights from South Asia contributing into the paucity of studies on corporate environmental management in developing countries. This is important as most of the corporate sustainability and environmental management studies have focused on

developed countries ignoring the global importance of environmental and sustainability management (Gunarathne and Lee, 2015; Lee and Schaltegger, 2018). Hence, understanding how corporate contributions (or resistance) to sustainable development in some regions such as South Asia (known as SAARC)[1], which currently has one of the highest economic growth rates in the world (World Bank, 2017) in their pursuit of economic development is important.

The rest of the paper is organized as follows. Section 2 presents the literature review followed by the research methodology in Section 3. Section 4 presents the findings and results of the study. Section 5 provides the discussion, Section 6 the implications and Section 7 the conclusions.

2. Literature review

2.1 Corporate environmental management maturity

Corporate environmental management strategies, methods and tools constitute a positive contribution to environmental sustainable development (Cramer, 1998, Ormazabal and Sarriegi, 2014). Along with the developments in organizational practices, researchers have shown a keen interest in studying corporate environmental management practices. They reveal while some companies embrace ecologically responsible behaviors with advanced processes, there are companies in seemingly similar circumstances that are still experimenting or not even complying with existing regulations (Bansal and Roth, 2000; González-Benito and González-Benito, 2006; Ormazabal *et al.*, 2017). Hence, they point to the importance of considering different levels of organizational adoption and development in environmental management (Buysse and Verbeke, 2003; Clemens, 2001; Maialle and Jabbour, 2014; Murillo-Luna *et al.*, 2011; Ormazabal and Sarriegi, 2014; Ormazabal *et al.*, 2015; Park and Ahn, 2012, Primc and Čater, 2016).

Various classifications methods or taxonomies have been proposed to analyze corporate EMM. They can be broadly divided into progressive/developmental (maturity or evolutionary) models and non-progressive/non-sequential (or typologies) models (González-Benito and González-Benito, 2006; Hass, 1996; Kolk and Mauser, 2002). The development models this study deals with focus on how organizations integrate the environmental variable into their management activities while classifying companies according to their stage of environmental management evolution (Jabbour and Santos, 2006). These "maturity staging models deconstruct the operating processes of a firm, with each stage representing a more effective and efficient use of the firm's resources for achieving the firm's goals" (Ormazabal *et al.*, 2017, p. 28). These diverse developmental models range from environmental reactivity in which companies only meet the regulatory requirement to environmental proactivity in which companies take voluntary measures to reduce the environmental impact (González-Benito and González-Benito, 2006). An exhaustive literature review based on the content analysis method (see Gaur and Kumar, 2018 for more details on conducting a literature reviews using content analysis) on EMM reveals that an increasing number of development models have been proposed over the last three decades (see Table I).

As Table I shows, there are diverse viewpoints on the number of stages and characterization of each stage. However, they all show that the evolution of environmental management tends to go through similar patterns in virtually all companies (Ormazabal and Sarriegi, 2012). After analyzing the above taxonomies, it was decided to follow the taxonomy of Jabbour and Santos (2006) for two reasons. First, their taxonomy is based on a systematic analysis of similar taxonomies (Maialle and Jabbour, 2014) and second, the applicability of this taxonomy has been empirically tested in several studies (Ferreira *et al.*, 2017; Jabbour *et al.*, 2010; Jabbour, 2015; Teixeira *et al.*, 2012). Table II shows some of the salient features of the Jabbour and Santos (2006) corporate EMM model (see Table II).

Author(s)	Development stages of environmental management
Hunt and Auster (1990)	Beginner, fire fighter, concerned citizen, pragmatist, pro-activist
Roome (1992)	Non-compliance, compliance, compliance-plus, leading edge, excellence
Azzone and Bertelè (1994)	Stable, reactive, anticipatory, proactive, creative
Venselaar (1995)	Reactive, active, proactive
Hart (1995)	Prevention of prevention, environmental management in products, sustainable development
Shrivastava and Hart (1995)	Band-aid, more serious, deep change
Berry and Rondinelli (1998)	Non-compliance, compliance, beyond compliance
Buysse and Verbeke (2003)	Reactive strategy, prevention of pollution, environmental leadership
Cagno *et al.* (2005)	Control of pollution, prevention of pollution
Rothenberg *et al.* (2005)	Regulatory, gross emissions, efficiency, life cycle
Jabbour and Santos (2006), Jabbour *et al.* (2010)	Functional specialization, internal integration, external integration (Reactive, preventive and proactive)
Murillo-Luna *et al.* (2011)	Passive, attention to legislation, attention to stakeholder, total environmental quality
Garces-Ayerbe *et al.* (2016)	Laggards, initiated, proactive, eco-innovative
Ormazabal and Sarriegi (2012), Ormazabal *et al.* (2015, 2017)	Legislation fulfillment, training, systematization, eco_2, eco-innovative, leading green company
Primc and Čater (2016)	Reactors, defenders, analyzers, prospectors

Table I.
Different environmental management maturity stages

	Functional specialization stage	Internal integration stage	External integration stage
Focus	Complying with regulations or stakeholder expectations	Better utilization of inputs and initiation of projects in environmental management	Exploring the opportunities for improving the competitiveness in the external context
Company perception	Additional cost of compliance	Tool for improving eco-efficiency	Means of achieving competitive advantage
Role and support of top management	Limited	Linked to the improvement of eco-efficiency	Continuous

Source: Adapted from Jabbour *et al.* (2010, p. 1054)

Table II.
Salient features of environmental management in companies

2.2 Institutional theory

The adoption of sustainability management practices (or even corporate socially responsible behaviors) has been often explained through institutional theory (Bansal, 2005; Boiral, 2002; Campbell, 2007; Judge *et al.*, 2010; Patnaik *et al.*, 2017; Windolph, Schaltegger and Herzig, 2014). In this study too, we were motivated to use institutional theory as our theoretical model as it provides rich insights into the adoption of environmental management strategies/practices in the organization of a firm (Bansal, 2005; Campbell, 2007; Delmas and Toffel, 2004; Kang and Lee, 2016) such as the hotel industry which is the subject of this study. In order to systematize the different strands of institutional theory, Scapens (2006) suggests three categories, namely, new institutional economics, which identifies the structures used to govern economic transactions; new institutional sociology (NIS), which considers the institutions in the organizational environment that shape organizational structures and systems; and old institutional economics, which focuses on the institutions that shape the actions and thoughts of individual human agents. Since the focus of this study is on identifying how institutional pressures in the hotel field shape the environment-oriented organizational structures and systems at different EMM stages, we use NIS as the

analytical framework of this study. According to NIS, structural changes in organizations can occur as a result of processes that homogenize organizations, which process is called isomorphism (DiMaggio and Powell, 1983). There are three mechanisms through which institutional isomorphic changes occur: coercive isomorphism that stems from political influence and the problem of legitimacy; mimetic isomorphism resulting from standard responses to uncertainty; and normative isomorphism, associated with professionalization (DiMaggio and Powell, 1983).

Coercive isomorphism results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent (DiMaggio and Powell, 1983). Powerful stakeholders such as regulators, foreign investors, non-governmental organizations, standardization agencies, industry norms, parent companies and rating organization can exert coercive pressure on organizations to follow sustainability practices (Bansal, 2005; Amran and Haniffa, 2011; Windolph, Schaltegger and Herzig, 2014). Such pressures may be felt to be force, persuasion or invitation to join in collusion (DiMaggio and Powell, 1983). By complying with expectations, standards, guidelines of standard organizations and sustainability rating agencies, companies attempt to receive social legitimacy through sustainability management (Windolph, Harms and Schaltegger, 2014).

Mimetic isomorphism can be induced by uncertainty and consequently organizations model themselves on other organizations as a convenient source of practices (DiMaggio and Powell, 1983). Sustainability management tools, approaches and principles that often overwhelmingly appear in academic research create uncertainty for practitioners (Windolph, Schaltegger and Herzig, 2014). In such situations, organizations may follow the practices followed by a significant number of organizations (Abrahamson, 1991). This mimicry of corporate sustainability can take place indirectly through employee transfer or turnover, or explicitly by sustainability organizations such as consulting firms or industry trade associations (DiMaggio and Powell, 1983; Windolph, Schaltegger and Herzig, 2014). According to Grob and Benn (2014), these would include voluntary reporting frameworks such as the Global Reporting Initiative (GRI) and environmental management systems.

Normative isomorphism stems primarily from professionalization (DiMaggio and Powell, 1983), deriving from professional networks, corporate sustainability associations and education and training (Bansal, 2005; Campbell, 2007; DiMaggio and Powell, 1983; Windolph, Schaltegger and Herzig, 2014). Hiring of individuals from the same industry, recruitment of staff from a narrow range of training institutions and common promotion practices and skill-level requirements for particular jobs can result in normative isomorphism (Grob and Benn, 2014).

By combining corporate EMM with NIS theory, we use the following framework, which is synthesized as the core analytical framework of this study (see Figure 1). This figure is built on the notion that the organizational field is the unit of analysis in institutional theory. Figure 1 also embodies the top-down process of diffusion and the simultaneous counter-process of invention by which lower level organizational actors shape and change the contexts within which they operate (Scott, 2008). Figure 1 also highlights that due to the complex interaction between institutional pressures and organizational units at different EMM stages, there will be different forms of corporate environmental management practices.

3. Research method

In this study, we selected travel and tourism sector as our industry since it is an important economic sector in the global economy that creates jobs, drives exports and generates wealth. The World Travel and Tourism Council (WTTC) (2017) reports that this sector contributed 10.2 percent of global gross domestic product and generated one in ten of the world's total jobs. Environmental sustainability is crucial to this sector as the survival of tourism relies heavily on the quality of the natural and physical environment (Hashimoto, 1999). Further, the importance of the tourism sector for global sustainable development was highlighted when

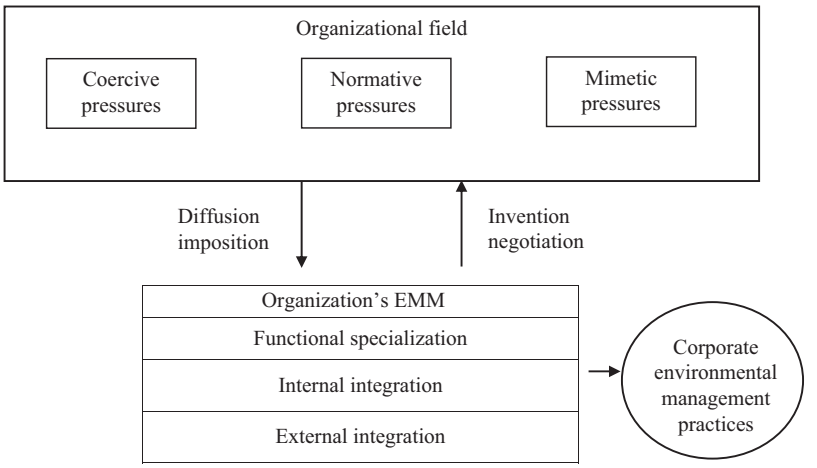

Figure 1.
Analytical framework of the study

the United Nations designated 2017 as the International Year of Sustainable Tourism for Development (WTTC, 2017). While tourism plays a crucial role in achieving many of the Sustainable Development Goals (SDGs) such as achieving inclusive and sustainable economic growth, reducing poverty, improving resource efficiency and reducing climate change and promoting peace and diversity, the industry faces the growing challenge to sustainably manage an expected 1.8 bn international tourists in 2030 (United Nations World Tourism Organization, 2017).

The data for this study were collected as part of an ongoing research project that explored corporate environmental management practices in Sri Lanka based on a case study approach as the research question was concerned with a contemporary real life phenomenon of organizational and managerial issues (Myers, 2003; Yin, 2009). We selected three hotel groups for analysis, hereafter referred to as Hotel Group 1, Hotel Group 2 and Hotel Group 3. These three hotels are in different corporate EMM stages and were categorized according to the EMM stage based on the situation that best describes them. Three situations were described for each of the three EMM stage and the descriptions contained several characteristics that enabled determining the EMM stage (see Table III).

Hotel Group 1 is a well-known hospitality group in Sri Lanka and we selected three hotels in Negombo. Hotel Group 2 belongs to one of the largest diversified conglomerates in Sri Lanka and we selected two hotels in Colombo. Hotel Group 3 also belongs to a diversified conglomerate in Sri Lanka and we selected two hotels, one in Sigiriya and the other in Negombo. Thus, we selected seven hotels in different geographical locations of the country. All these hotel groups are listed on the country's Stock Exchange and the clientele comprises a mixture of local and international up-end tourists.

We visited all the hotels in Hotel Groups 1 and 2 and the hotel in Sigiriya in Hotel Group 3. During our visits, we mainly interviewed the general manager, the hotel's naturalist or environmentalist and the chief engineer of each hotel during January 2017 to May 2017. In Hotel Group 2, we interviewed the health and safety manager who handles waste management. The interviews with the general managers were relatively short and lasted about 20 minutes on average. We had in-depth interviews with chief engineers and the naturalist/environmentalist. The duration of these interviews ranged from 40 minutes to 2 hours. Most of them were electronically recorded with their consent for later analysis. During our on-site observations, we observed the physical evidence pertaining to the operation of environmental management practices such as boilers, chillers, sewerage

Organization	Characteristics of corporate environmental management practices[a]	EMM stage
Hotel 1	Strong emphasis on end of pipe technologies Inclusion of environmental considerations to the business operations is reactive to environmental legislation Environmental expertise of the company is not articulated Environmental performance appraisal of the supplier is not carried out or is not systematic	Functional specialization
Hotel 2	Environmental management focuses on increasing the efficiency of natural resources such as water, energy and raw materials Environmental management is linked to the prevention of pollution Environmental performance appraisal of the supplier is becoming systematic	Internal integration
Hotel 3	Environmental management focuses on creating opportunities Innovations focus on exploring new market niches Process innovations focus on improving the productivity of natural resources in a systematic way Continuous improvement of annual goals of reduction in pollution and its sources Environmental performance appraisal of the supplier is systematic	External integration

Note: [a]These characteristics were developed based on Jabbour *et al.* (2010)

Table III.
Characteristics for categorization based on corporate EMM

treatment plant, kitchen, laundry, hotel rooms, lobby, etc. Depending on the practical feasibility, we further interviewed a few guests and various other hotel staff (accountant in Hotel Group 3, quality assurance manager, department managers, chief steward, and members of the hotel's Green Committee) as a means of cross-checking and confirming the practices so as to increase the research validity of our findings. We also referred various internal records of the hotels for collecting secondary data. These internal records included monthly and weekly energy records, project proposals, Green Directory, waste collection sheets, waste disposal records, etc. Finally, we also interviewed an officer of the Central Environmental Authority (CEA) representing regulators. These interviews were semi-structured with open-ended questions. We also referred other online data such as websites of the hotels, acts, annual reports, etc. As a mean of triangulation, we used non-participative observations, physical inspections of artifacts and content analysis of the documents (Chan, 2009; Golafshani, 2003; Yin, 2009). The collected data were analyzed based on the analytical framework developed in the study.

4. Findings and analysis

4.1 Coercive pressures on environmental management practices

There are certain legislations that influence the environmental management practices of the hotel sector of Sri Lanka. Among them the environmental protection license (EPL) that every hotel has to obtain from the CEA on an annual basis is important (Government Information Centre, 2014; Gunaruwan and Josep, 1999). When this license is issued, CEA evaluates how wastes, especially waste water and effluents, are disposed of. The gazette notification with regard to the issue of EPL for emission or disposal of waste is as follows:

> No person shall discharge, deposit or emit waste into the environment or carry on any prescribed activity […] in circumstances which cause or are likely to cause pollution, or noise pollution. (The Gazette of the Democratic Socialist Republic of Sri Lanka- Extraordinary, 2010)

Apart from this minimum regulatory requirement, it is difficult to identify other direct standard operating procedures or structures of influential institutions that exert coercive pressure on the hotel sector in Sri Lanka. There was a hotel greening program called "greening the hotels" operated by SwitchAsia in collaboration with the Ceylon Chamber of

Commerce (SwitchAsia, 2010). However, it is not in operation now. The Chief Engineer of Hotel Group 2 expressed his dismay over the cessation of this program:

> SwichAsia programme is the only structured environmental management programme we had so far. Unfortunately it is not in operation now […] We have no clear guidance from the government or any other institution.

In our study, as seen in Hotel Group 1, the environmental management practices of the organizations in the functional specialization are primarily driven by the need to comply with legislative requirements. The chief engineer of the Hotel 1 confirmed this:

> Our main purpose is to comply with the EPL [i.e. legislative aspects] requirements. We take all the steps to meet these requirements […] When the regulations change we are keen to incorporate them into our operations since non-compliance can create various problems.

His statement further confirms that the organizations in the functional specialization stage adopt a reactive approach to corporate environmental management (Roome, 1992; Jabbour and Santos, 2006; Buysse and Verbeke, 2003). Hence, these organizations perceive meeting legislative requirements sufficient for carrying out their business activities. Since much of the legislation focuses on reducing the immediate damage to the environment, these organizations place greater emphasis on end-of-pipe technologies (Roome, 1992) such as managing waste water or solid waste. Hence, their environmental management strategies are too fragmented and limited in scope to cover immediate environmental problems such as waste water and solid waste (Gunarathne and Lee, 2015).

Since these organizations still consider environmental compliance an additional cost, the environmental expertise of the company is not articulated, primarily due to the lack of resource allocation (Jabbour and Santos, 2006). The general manager of Hotel Group 1 confirmed this:

> We still do not see the need to have a separate division for environmental management. Perhaps in the future depending on how the legislations and other factors change, we will consider having more resources for environmental sustainability.

Further, due to this limited scope and resources for environmental management and non-coverage of these aspects by legislation, organizations in the functional specialization stage do not carry out an environmental performance appraisal of the supplier (Jabbour and Santos, 2006; Jabbour *et al.*, 2010).

However, the organizations in the internal and external specialization stages go beyond these regulatory requirements. As shown in our study, Hotel Groups 2 and 3 hold similar views on the impact of coercive pressures on environmental management. As EPL is only general in nature, i.e., applicable to all the industries in Sri Lanka, the influence it bears on a hotel's environmental practices at these stages seems to be minimal. Therefore, Hotel Groups 2 and 3 dispose of their waste in a more responsible manner than required by EPL. The chief engineer of Hotel Group 3 said:

> The environmental regulations applicable to our sector are very minimum and basic. We actually go beyond the regulations to manage waste, mostly on a voluntary basis.

Reaffirming this, the health and safety manager of the Hotel Group 2 said:

> In fact, EPL stipulates that waste has to be properly disposed of. In that case even giving waste to a municipal council is enough. But we try to manage waste in-house as much as possible and only what we can't manage is given to the municipal council.

These statements indicate that the impact of coercive pressure on the organizations at higher levels of EMM has no bearing on the regulatory requirements. Their focus is to always exceed the minimum requirements set out in the legislation owing to other institutional pressures.

4.2 Normative pressures on environmental management practices

Normative isomorphic pressures arising from the professionalization of the members of an occupation defining their working conditions and practices (DiMaggio and Powell, 1983) can be witnessed through sources such as professional networks, sustainability associations and education and training requirements (Bansal, 2005; Campbell, 2007; Windolph, Schaltegger and Herzig, 2014). In general, many of the environmental management practices of the hotel sector in Sri Lanka affected by normative pressures are due to the hiring of professional with the same background or universities.

Organizations in the functional specialization stage, as in Hotel Group 1, do not have a specialized department/expertise for corporate environmental management. They are usually carried out by the engineers who oversee the other day-to-day operations of the hotel (Gunarathne *et al.*, 2015). Hence, the influence of the normative pressures on corporate environmental management strategies in terms of professionalization is minimal in organizations at the functional specialization stage.

Organizations at the internal integration and external integration stage focus on increasing the efficiency of natural resources such as water, energy and raw materials (Jabbour and Santos, 2006). These organizations hence employ skilled personnel such as naturalists/environmentalists or dedicated (environmental) engineers to carry out these activities. These engineers belong to engineering faculties of the country or technical colleges. The naturalists/environmentalists usually possess a degree in environmental management. It is, thus, evident that the hiring of professionals of similar educational background has largely shaped the environmental management practices of the hotel sector. The chief engineer of Hotel Group 2 said the following in respect of their recruitment policy:

> We always hire engineers for environmental management who have a basic degree in engineering with some specialization in environmental related fields. Also they need to have at least five years of experience in the industry including a minimum two years' experience in the hotel sector.

In addition to a similar education background, similar training or experience has also affected the environmental strategy of the hotels at the internal integration and external integration stages. We observed that these engineers and/or naturalists/environmentalists prefer to work in the hotel sector even when they change their organization. This too acts as normative pressure which shapes the environmental practices of the hotels. The chief engineer of Hotel Group 3 stated:

> We know each other [the Engineers of the other hotels] well. We sometimes visit their hotels or they come and visit us. For example, one of my subordinates joined Hotel xx (name is not disclosed) and he has started to use kitchen oil in their boiler which we do here normally.

The above statement highlights the influence of similar training or industry experience in influencing the environmental strategy of the hotel sector organizations at the internal and external integration stages.

Furthermore, in Hotel Group 3 we observed some advanced environmental management practices that go beyond common environmental aspects such as water, waste and energy. The hotel has implemented certain biodiversity and carbon management practices initiated by the naturalists. A general manager of Hotel Group 3 said:

> In the last couple of years we have introduced many carbon and biodiversity management and reporting practices systematically, thanks to the Naturalist we recruited for environmental management of the hotel. He has a degree in bio-diversity and natural resource management and it is this background that has provided him a sound foundation to initiate these practices which you do not find in many other hotels in the country. In fact, he was instrumental in setting up many proper systems and procedures in place [for environmental management].

This statement of the general manager shows the effect of normative pressure (i.e. education background of specialists employed for environmental management) in the organizations at the external integration stage in shaping advanced and structured management approaches in environmental domains that are less common such as biodiversity management.

4.3 Mimetic pressures on environmental management practices

Consulting firms, industry trade associations, voluntary reporting frameworks and environmental management systems can induce mimetic isomorphism (DiMaggio and Powell, 1983; Grob and Benn, 2014; Windolph, Schaltegger and Herzig, 2014). Among these various mimetic pressures, the impact of ISO certification is important in the hotel sector of Sri Lanka. In particular, management of energy, water and food is largely affected by accreditation for ISO 14000, 22000 and 50001 standards (Gunarathne *et al.*, 2015).

Hotel Group 1 has obtained neither any environmental management certifications nor engaged in any sustainability-related disclosures in their annual reports. Hence, the influence of mimetic pressures on organizations at the functional specialization stage is very minimal, as revealed in Hotel Group 1. As stated previously, their focus on environmental management does not go beyond the requirements specified in legislation.

According to Hotel Groups 2 and 3, the influence of mimetic pressures is quite visible in organizations at internal integration and external integration stages. Both Hotel Groups 2 and 3 have obtained ISO 14000 and ISO 50001 certification. The chief engineer of Hotel Group 2 mentioned about their motivation to go for ISO 50001 as follows:

> ISO 50001 certification is now becoming common in our industry. In addition, it streamlines your energy management system […] ISO accreditation brought a lot of changes in the way we managed and especially the way we reported on energy management.

From his statement it is clear that ISO accreditation shaped their energy management practices to a great extent. As the focus of the organizations on the internal integration stage is to improve the efficiency of resource consumption (Jabbour and Santos, 2006), mimetic pressures such as environmental accreditation support their objective.

In addition, both hotel groups get the help of consulting firms in managing energy and calculating the carbon footprint especially because proper guidance is not forthcoming from industry trade associations or government (Gunarathne *et al.*, 2015). Since there are very few specialized environmental consulting firms in the country, the environmental practices adopted by the hotels largely resemble each other. Energy saving practices such as use of LED and alternative bio fuel, thermal insulation, deployment of intelligent thermostats, maximization of natural ventilation and waste management practices such as the use of sewerage treatment plants, separation at the point of generation, non-use of toxic chemicals and minimization of plastic and polythene are commonly adopted in both Hotel Groups 2 and 3 encouraged by external consultants. Also, the Green Directory[2] as an internal sustainability measurement and reporting mechanism is adopted by Hotel Groups 2 and 3. The general manager of Hotel Group 2 said:

> We started following most of these environmental practices after we got the service of consultants. Even before that we had some reporting structure. But the concept of Green Directory provided a good structure for us to identify, measure, and report what we do […] Also to provide the information for the Green Directory we also have to follow/change many practices.

The chief engineer of Hotel Group 3 also agreed:

> The Green Directory is a concept introduced by the environmental consultant we hired. This has now become a common practice among many hotels in the country.

This suggests that the Green Directory, a mechanism introduced by mimetic isomorphic pressure, has become a means of collecting and reporting environmental sustainability information. Further it reflects the influence of mimetic pressures in shaping the environmental management practices of organizations in the internal and external integration stages.

Although the influence of mimetic pressures is visible in organizations in both internal and external integration stages, it is more visible in organizations in the external integration stages, as revealed by Hotel Group 3. In this regard, the influence of the GRI reporting system is clearly evident in the environmental management practices of Hotel Group 3 (Grob and Benn, 2014). Though all the hotels in this study are listed in the country's Stock Exchange, it is only Hotel Group 3 that prepares a sustainability report based on GRI guidelines. The accountant of Hotel Group 3 stated:

> We usually benchmark the sustainability leaders in and outside our industry and their reporting practices […] And we also continuously endeavour to improve our sustainability reporting based on GRI Guidelines […] To comply with GRI guidelines we have to push the hotels to follow a lot of practices here.

Confirming this view, the general manager of Hotel Group 3 stated:

> I think the biggest factor that streamlined our practices was the adoption of GRI guidelines for reporting sustainability. It enabled us to have a very structured approach [for corporate environmental management] for many of the environmental factors such as energy, water, carbon, etc. […] It also provided us evidence of how far we have improved compared to previous years.

This is in line with the argument put forward by Schaltegger *et al.* (2006) of accounting-driven sustainability. Further, it indicates how sustainability reporting has created mimetic pressure on the environmental management practices (Grob and Benn, 2014; Windolph, Schaltegger and Herzig, 2014) of organizations in the external integration stage.

The general manager of Hotel Group 3 further stated:

> We use these aspects [i.e. unique environmental management practices] in our web sites and other promotional materials especially to attract international green-conscious guests, who we believe are a growing customer segment. Our organization has deployed a considerable amount of resources on sustainability and we always try to capitalize on what we do.

This statement provides evidence of how the organizations in the external integration phase aim to generate competitive advantage and explore emerging opportunities in the market through corporate environmental management strategies (Gunarathne and Lee, 2015; Jabbour and Santos, 2006; Roome, 1992) fostered by various mimetic and normative pressures.

The next section provides the discussion based on these findings.

5. Discussion

As revealed in our study, the effect of institutional pressures on organizations at different corporate EMM stages can be summarized as in Table IV.

	Institutional pressure for environmental management		
Stage of corporate EMM	Coercive	Normative	Mimetic
Functional specialization	Primarily driven by these pressures	Minimum consideration	Minimum consideration
Internal integration	Goes beyond these compulsory requirements	Medium consideration	High level of attention given
External integration	Goes well beyond these compulsory requirements	High level of attention given	Very high level of attention given

Table IV. Effect of institutional pressures at different corporate EMM stages

Environmental management practices of the organizations in the functional specialization stage have been largely shaped and influenced by coercive pressure in the organizational field. Hence, the environmental strategy of the functional specialization stage organizations is reactive and is set by legislation focusing on a few environmental domains such as water and waste (Berry and Rondinelli, 1998; Buysse and Verbeke, 2003; Jabbour and Santos, 2006; Ormazabal and Sarriegi, 2014; Roome, 1992). Our study also demonstrates that while combined mimetic and normative pressure has the highest influence on organizations in the external integration stages, as suggested by Bansal (2005). On the other hand, our study manifests that normative pressures too exert influence on organizations in the internal integration stages.

In general, our study highlights the lack of industry-specific regulations and governance systems as a major impediment to the progress of organizations to reach higher levels of EMM (or more broadly corporate socially responsible behavior) in developing countries, as suggested by Christmann and Taylor (2002), Herzig *et al.* (2012) and Patnaik *et al.* (2017). Most of the available legislation is general and not industry specific. Therefore, the industries can easily meet the regulatory requirements. Further, the governments of these countries have either neglected the environment in their development pursuits or have been reluctant to enact more stringent industry-specific environmental laws governing industries for fear of discouraging investments (Christmann and Taylor, 2002). They argue that "lax" environmental regulations and law enforcement are followed by developing countries to attract foreign direct investment. Hence, as seen in Hotel Group 1, most organizations may remain in the functional specialization stage without necessarily progressing toward advanced levels of EMM. Without top management support and resources, environmental management will simply be a reactive approach (Dixon-Fowler *et al.*, 2017; Jabbour and Santos, 2006; Jabbour *et al.*, 2010). In the absence of other powerful institutions such as rating agencies or industry guidelines, the role of government in developing countries is important in propelling the companies to higher levels of EMM.

As our study also reveals, many industries including the travel and tourism sector in developing countries suffer from a lack of guidance from the government or industry-specific trade associations in the adoption of systematic environmental management practices. Due to this inadequate coercive pressure many organizations have started to follow environmental management practices on a voluntary basis. However, the intensity of these voluntary actions depends on many contextual factors such as top management commitment, pressure from stakeholders and financial and technical knowhow of organizations (Chung and Parker, 2008; Gunarathne and Lee, 2015; Moreno *et al.*, 2004). This situation has inevitably resulted in various degrees of intensity in their approach to environmental management even in the same industry.

The study also reveals the important role played by environmental professionals (Bansal, 2005; Windolph, Schaltegger and Herzig, 2014) such as environmental engineers, health and safety officers or naturalists/environmentalists in implementing these environmental strategies particularly in organizations at the internal and external integration levels. However, except for the external integration stage organizations, there is an absence of or inadequacies in a structured and systematic organization-wide approach to implementing and communicating the environmental practices in organizations at other EMM stages. Influenced by normative and mimetic pressures, the deployment of specialists, resources and top management commitment (Jabbour and Santos, 2006) have helped the external integration stage organizations to explore market opportunities.

Finally, the study reveals that due to the internal and external pressures for green practices, the adoption and implementation of environment-friendly business activities is becoming crucial for the firms (El-Kassar and Singh, 2018) irrespective of their level of EMM. However, only a few firms will develop their systems and structures in response to

the various institutional pressures for sustainability (Bansal, 2005; Boiral, 2002; Campbell, 2007; Windolph, Schaltegger and Herzig, 2014). The adoption of green innovative practices that reduce the consumption of energy and generation of waste and emissions, and enhance the sustainable utilization of resources (El-Kassar and Singh, 2018) will provide a competitive edge for the firms that are at higher levels of EMM.

6. Managerial and theoretical implications

The findings of this study have several practical/managerial and theoretical implications.

We believe that they can be of relevance to industry, policy makers and regulators in both developing and developed economies. The findings point to the need for the gradual development of environmental-related institutional, governance and enforcement capacity in developing countries (Christmann and Taylor, 2002; El-Kassar and Singh, 2018; Patnaik *et al.*, 2017). Compared to developed countries, developing countries suffer from a lack of these institutional, governance and enforcement mechanisms which, in turn, act as a barrier to the achievement of SDGs. Hence, the introduction of such mechanisms should be gradual in propelling the industries smoothly toward higher levels of environmental management. Further, in developing these regulations and enforcement mechanisms there should be a process of stakeholder engagement that would not deter economic development and social acceptance. This is essential as any restrictive legislations or any other governance mechanism can hinder the rapid economic growth of these countries and limit improvements in living standards. As Campbell (2007) puts it, "corporations will be more likely to act in socially responsible ways if there are strong and well enforced state regulations in place [and if] […] these regulations and enforcement capacities were developed based on negotiation and consensus building among corporations, government, and the other relevant stakeholders" (p. 955). As there are shareholder activists who are not only financially driven but also socially driven, this process of stakeholder engagement can be beneficial in economic and social (end environmental) terms (Judge *et al.*, 2010). Hence, regulators or policy makers in developing countries should develop legislation and relevant institutional capacity through a gradual consensual process having considered potential long-term economic and social implications. On the other hand, our findings further highlight the need for holistic multi- or trans-disciplinary sustainability education to foster higher order organizational performances and outcomes through corporate environmental management strategies (Schaltegger *et al.*, 2013; Tingey-Holyoak and Burritt, 2012). As our study reveals, due to the impactful influence of normative pressure in shaping the environmental management practices in organizations at internal and external levels, there is a need for a holistic transdisciplinary (or multidisciplinary) approach to sustainability education in which the universities and professional education bodies can play an active role (Evans, 2015; Remington-Doucette *et al.*, 2013). This would pave the way for organizations to develop structured environmental management strategies to benefit from the advances in their EMM.

The theoretical implications of the study are manifold. First, it provides a new theoretical framing to analyze the different levels of EMM with the three isomorphic pressures suggested in the NIS branch of institutional theory. Although the various taxonomical explanations have been provided for corporate EMM (see Kolk and Mauser, 2002 for more details), no study has so far focused on how different isomorphic pressures can shape the environmental systems and structures of firms in an organizational field. Second, this study provides insights into corporate environmental management and institutional pressures for sustainability from the emerging economy (or developing country) context. Several scholars in the business domain have argued the need to shift the focus from developed markets to emerging markets (Singh *et al.*, 2018). Also, given the fact that most of the EMM literature has so far focused on developed countries, this study fills this gap in the literature by providing an empirical case from Sri Lanka. This is a significant contribution as developing countries have different and

weaker legislations, governance systems, institutional capacity and social infrastructure (Christmann and Taylor, 2002; Herzig *et al.*, 2012; Lee *et al.*, 2017; Patnaik *et al.*, 2017). Third, this study identifies the EMM in the non-manufacturing sector in general and hotel sector in particular. As an important sub-sector of the tourism industry, the focus of this study has been on the hotel sector, which plays a pertinent role in contributing to many of the SDGs. With this focus, our study expands the understanding of corporate environmental management beyond the commonly studied manufacturing industries (Foster *et al.*, 2000; Gunarathne and Lee, 2015; Lucas and Wilson, 2008; Moreno *et al.*, 2004). Overall, our study is expected to promote future research on corporate environmental management and its maturity in the service sector industries in the developing countries.

7. Conclusions

The study identified the influence of institutional pressures on the corporate environmental management practices of service sector organizations at different EMM levels taking the Sri Lankan hotel sector. Our study highlights the need to consider the institutional influences in the discussion of corporate EMM so as to generate a better understanding of the top-down process of diffusion and the simultaneous counter-process of invention by which the lower level organizational actors shape and change their environmental management practices. It is also suggested that developing countries lack necessary regulatory and other coercive institutional capacity or mechanisms to foster higher order EMM. Thus, the development of environmental management strategies has been largely left in the hands of normative and mimetic institutions.

Our study, however, is not without limitations. First, it is limited to a few organizations for in-depth analysis so our findings lend themselves only to cautious generalization. They can only be theoretically generalized in a contextual way (Enquist *et al.*, 2006). The three hotel groups we selected in the study are large and publicly listed. Due to their public visibility and financial feasibility, they may adopt many environmental management (or socially driven) practices when operating in a specific institutional environment (Judge *et al.*, 2010). However, it may not be representative of the hotel sector nor other industries in developing countries. In future studies, it will be insightful to consider hotels of different sizes and customer profiles. Also in this study we did not consider the influence of the business groups on the institutional context of the industry as suggested by Lee *et al.* (2017). It will also be necessary to consider other industry sectors in different developing countries too in order to obtain a better picture of the adoption of environmental management strategies in the developing country context.

Notes

1. The South Asian Association for Regional Corporation (SAARC) is an organization of eight countries including Afghanistan, Bangladesh, Bhutan, India, Nepal, the Maldives, Pakistan and Sri Lanka. SAARC region with its 1.7 billion people represent 21 percent of the world population but only occupies 3 percent of the world's land area (SAARC, 2015).
2. Green Directory is a book prepared by the hotels showcasing their various environmental management actions. The information for the Green Directory such as energy, water, waste, food, etc. is supplied by all the departments in a hotel to the engineering division.

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Critical success factors for sustainable construction: a literature review

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Abstract

Purpose – The purpose of this paper is to synthesize and evaluate the available literature with respect to critical success factors (CSFs) for sustainable construction (SC).

Design/methodology/approach – A systematic literature review (SLR) was undertaken to assist in the identification of the most pertinent papers from three publishers: Emerald, Elsevier and Wiley. The literature findings were assessed and presented relative to publication, author and contents as determined by review.

Findings – The SLR was conducted using a number of search criteria. A final set of 31 publications were detected for further examination. The characteristics in terms of publications, authors and contents of the extracted publication set were examined and discussed. A total of 35 factors were identified, distributed in five research categories. The frequency of the extracted factors within the publication set was investigated and enabled valuable quantitative and qualitative observations of current trends for SC. Interestingly, all research categories were represented in the top-counted factors, demonstrating a holistic perception of SC. Given the publication set, in most aspects, the research area examined seems to demonstrate features of an emerging field, which is not yet well established.

Research limitations/implications – SLR cannot ensure that all pertinent publications were identified, because it was tailored to a number of search criteria, although certain actions were taken to moderate this limitation. However, the outcome adequately identifies trends and offers valuable information and knowledge for SC and its successful implementation.

Originality/value – The present study presents a broad list of factors for SC, integrated from a variety of disciplines and stakeholders. The findings, therefore, provide a valuable reference for both construction professionals and practitioners attempting to implement SC. Furthermore, the list can be of use to academic scholars for further empirical work and basis for future research.

Keyword Sustainable construction, Critical success factors (CSFs), Systematic literature review, Key drivers

Paper type Literature review

1. Introduction

The need for sustainable development (SD) has been widely documented (Barbier, 1987; Reid, 1995; Clark *et al.*, 1987; Mebratu, 1998; Robinson, 2004; Redclift, 2005). According to the Brundtland Commission (1987) Report, SD is development "that meets the needs of the present without compromising the ability of future generations to meet their own needs" and requires the balance of three pillars: economic, social and environmental (Edum-Fotwe and Price, 2009; Parkin *et al.*, 2003). According to Ortiz *et al.* (2009), SD "can be described as enhancing quality of life and thus allowing people to live in a healthy environment and improve social, economic and environmental conditions for present and future generations." According to Spangenberg (2004), these conditions should equally be taken into consideration when strategies for implementing and enhancing sustainability are selected. In effect, one of the main challenges with sustainability is the high implementation costs required for changing, in some instances entirely, the sector's long-established strategies. This shifting has to include both environmental and human resource management in a globally harmonized manner so as to transform the controversial practices of the past in a responsible course of action in the future.

The scholarly literature demonstrates that the construction industry has a significant impact on the environment (Chan *et al.*, 2009; Chen *et al.*, 2010; Shen *et al.*, 2007), as well as on social and economic life (Darko and Chan, 2017; Geng *et al.*, 2012), due to its activities, and it

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has become a growing concern. The idea of sustainable construction (SC) was introduced in 1994 in the first international conference on SC (Kibert, 1994). Hill and Bowen (1997) introduced a definition of SC during that conference: according to them, SC is "creating and operating a healthy built environment based on resource efficiency and ecological design." According to Dickie and Howard (2000), SC is defined as the contribution of construction to SD, which is in agreement with Kibert's (2008) suggestion that SC be viewed as a subset of SD. Indeed, Shen *et al.* (2007) maintained, "construction sustainability performance is indispensable to the attainment of sustainable development."

According to Alwan *et al.* (2017) and Chen *et al.* (2010), construction impacts the environment through a series of factors, such as environmental pollution, climate change, carbon emissions, depletion of natural resources, generation of waste and land use changes. According to Hu *et al.* (2010), the construction industry consumes 50 percent of all extracted natural material resources and produces enormous quantities of construction and demolition waste. According to Waste and Resource Action Plan (WRAP) (2009), in developed countries, the construction sector is the largest consumer of material resources. Oyedele *et al.* (2014) argued that the continuous extraction of natural resources and other human activities causes material depletion and have an overall negative impact on the environment, affecting environmental biodiversity, increasing carbon emissions and creating other environmental risks (WRAP, 2009; Shen and Tam, 2002). Furthermore, Darko and Chan (2017) report that construction consumes more than 40 percent of world's energy, 25 percent of its water and 40 percent of its natural resources, being also responsible for over 45 percent of global waste generation (United Nations Environment Programme, 2009). In the European Union, the building sector alone consumes 42 percent of the energy consumption of the EU; more than 50 percent of materials extracted from earth; 35 percent of the greenhouse emissions; and causes 30 percent of waste generation and water consumption (Kylili and Fokaides, 2017; European Commission, 2007, 2011).

The revelation of data relating to the impact of construction on the environment has attracted the attention of politicians, administrative authorities, policy makers, construction professionals, the scientific community and consumers, worldwide (Kylili and Fokaides, 2017). The need for SC to address the factors of SD is growing, as a result of a structure of environmental, economic and social drivers. As such, and according to Yahya *et al.* (2016), SC processes have been of key importance to the construction industry for the last couple of decades. Clearly, the application of SD to the construction cycle has a wide range of application and different approaches, as Tari (2011) explained: "from the extraction of raw materials through the planning, design and construction of buildings and infrastructure, until their final deconstruction and management of the resultant waste."

Consequently, a number of literature reviews and empirical studies have been conducted to develop tools and methodologies that identify environmental impacts deriving from the activities of the construction industry at different phases of the life cycle of construction: from innovation and the consumption and reuse of resources and materials, to the procurement, design, construction, operation, maintenance, demolition and waste management, to organizational structure, regulations and environmental management programs (Al-Jebouri *et al.*, 2017; Christini *et al.*, 2004; Ghisellini *et al.*, 2018; Hill and Bowen, 1997; Engert *et al.*, 2016; Kibert, 2008; Manoliadis *et al.*, 2006; Nelms *et al.*, 2007; Ofori, 1998; Pietrosemoli and Monroy, 2013; Pitt *et al.*, 2009; Shen and Tam, 2002; Shen *et al.*, 2010; Sfakianaki and Stovin, 2002; Tam *et al.*, 2007). Moreover, policies and regulations at an international level are pushing the construction sector toward sustainability (Albino and Berardi, 2012). For example, the EU Energy Performance of Buildings Directive (European Commission, 2010), which has as its target limitation to only zero-energy buildings being built after 2020, is causing confusion to the construction sector and radical transformation in current practices (Albino and Berardi, 2012). It is interesting to note that in the studies of

both Häkkinen and Belloni (2011) and Tan *et al.* (2011), the number of customers that demand sustainable policies in construction processes is increasing. Customers prefer contractors and suppliers that are friendlier to sustainable approaches, and large companies and government agents are setting targets for sustainable techniques and management to improve the performance of their projects in sustainability.

Surprisingly enough, notwithstanding the wealth of literature published on SC, a lack of scholarly research (conceptual and empirical) is found that identifies the critical success factors (CSFs) contributing to SC. According to Rochart (1979), who first introduced the method, namely that of assessing CSFs, they are those "limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization." In other words, CSFs have a direct and serious impact on the effective and efficient performance of an organization. According to Freund (1998), CSFs are the actions a company must undertake to be successful, whereas Pinto and Covin (1989) characterized them as those organizational rules, executive procedures and environmental conditions that are crucial to the success of all types of projects. Identification of these factors is important, because it allows decision makers to focus on critical elements, which, when put into practice, will enhance chances for the successful implementation and adoption of, in the context of this study, SC; on the other hand, they can act as benchmarks for the assessment of whether the right tools are available, such as the knowledge and resources and meet the CSFs necessary for SC.

The majority of existing studies of SC examine specific case studies of, materials of, or approaches toward SC; however, their conclusions isolate the problems, limitations and barriers that prevent the successful implementation. The findings that lead to the development of the criteria for the successful implementation of SD in construction remain scant. Against this backdrop, considering the importance of construction to SD, this study synthesized and evaluated the literature on CSFs for SC. To achieve this, a systematic literature review (SLR) approach was adopted as the research methodology, as is further developed in the following section. The study explored pertinent literature and provided an understanding of the factors, updating the current literature and addressing gaps in knowledge. The following research questions were posed:

RQ1. Publication review: what are the trends in publication for specific periods of time? Which are the outlets publishing work for this research area?

RQ2. Author review: how many authors have published in the research area? What are the locations of the authors, and what is their geographical dispersion? Are new authors emerging in this area? To what degree do authors collaborate?

RQ3. Content review: what are the factors that are most often identified and could be related to the success of SC?

The structure of the paper is the following: the methodology adopted is presented first, followed by the findings of the research; then, a discussion of the main findings is given, with the conclusions, limitations and recommendations of the study coming after.

2. Methodology

Many methods have been proposed for conducting systematic reviews. Content analysis, for example, has been proven useful for inductive and deductive research on large data (see e.g. Gaur and Kumar, 2018, for a recent review); SLR, on the other hand, seems more appropriate for smaller data volumes (Tranfield *et al.*, 2003). The present study therefore undertook an SLR (Cook *et al.*, 1997; Cooper, 2010; Tranfield *et al.*, 2003), based on the work of Tranfield *et al.* (2003). An SLR is a comprehensive and reproducible method used to identify, evaluate and synthesize all available research produced by researchers, scholars and practitioners on

a particular topic area, research question or phenomenon of interest (Becheikh *et al.*, 2010; Coombes and Nicholson, 2013; Sandberg and Aarikka-Stenroos, 2014; Tranfield *et al.*, 2003). SLR is particularly suited to studying "what" and "how" issues in a literature review (Abatecola *et al.*, 2013) and identifying avenues for future research (Denyer and Tranfield, 2009) after classifying the studies concerned with these issues (Aquilani *et al.*, 2017). The review followed the guidelines for SLR proposed by Tranfield *et al.* (2003), consisting of six steps, as illustrated in Figure 1. Stages 1–3 are described further below. Stages 4–6 are described in the findings.

Definition of the problem

Over the past decade, only a limited number of papers have been published on the CSFs that are influencing SC; hence, this was an opportunity to improve and extend knowledge on CSFs related to SC. An analytical methodology has been adopted that allows for the review of alternative perspectives on the existing literature and contains three types of characteristics: publications, authors and contents. In this way, SLR documents current literature and can be beneficial for guiding future development efforts and priorities in the specific area.

Search strategy

Ghadge *et al.* (2012) found that the quality of SLR "is driven by the data sources that are used for analysis." With this in mind, taking two database experts with extensive experience in conducting SLRs (Wetzstein *et al.*, 2016), it was decided that to obtain a comprehensive view of CSFs that influence SC at this exploratory stage of research, three major research publishers should be chosen: Emerald, Elsevier and Wiley. Besides the size and significance of these organizations, they also provide good coverage for the purpose of this study and they are widely accepted in the academic world. They were also used in earlier, similar reviews (Hohenstein *et al.*, 2014). In addition, according to Levy and Ellis (2006), the most efficient way to search the literature is to use electronic resources. The three publishers' databases were searched using keywords, which prevent unbiased research expelling unnecessary material (Duff, 1996).

The review is restricted to published peer-reviewed articles in English language, published within the last decade, to ensure timeliness (Alwan *et al.*, 2017); specifically from January 2007 to December 2017. The search strategy protocol consisted of search term sustainable construction (SC) and four CSF terms, namely, success factor, critical factor, critical success factor, CSF. The search of each database used the term sustainable construction in combination with each of the four CSFs search terms, only returning a hit if the terms were mentioned in the title, abstract or keywords. This search strategy protocol was tested and modified several times to identify a final set of relevant publications for the research area. More specifically, the search term key factor was also included to increase search sensitivity. This change provided additional publications related to CSFs for SC. The search strategy was modified relative to the needs of the search engines for the relevant databases. Additional individual searches were carried out for each database to improve the quality of the overall search. During the manual search of the publications, and using the snowballing principle (Choong *et al.*, 2014), other cited articles were added.

Source: Adapted from Tranfield *et al.* (2003)

Figure 1.
Guidelines for SLR

Exclusion criteria

After the database search was completed, the findings were stored in coding sheets to keep track of the selected and rejected records and as a means of classifying selected papers (Aquilani *et al.*, 2017). A total of 67 papers were found and screened through several stages. During the first stage, duplicates were removed (12 publications, or 18 percent of the raw results). Publications unrelated to the topic were screened during the second stage (14 publications, or 21 percent of the raw results). The search terms sustainable construction, critical factors, success factors, critical success factors, CSF and key factors are not vague at all in this research area; however, as it appears, they occur with very different meanings in other fields. At the final stage, publications related to the topic of the present study but not directly focused on CSFs were also excluded (10 papers, or 15 percent of the raw results), based on a full-text screening of the publications.

After the exclusion criteria were applied, the publication set had a total of 31 publications representing 46 percent of the initial set. The set included information on the publication characteristics, such as year of publication, journal of publication, country of publication, number of authors and type of publication (i.e. conceptual, empirical) (Aquilani *et al.*, 2017). In the following sections, this study examines how this research area is developing by synthesizing and assessing the literature to address the dimensions of the research questions set in the introductory section: publication review, author review and content review.

3. Results—findings

Publications review

The analysis of the publication rate, showing how publications fluctuate over time, allows the present research to evaluate trends. Figure 2 illustrates the frequency of publications per year for the examination period (2007–2017) and assists in the evaluation of the results; it also presents a cumulative frequency to better reflect potential increases in interest during the examination period.

The number of publications fluctuates around a low average of one to three a year (with the exception of 2010 with four publications) for 2007–2015 and does not show any real increasing trend, demonstrating a low interest on the subject. For 2016–2017 the picture changes, however, and the publication rate increases.

After the publication rate comes the analysis of publication outlets, which determines the types of source that are publishing work in the specific area. For the set of 31 publications, 18 different publication outlets were identified. The publication journals used were,

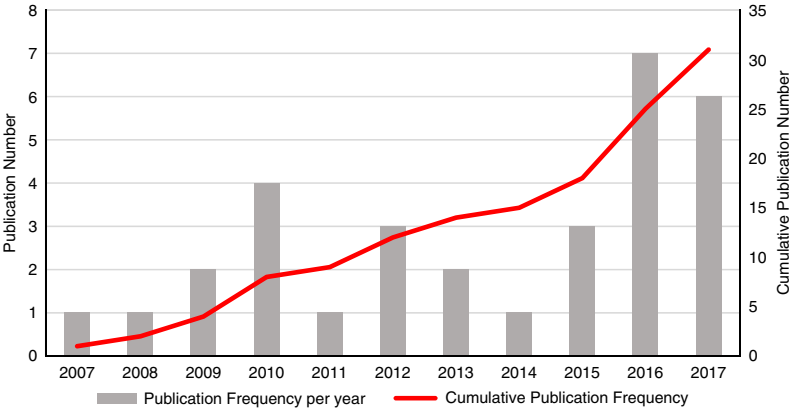

Figure 2.
Publication frequency, 2007–2017

from most to least frequent, *Journal of Cleaner Production* (four), *Renewable and Sustainable Energy Reviews* (four), *Resources, Conservation and Recycling* (four), *Building and Environment* (two), *Habitat International* (two), *Construction Innovation* (two), *Ecological Indicators* (two), *Construction and Building Materials* (one), *Automation in Construction* (one), *Energy* (one), *Energy Policy* (one), *International Journal of Sustainable Built Environment* (one), *Journal of Environmental Management* (one), *Journal of Hazardous Materials* (one), *Journal of Industrial Ecology* (one), *Permafrost and Periglacial Processes* (1), *Sustainable Cities and Society* (one) and *Waste Management* (one). The above results show that there are few important contributors (*Journal of Cleaner Production*, *Renewable and Sustainable Energy Reviews*, *Resources* and *Conservation and Recycling*), and the majority of the outlets have a low number of publications on the subject. Indeed, the distribution of publications among different outlets for this research area, with only one or two publications per outlet, is not an element of a dominant presence for publication outlets in the specific area. This may be interpreted as lack of maturity in the area examined, as Maloni *et al.* (2012) found, or it may be perceived as an indication of a growing trend.

The interrelation of co-citations to publication sources as a primary organizing attempt to form a network is shown in Figure 3 with the use of the VOSviewer scientometric software. In terms of visualization, if two publication sources are closely located in terms of distance on the map, it is an indication of strong relatedness in terms of co-citation links (van Eck and Waltman, 2018). The strongest links are being observed for *Building Environment, Energy Buildings, Journal of Cleaner Production and Resources Conservation and Recycling.*

Author review

To answer *RQ2*, the present study examined the following characteristics of the authors: quantity, diversity and collaboration. For author quantity, we examined, in the set of publications decided, the number of authors, the frequency of authors and the number of new authors publishing in the research area. In all, there were 31 publications with 108 unique authors, of whom only four repeat in our data set: Lukumon O. Oyedele, Saheed O. Ajayi, Kabir O. Kadiri and Jian Zuo, each with two publications. It is interesting to observe that the first three authors listed published together in 2014 and again in 2017. No main core of contributors for the research area has yet been established (Martin, 2012) or is emerging.

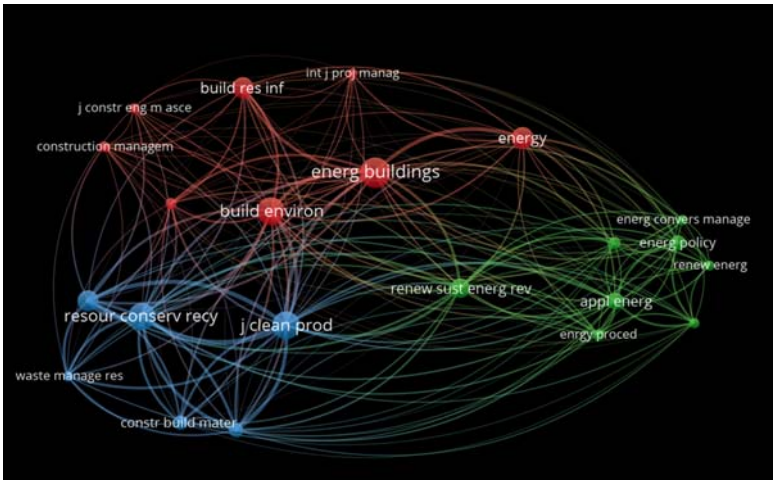

Figure 3.
Co-citation-publication sources links

Next, the frequency of new authors' publication in the research area was examined. The results are presented in Figure 4. No clear conclusions can be drawn for the data for 2007–2015, since the number of authors does not constantly increase every year. The findings for the years 2016 and 2017 clearly indicate a significant increase in the number of authors emerging in the specific research area. Overall, it is clear that the research area is attracting new authors, particularly more, over the last two years of the period of study, which can be perceived as an indication of development in the research area (Maloni *et al.*, 2012).

Next, the diversity of authors in terms of country of origin was investigated. The 108 authors represent a total of 20 countries. Most of the authors come from China (18 percent, 19 authors), the UK (16 percent, 15 authors), Malaysia (10 percent, 9 authors), Australia (8 percent, 7 authors), and India and the USA (7 and 7 percent, 6 authors each). Other countries represented in the set of publications are New Zealand, The Republic of Korea and Taiwan, each with five authors, France and Nigeria with four authors each, and a few more countries with fewer contributions. Figure 5 illustrates the geographic dispersion of the

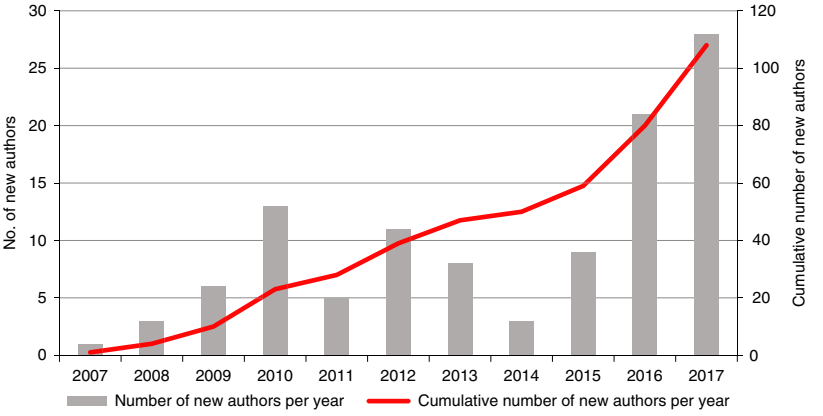

Figure 4.
Number of new authors, 2007–2017

Figure 5.
Geographic origin of contributing authors

authors of the publication set adopted. It is interesting to note that the research area has attracted interest from authors around the world, who represent all continents. There is, however, an important concentration in six countries, accounting for 67 authors. While these six countries are dispersed among four continents, which may be a promising sign, it is clear that the specific research area could further benefit from broader participation around the world. Finally, the greater concentration of authors in China and the UK may be an indication that CSF in SC is growing as a research area.

Finally, the collaboration among authors from different countries and the number of authors per paper are examined. Out of the 31 publications, only 1 was produced by one author, and the rest were produced by two or more authors. In ten publications, multi-country collaboration is seen, accounting for 32 percent of the total of publications. This is a significant percentage for such cross-border collaboration and may indicate that CSFs for SC has gone beyond the stage of emerging research, according to Borrego and Bernhard (2011). Collaborations occurred between China and the USA, China and the Netherlands, China and Australia, the UK and Nigeria, the UK and Saudi Arabia, France and Mali, and New Zealand, Canada, Malaysia. The authors of the rest of the remaining 21 publications were conducted by authors from the same country.

Content analysis

The publication set identified in the previous steps was critically reviewed and individually categorized to determine what the critical factors were for SC and develop a pertinent list following a three-step approach. The author used cornerstone publications as suggested by Rashman *et al.* (2009) based on the number of citations of the publications; Aissaoui *et al.* (2007) and DeBoer *et al.* (2001) were accordingly employed. Useful insights were also drawn from a more recent publication, that of Wetzstein *et al.* (2016). Step 1: once the publications identified were reviewed, different SC research areas were recognized, using a top-down procedure (Wetzstein *et al.*, 2016). Five distinct research categories appeared, including environmental factors, social factors, economic factors, design and techniques, and implementation, policy and regulations. Step 2: following Tranfield *et al.* (2003) and Wetzstein *et al.* (2016), a bottom-up approach was employed, in which an extensive qualitative content analysis was conducted to define an analytical set of factors to reflect the contents of the publication set that was extracted. All publications were read thoroughly to gain perspective (Sandberg and Aarikka-Stenroos, 2014) relative to the previously determined research categories. Factors were extracted from different parts of the publications, including lessons learnt, findings, limitations and barriers. Step 3: the factors identified in the previous step were consolidated and distributed amongst the different categories, making the necessary adjustments to make the final table meaningful. For example, factors that were only mentioned once in a publication, depending on the subject, were either consolidated with another factor or excluded.

At the completion of the decoding of the publication set into categories of success for SC, a total of 285 items were extracted out of the 31 papers and were mapped onto 35 distinct factors presented in Table I. The factors were allocated among the five research categories, as follows: economic factors (five), social factors (five), design and techniques (eight), environmental factors (ten) and implementation, policy and regulation issues (seven). Table I illustrates the distribution of factors per category as appear in the publication set, given the consolidations and exclusions described above. More specifically, the horizontal dimension represents the number of publications (1–31), whereas the vertical dimension distributes the identified factors in the five research categories.

Table II (Column 3) illustrates, in descending order, how often each factor appears in the set of publications as an indication of its frequency. Naturally, if one factor is mentioned several times in one publication (i.e. in the findings and in the conclusions section), it is still counted as

No. of publication/Research category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Environmental factors																
Energy efficiency/Energy consumption		x		x	x	x			x			x				x
Efficient use of resources				x	x							x				
Construction waste/Demolition waste management	x	x	x	x	x		x	x		x		x	x			x
Land use change/urban planning								x			x					
Air quality/Indoor environmental quality													x			x
Reusable/Recyclable/Sustainable materials		x	x	x	x	x		x				x			x	
Material consumption	x			x	x					x						
Pollution generation				x	x											
Climate change/Climate protection											x		x			
Carbon emissions									x				x			x
Economic factors																
Long-term cost			x	x	x				x			x	x	x		
Affordability													x			
Initial construction costs					x				x							
Construction time				x						x				x		
Production										x			x			
Social factors																
Impact on health and community				x	x							x	x			
Esthetic issues			x		x								x	x		
Awareness (i.e. techniques and specifications, public awareness, potential restrictions)		x	x				x					x				
Quality of life				x								x	x			
Stakeholder participation						x										
Design and techniques																
Environmental/economic design		x		x	x		x									
Constructability		x			x					x						
Improvement/Availability of construction techniques (i.e. off-site construction)		x						x								
Durability/prolong lifetime (i.e. regular renovations)								x		x						
Usage efficiency/flexibility										x						
Appropriate specifications/guidelines (i.e. non-toxic and hazardous materials)				x		x								x		
Use of techniques such as LCA, Leeds, etc.				x					x							
Innovation		x										x				
Implementation, policy and regulations																
Procurement system										x						
Effective legal and policy frameworks		x	x	x		x	x			x		x				
Project control guidelines										x				x		
Government support																
Education and Training							x						x			
Organizational culture																
Communication (i.e. with supply chain members, customers)																

No. of publication/Research category	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Environmental factors															
Energy efficiency/Energy consumption		x			x		x	x		x	x	x		x	
Efficient use of resources						x	x			x				x	x
Construction waste/Demolition waste management			x					x	x						

Table I.
Distribution of factors of the publication set per research category

(*continued*)

Land use Change/Urban planning												x
Air quality/Indoor environmental quality									x	x		
Reusable/Recyclable/Sustainable materials			x		x	x		x		x	x	x
Material consumption								x				
Pollution generation												
Climate change/climate protection		x							x			
Carbon emissions		x		x		x						
Economic factors												
Long-term cost						x						
Affordability						x						x
Initial construction costs	x									x		
Construction Time	x											
Production												
Social factors												
Impact on health and community										x		x
Esthetic issues												
Awareness (i.e. techniques and specifications, public awareness, potential restrictions)	x			x						x		x
Quality of life												x
Stakeholder participation												x
Design and techniques												
Environmental/economic design								x	x	x	x	x
Constructability												
Improvement/availability of construction techniques (i.e. off-site construction)	x			x						x		x
Durability/prolong lifetime (i.e. regular renovations)										x		
Usage efficiency/Flexibility								x				
Appropriate specifications/guidelines (i.e. non-toxic and hazardous materials)				x				x		x	x	
Use of techniques such as LCA, Leeds, etc.				x		x					x	
Innovation									x			
Implementation, policy and regulations												
Procurement System	x											
Effective legal and policy frameworks	x							x			x	x
Project control guidelines												
Government support											x	
Education and Training	x							x				
Organizational culture	x									x		
Communication (i.e. with supply chain members, customers)							x			x		

Notes: 1. Chateau (2007), 2. Glass *et al.* (2008), 3. Da Rocha and Sattler (2009), 4. Pitt *et al.* (2009). 5. Chen *et al.* (2010), 6. Lam *et al.* (2010), 7. Lu and Yuan (2010), 8. Hu *et al.* (2010), 9. Tsai *et al.* (2011), 10. Yunus and Yang (2012), 11. Zhang *et al.* (2012), 12. Singh *et al.* (2012), 13. Niroumand *et al.* (2013), 14. Shi *et al.* (2013), 15. Oyedele *et al.* (2014), 16. Chen *et al.* (2015), 17. Gan *et al.* (2015), 18. Hu and Liu (2016), 19. Li *et al.* (2016), 20. Marjaba and Chidiac (2016), 21. Mohammadi and Birgonul (2016), 22. Park *et al.* (2016), 23. Tripathy *et al.* (2016), 24. Woo *et al.* (2016), 25. Akinade *et al.* (2017), 26. Alrashed and Asif (2015), 27. Camara *et al.* (2017), 28. Doan *et al.* (2017), 29. Jagarajan *et al.* (2017), 30. Kylili and Fokaides (2017), 31. Oyebanji *et al.* (2017)

Table I.

one in the specific publication. Ideally, therefore, the maximum count for a factor is 31. In Column 4 of Table II, the cumulative frequency of factors is calculated. If a Pareto evaluation (80/20 rule) is to be conducted, it would be expected that a critical mass of a few factors (20 percent) would be the most frequently mentioned in the literature (80 percent) (Column 4 of Table II), influencing the successful implementation of SC; however, such relationship cannot be determined within the selected set of publications as also illustrated in Figure 6.

Research category	Factor	Factor count within the publication set	Cumulative count (%)
Environmental factors	Energy efficiency/Energy consumption	15	8.38
Environmental factors	Reusable/Recyclable/Sustainable materials	15	16.76
Environmental factors	Construction waste/Demolition waste management	14	24.58
Implementation, policy and regulations	Effective legal and policy frameworks	10	30.17
Design and techniques	Environmental/Economic design (including deconstruction design)	9	35.20
Economic factors	Long-term cost	8	39.66
Social factors	Awareness (i.e. techniques and specifications, public awareness, potential restrictions)	8	44.13
Environmental factors	Efficient use of resources	8	48.60
Social factors	Impact on health and community	6	51.96
Design and techniques	Appropriate specifications/guidelines (i.e. non-toxic and hazardous materials)	6	55.31
Environmental factors	Carbon emissions	6	58.66
Design and techniques	Use of SC techniques such as LCA, Leeds, etc.	5	61.45
Environmental factors	Material consumption	5	64.25
Economic factors	Initial construction costs	4	66.48
Economic factors	Construction time	4	68.72
Social factors	Esthetic issues	4	70.95
Social factors	Ensuring quality of life	4	73.18
Design and techniques	Improvement/availability of construction techniques (i.e. off-site construction)	4	75.42
Environmental factors	Air quality/Indoor environmental quality	4	77.65
Environmental factors	Climate change/climate protection	4	79.89
Implementation, policy and regulations	Education and training	4	82.12
Economic factors	Affordability	3	83.80
Design and techniques	Constructability	3	85.47
Design and techniques	Durability/Prolong lifetime/Enhance building stock management, i.e. regular renovations	3	87.15
Design and techniques	Innovation	3	88.83
Environmental factors	Land use change/Urban planning	3	90.50
Economic factors	Production	2	91.62
Social factors	Stakeholder participation	2	92.74
Design and techniques	Usage efficiency/Flexibility	2	93.85
Environmental factors	Pollution generation	2	94.97
Implementation, policy and regulations	Procurement system	2	96.09
Implementation, policy and regulations	Project control guidelines	2	97.21
Implementation, policy and regulations	Organizational culture	2	98.32
Implementation, policy and regulations	Communication (i.e. with supply chain members, customers)	2	99.44
Implementation, policy and regulations	Government support	1	100.00

Table II.
Factor frequency in the publication set

Indeed, Figure 6 illustrates that it is more than a few factors, approximately 20 out of the 35 totally identified, that represent approximately 80 percent of the cumulative count of factors within the set of publications and thus Pareto's law is not applicable in the present study. This means that investigation into the research area requires further effort.

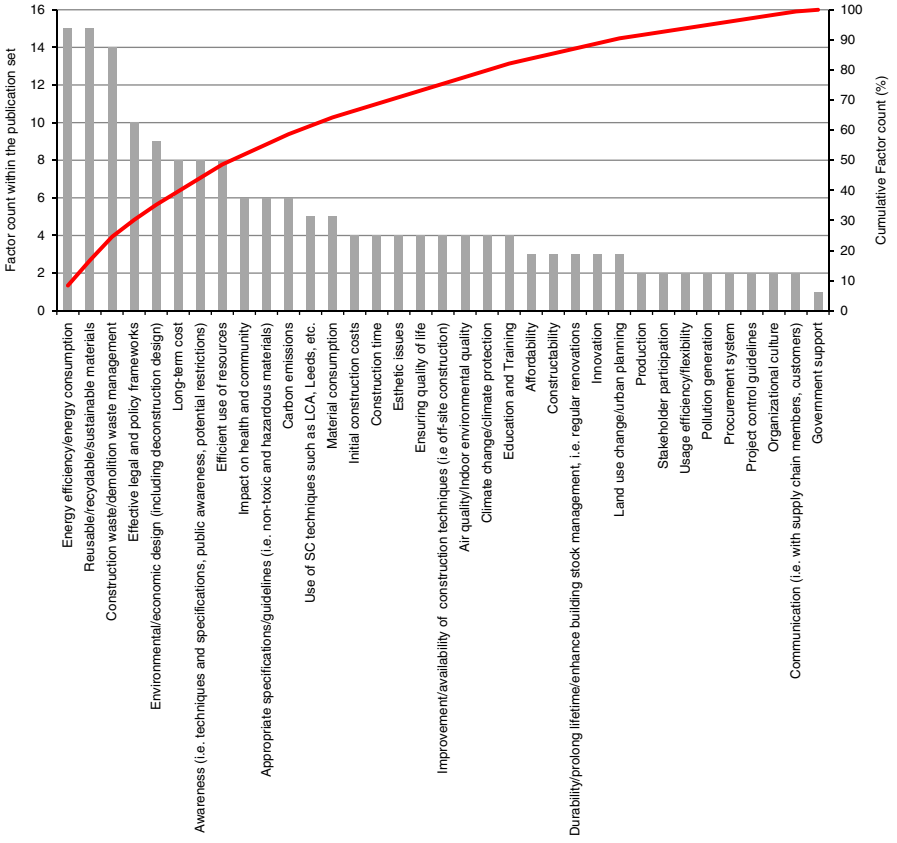

Figure 6.
Factor count and cumulative factor count (percent) within the publication set

Interestingly, almost 50 percent of the cumulative factor counts are represented by only 8 factors out of the 35. Further, within this set of eight factors, all five research categories are reflected. This finding is particularly valuable, as the publication set is derived from a variety of disciplines which represent different stakeholders. Indeed, as Lam *et al.* (2010) explained, stakeholders emphasize different categories differently; consequently, an incompatibility of interests can appear among stakeholders (Fenn *et al.*, 1997), causing conflicts and disputes. One can assume SC is coming to be viewed as a more holistic approach (in the form of SD), which needs to address several different dimensions.

From a more qualitative perspective, the top eight factors provide basis for further reflection. The research category of Environmental factors shows a strong presence, with four factors out of the eight, with energy issues, the reusability/recycling of materials and waste management being ranked at the top of the list. The identification of these environmental factors, which are on the top of the list and that have a significant appearance throughout the period of time examined, generally confirm the findings of previous research discussing the consciousness achieved in the construction sector over the years, the need for resource-efficient construction (Bock and Linner, 2010; Sfakianaki, 2015), the prominent trends for options for alternative and recycled material, the need for energy and waste management in a proactive and sustainable manner and overall improved environmental performance (Kylili and Fokaides, 2017; Manoliadis *et al.*, 2006; Pietrosemoli and Monroy, 2013; Viera *et al.*, 2016).

The Implementation, policy and regulations research category shows one factor in particular, that of effective legal and policy frameworks, which was predominant during the first years of the examination period of the specific research. It reflects the lack of proper frameworks for policy and regulation relating to SC, a lack that may have been reduced, as increasing structured contexts, regulations and guidelines have appeared and boosted SC (i.e. Chang *et al.* 2016; WRAP, 2009; EC, 2007, 2010, 2011). However, particularly in terms of construction and demolition waste, although the benefits of their management are well known, the legislation and policies that place obligation and contractors to build deconstructable facilities are not yet particularly strict (Kylili and Fokaides, 2017).

Among Economic factors, only one factor, surprisingly, comes up on the top eight list, that of long-term costs. Oyebanji *et al.* (2017) maintained that to achieve SC, it may be required to "sacrifice more on economic rather than on environmental and social issues," claiming, however, that costs cannot be neglected as a parameter, as is also confirmed by the findings shown in Table II. It is to be noted, however, that this parameter was at a higher concentration over the first years of the examination period. This may be due to the realization over time of the benefits of SC by stakeholders and the diffusion of technological innovations in the construction sector, which assists the improved implementation of methods and techniques.

In Design and techniques, only one factor, that of environmental/economic design, appears in the top eight list. This factor shows a steady and increasing tendency. Designing in a sustainable way is both cost-effective and environmentally friendly, according to Kylili and Fokaides (2017) and Oyebanji *et al.* (2017). This can be seen through the implementation of several emerging tools, such as building information modeling, which, in addition to being software, is a platform for bringing together different expertise and achieving optimal designs at an early design stage, showing rising interest (Kylili and Fokaides, 2017; Shadram *et al.*, 2016). Furthermore, environmental and economic design covers the entire life cycle of projects, including what materials are to be used to decompose a project at the end of its life. According to Kibert (2008), the paradigm shift from demolition to deconstruction is crucial, because of its significant reduction of waste and energy consumption (Akinade *et al.*, 2017). In the same vein, Sfakianaki and Moutsatou (2015) discussed adaptive reuse instead of demolition of buildings, providing, in addition to the obvious environmental benefits, respect for cultural and architectural heritage. All the above decisions are based predominantly on the initial design. Thus, the involvement of engineers and designers is imperative, because they determine to a great extent the long-term strategy related to sustainability that in turn will accrue economic benefits. However, the incorporation of sustainable elements into the design process and its acceptability among stakeholders remain limited. For example, Oyedele *et al.* (2014) criticized designers for being still hesitant to use recycled materials in construction, due to the lack of adequate information about their quality and availability, in addition to their high costs.

In the category Social factors, awareness was identified within the list of top eight factors, with a steady appearance within the examination period. More specifically, according to Jagarajan *et al.* (2017), stakeholders do not have enough access to information to convince them that SC is a valuable avenue to pursue. In addition, Da Rocha and Sattler (2009) and Abidin (2010) explained that the lack of information on SC and the specific awareness of techniques and specifications creates misconceptions, which can be overcome through informative seminars and dissemination of more information. Oyebanji *et al.* (2017) also advocated the need for the awareness of the public on sustainable lifestyles and consumption culture. Awareness is important for construction professionals and clients, and it is related to a number of topics, from techniques and specifications to potential restrictions and public information.

4. Conclusions

Sustainability is becoming a necessity, although the way that the firms decide to make this transition strongly varies between and within sectors. Certain drives, such as human rights (Li and Gaur, 2014) and diversification (Singh *et al.*, 2010), accelerate the process, whereas others, such as economic capabilities (Hwang and Gaur, 2009), reduce rates considerably. Certainly, firms have to change their philosophy (Pattnaik *et al.*, 2018) as well as their technological capabilities (Lee *et al.*, 2017) in order to pursue sustainability objectives.

The identification of pertinent publications in the context of SC and CSFs is valuable to both academic scholars and construction professionals. The SLR approach undertaken by the present study was based on α specific research protocol, which assisted in the identification of the most relevant publications available. Analyses were undertaken from 31 publications, of which 35 factors for SC were distributed in five research areas. The factors identified are by no means exhaustive or definitive, being rather exploratory.

The present study made several contributions to the literature and advanced this subject area. It introduced an analytical guide to conducting an SLR, which may be of use to other researchers conducting reviews of the literature in relation to SC or who wish to update the existing study. The results of the analyses of publications, authors and content provided in combination a good perspective on the publication set examined. Through the examination of publications, the research area seemed to fluctuate, with low averages of publication, and it is not clear whether there was an increasing trend; however, there has been much increase in interest in recent periods. It is therefore safe to assume that this is an emerging research area. There are a variety of publication outlets, but only a few of them have hosted more than a couple of publications on the subject. The indications of the author's review are rather confusing: the number of new authors emerging in the research area is growing, there is no determined set of repetitive authors for most of publications, there is a wide geographical dispersion of authors around the world and the collaboration of authors between different countries seems quite mature; despite the latter finding, most findings here suggest that the research area is still emerging. From the perspective of content, the lack of a critical mass of CSFs to predominate the SC findings further demonstrates the emerging status of the research area.

Despite this limitation, the frequency of factor counts revealed a group of eight factors that have the greatest contribution to the total count of appearance of the 35 factors (50 percent). Although they cannot be considered to be critical, they can be perceived as key drivers influencing the successful implementation of SC. These factors include energy consumption, reuse/recycling of materials, construction and demolition waste management, effective legal and policy frameworks, long-term costs, efficient use of resources and environmental and economic design and awareness; they all represent categories originally put forward by research.

Such factors express current trends and throw light on future developments. Energy legislation and building regulations (Albino and Berardi, 2012) as well as legislation for the management of construction waste (Ghisellini *et al.*, 2018) both at the national and international level suggest that the construction industry will be more closely regulated (Glass *et al.*, 2008). Another finding from the top eight factors count is that SC needs attention from different perspectives and is to be seen as a holistic approach: a variety of factors from different categories are important to ensure SC, environmental, social, economic, technical and legislative. A more significant shift is to be anticipated toward more holistic and multidisciplinary professionals, who will be able to effectively combine different issues, from building design to life cycle assessments, which are all important for SC. This evolution may not be feasible for certain individual professionals, but it is likely that they will form different types of organizations that will be better able to respond to the actions required by the government, local authorities and clients. More collaboration and alliances between stakeholders will be required to reduce or even remove the barriers of lacking or inadequate information, enhancing knowledge distribution.

Research limitations and future research

Undoubtedly, the construction industry is huge and ever growing worldwide. Sustainability is a critical factor that might become a key element to a firm's success or failure. Various aspects of sustainability have not been considered yet in a systematic way, such as corporate expansion and diversification (Gaur and Delios, 2015; Singh *et al.*, 2017), the innovation environment and the supporting national policies (Singh and Gaur, 2013), and the impact of the availability of resources on growth (Gaur *et al.*, 2014).

The SLR conducted in the present study aimed to enrich the understanding of SC and its CSFs; yet, like all surveys and reviews, it had limitations that need to be considered. Despite the efforts of the author, the findings reflected only certain aspects of each publication and did not examine the papers in depth. The research recommendations presented in each publication were not reflected in the study, although they could considerably help in advancing SC knowledge. Furthermore, the publication set was established based on a number of search criteria, from three publishers, for a specific period of time; it was therefore tailored to the available body of research for the specific conditions. It is consequently anticipated that there is a body of SC knowledge that has been excluded. However, the author believes that the databases adopted and the search and time criteria used provide a representative picture of research carried out in the domain of SC and CSFs. Finally, the examination of the publications that were included in the set required, in certain occasions, the interpretation of the author for certain aspects and their categorization; this may have increased the degree of bias in examination of the literature (Tranfield *et al.*, 2003). Nevertheless, within the limitations mentioned, the list provided in the study provides an analytical list of factors in SC and identifies trends, therefore offering valuable information and knowledge on SC.

For future research, the obvious path is the revision of the strategy research protocol in terms of publishers, the period of examination and more in-depth analysis of the screened publications. Ultimately, the target is the transition from the key drivers identified in the present research to a set of CSFs for SC. In addition, further additional empirical research will assist in the investigation of the relationship between CSFs and SC. Through addressing the above issues, future research could add an additional contribution to the knowledge of SC.

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Examining the effect of employee green involvement on perception of corporate social responsibility

Moderating role of green training

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Abstract

Purpose – The purpose of this paper is to understand the extent to which green involvement (GI) can affect employee perception of corporate social responsibility (CSR), with the intervening role of green training (GT).
Design/methodology/approach – The sample for the study was collected from employees working in tourist hotels. Exploratory factor analysis and confirmatory factor analysis was conducted to assess the fit of the hypothesized model, and hierarchical regression analysis to test the hypothesis.
Findings – The results showed that GI of employees has a positive and significant relationship with their perception of CSR. The study further revealed that when there is an increase in GT, the relationship between GI and perception of CSR gets more positive.
Originality/value – It adds value to the ongoing research in the field of environment, training and CSR. The findings will be helpful for policy makers and researchers in the field of stakeholder management.

Keywords Corporate social responsibility, Green involvement, Green training, Tourist hotel

Paper type Research paper

1. Introduction

Committed employees are the key asset of every organization (Srivastava and Dhar, 2016a). When employees stay for a longer time, it contributes toward the organizational performance (San Park and Kim, 2009). This contributes to building up of a strong culture within the organization, with higher trust and productivity and lowers employee turnover and absenteeism (Ali *et al.*, 2010; Srivastava and Dhar, 2016a). In this line, Davis and Blomstrom (1975) stated that employees stay in an organization which aims to "protect and improve both the welfare of the society as a whole and the interest of the organization" (p. 5). Employees tend to exhibit positive behavior, when they work in an organization with good corporate social responsibility (CSR) image (Riordan *et al.*, 1997). Such employees also receive positive reactions from external parties, family and friends, as Peterson (2004) stated "employees will be proud to identify with work organisations that have favourable reputation" (p. 299). Such reputation affects their job satisfaction levels and motivates them to stay in the organization. Due to this, organizations have started to use CSR measures as a tactical instrument to develop healthy relations with employees (Vitolla *et al.*, 2017). However, there is a mismatch amid concept and practice. Most of the studies conducted on CSR considered consumer's perspective, financial performance and its effects on environment (McWilliams and Siegel, 2000; Carroll, 2015; Cheng *et al.*, 2014; Wang *et al.*, 2016). Therefore, the primary aim of this study is to explore and expand the concept of CSR from the employee's perspectives.

Employees are the salient stakeholder of the organization, to whom employers have perfect obligation (Lee *et al.*, 2013). This is why employee's perception and their opinion holds a very powerful place in the organization (San Park and Kim, 2009). Past studies have shown that the organizations with higher corporate social responsiveness are sorted as more attractive by the applicants. Although, once they join, the actual conditions might

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change their perception of CSR (Brammer *et al.*, 2007). Some studies have demonstrated that employee attitudes and behaviors get strongly influenced by the degree to which they consider their organization as fair (Cropanzano *et al.*, 2001; Rupp *et al.*, 2006). Employees tend to depend on the level on the fairness perceptions to decide the trustworthiness, non-biasness and whether the organization will treat them as legitimate part, considering their contribution (Ditlev-Simonsen and Wenstøp, 2013). Therefore, we assume that there might be a cyclical relationship between employee's involvement which changes their perception of CSR in the long run. Studies have shown that employees tend to stay in such organization which exhibits responsible behavior toward society, economy and environment. CSR activities allow development of positive employee's perception toward the organization (Rupp *et al.*, 2006). A few studies have addressed the perception of CSR toward employee commitment and involvement till date (Brammer *et al.*, 2007; Cropanzano *et al.*, 2001; Lee *et al.*, 2013), although how employee commitment builds up their perception of CSR is scant. As behavior is reciprocal, studies on perception causing behavior display the one-sided aspect of this relationship. Thus, this study attempts to fill this gap by examining the behavior–perception relationship.

The perception of CSR is based on the stakeholder's theory, which implicates that company's longevity is dependent upon the commitment, knowledge and abilities of their employees and their relationship with their investors, customer and other stakeholders (Du *et al.*, 2010; Ditlev-Simonsen and Wenstøp, 2013). To update and improve the knowledge and skills of the employees, organizations need to involve them in human resource development programs like training. Srivastava and Dhar (2016b) have indicated that when training is provided for updating the information on the initiatives taken by the organization to the employees, it affects their perception. To explore this relationship, we assume that green training (GT), a program given to make employees more sensitive and aware of their social responsibilities, may have an intervening role between employee's involvement and their perception of CSR.

The main rationale for placing environmental function within CSR was propelled by an organization's holistic approach to environmental sustainability. This approach demands an organizational culture where each and every participant in the organization is dedicated to develop behavior and attitudes that would boost the organization to achieve new goals (Fatma *et al.*, 2016; Freeman and Velamuri, 2006; Weber, 2008). The area of CSR is being explored more than ever before because of its overall impact on sustainable development (Gaur *et al.*, 2014). Firms are increasingly concentrating on sustainability and the effect of environmental concerns on competitiveness and success in the long run (Paille *et al.*, 2014). Various studies have confirmed the effect of CSR on employee and other stakeholders' perception of a firm (Daily and Huang, 2001; Bhattacharya *et al.*, 2009; Lee *et al.*, 2013). However, most of the studies have been carried out in developed nations with very few scholars, acknowledging the factors that affect the perception level of individuals in the developing states (Lee *et al.*, 2013; Freeman and Velamuri, 2006; Brammer *et al.*, 2007). It is with this view to understand the context of environmental sustainability through the prism of CSR that the present study has been undertaken at a pilot level which, later, would be expanded with greater sample size. The primary objective is the evaluation of key factors that affect employee perception in the Indian subcontinent in the given background.

Therefore, the current study tries to evaluate the association amid employee involvement and perception of CSR through intervening role of GT. This paper contributes toward the literature of green initiatives and provides a collectivist culture aspect. Further, the study adds value to the intervening role of GT and related HRD practices by providing a moderating role between green involvement (GI) and perception of CSR.

2. Literature review

2.1 Green involvement

GI is crucial to organizational sustainable performance (Matthes *et al.*, 2014). GI refers to opportunities given to employees to learn green strategies and adopt them to prevent pollution and other environmental issues (Renwick *et al.*, 2013; Gupta and Gupta, 2018). The more employees are engaged and involved in environmental protection activities, the more will be their orientation and focus toward environmental responsibilities (Matthes *et al.*, 2014). Through involvement, employees can write newsletters, develop problem-solving green teams and committees. It would improve the quality of organizational environmental activities and learn (Tang *et al.*, 2018). GI aims to develop a clear development based vision in environment management along with generating a shared learning environment for environment oriented behavior. Further, it enables the development of structured and unstructured (informal) communication routes to develop an organizational culture which is inclined toward environment support. GI also allows value enhancement and problem-solving abilities on environmental related issues with the increasing awareness of practices in environmental management and to develop a culture of environmental protection (Tang *et al.*, 2018; Renwick *et al.*, 2013; Ghani *et al.*, 2017).

2.2 Green training

GT is a human resource activity which motivates employees to gain skills to understand the environmental issues, and thereby to protect the environment (Renwick *et al.*, 2013). According to Zoogah (2011), GT ends the erosion of environment-related attitudes, skills and knowledge that come with training and development practices. Such training can avail enhancement in awareness, attitudes, knowledge and skills of employees in the conducting pro-environmental activities at a workplace (Jabbour, 2011). Further, it makes individuals sensitive to their environment which can help them to carry out prevention processes (del-Río *et al.*, 2012). Tang *et al.* (2018) provided GT as training programs in environmental management to create the emotional involvement of an employee, green knowledge, attitudes, awareness and skills in environmental management and a course structure to develop management students in green activities. GT can also create a green climate through a series of programs and events like waste reduction and energy conservation at a workplace, to provide an opportunity to employees to contribute their part in environmental problem solving (Perron *et al.*, 2006). Although HRM researchers acknowledge that giving training simply cannot allow attainment of desirable results (Liebowitz, 2010), readiness, criticism and acceptability of trainees are also required (Jackson *et al.*, 2011).

2.3 Perception of CSR

CSR refers to activities that are concerned with social and environmental issues existing in the operations of every business (Van Marrewijk, 2003). It is based on the interaction of organizations with the stakeholders and aims at corporate sustainability (Patnaik *et al.*, 2017). The concept of CSR is based on the Freeman's (1999) stakeholder theory. This theory explains the relevance of stakeholders, who influence or get influenced by the activities or performance of the firm, toward a corporate success. In this line, scholars have studied from different aspects, ranging from ethical to social to environmental, depending upon the stakeholders (McWilliams and Siegel, 2000; Carroll, 2015; Cheng *et al.*, 2014; Wang *et al.*, 2016). The present study considered the environmental aspect of CSR, including activities like exploiting renewable energy in a creative procedure companionable with the environment; respecting and protecting the natural environment (Gaur and Gaur, 2009; Al Mehrzi and Singh, 2016); optimistic disposition to the usage, procurement or production of environmentally friendly goods; reducing consumption of natural resources; communicating to customer about its environmental practices; and participation in

environmental certification (Brammer *et al.*, 2007). Such behavior promotes the company as a responsible entity and thus provides them competitive advantage regarding productivity efficiency, company goodwill, loyal customers and easier access to financial resources (Garriga and Melé, 2004; Aravossis *et al.*, 2006).

2.4 GI and perception of CSR

Researchers have highlighted several factors that affect the perception and application of CSR, for instance, the extent to which there is congruence between business and corporate culture, and social needs and sincerity in organizations (Porter and Kramer, 2006; Gaur *et al.*, 2014). Recent research highlights that green employee involvement can lead to successful outcomes in a successful implementation of CSR, especially concerning environment management (Hanna *et al.*, 2000; Singh and Gaur, 2009).

Researchers have also mentioned about embedding green practices in organizations as one of the key drivers leading toward employee commitment and engagement (Renwick *et al.*, 2013; Aragón-Correa *et al.*, 2013). Several studies in countries like Canada, Belgium, Spain have found a significant relationship between the employees as proactive stakeholders in such initiatives, leading to more efficient and effective environmental management (Buysse and Verbeke, 2003; Florida and Davison, 2001) and even being instrumental in leading to reduced pollution (Chan *et al.*, 2014). While the association between employee involvement and the resultant perception toward CSR has been discussed mostly in positive light, researchers Aguinis and Glavas (2013) showed another perspective in bifurcating CSR into the following in the light of how each could impact employee perception in positive or negative light:

(1) CSR embedded in employee's job, as part of a day to day routines and operations; and

(2) CSR, as a peripheral activity, such as philanthropic or volunteering activities.

They proposed that employee involvement in CSR, as embedded in overall strategy and functioning, has a positive impact on their perception. As a peripheral entity, the impact of CSR can be negative on employees as the latter might consider it as an eye wash or simply an additional burden due to extra pressure of volunteering perceived as being added to existing work pressure. There is logic in making CSR a way of life rather than a mere fulfilment of a compliance. Earlier, this psychology of employees was reflected in Jones and Davis's (1965) correspondent inference theory, and in the causal attribution theory of Kelley (1973), who concluded that people would make dispositional attributions for behavior that is voluntary than obligatory. Additionally, they would volunteer only for causes they feel strongly about. When CSR becomes an integral part of the organizational functioning, employees are therefore more likely to perceive their involvement as integral to the organizational objectives. Encouraging GI of employees requires constant engagement with them by providing them ample opportunities toward day to day functioning, quality initiatives and processes. In summary, organizations must identify a proactive approach to making the best of their people, the human resources, to achieve environmental goals under CSR. Such proactive initiatives would add value to governance and firm strategic choices in emerging markets (Li and Gaur, 2014; Singh and Gaur, 2013) Hence, in the light of this understanding, it is hypothesized that employees' GI would affect their perception of CSR.

2.5 GT as a moderator

Training is considered as a tool to infuse skills, knowledge and awareness (Srivastava, 2017). Some studies consider training as instrumental toward attaining employee's positive work behavior. However, some consider that training can play an independent role rather

than a direct effect (Srivastava and Dhar, 2016b; Ehrhardt *et al.*, 2011). Although the effectiveness of training is dependent on attitude and acceptance level of employees, in this background, Bernstein (1992) writes that "managing [change] is impossible without employee participation. Participation is impossible without understanding." Sensitizing employees toward the importance of green initiatives and endeavors culminating in CSR activities is crucial for organizations and training could be an enabler in this context (Shree, 2017). Training has the potential to influence employee behavioral outcomes and commitment (Paul and Anantharaman, 2004; Srivastava and Dhar, 2017). Scholars like Snell and Dean (1992) and Srivastava and Dhar (2015) have also highlighted that employee perceptions of training programs constitute an integral part of HRD practices and have a moderating effect on their behavioral outcomes. Therefore, based on this perspective, this study considers GT as intervening the channel of GI and perception of CSR. In other words, when GT is higher, the GI of employees toward a perception of CSR will be higher. Contrary to this, when GT is poor, the effect of GI in developing the healthy perception for CSR activities will decline. Thus, we propose the following hypotheses:

H1. Employee GI would affect employee perception of CSR.

H2. Employee GI and their perception about CSR would be moderated by GT.

3. Methodology

3.1 Sample and data

The samples for the study were selected through random sampling method from tourist hotels operating in different regions near Pune, Maharashtra, India. The survey method was used for data collection. Out of 130 questionnaires distributed among hotel employees, 76 complete responses were selected, through screening for outliers and missing values. The completed questionnaires were collected personally by the investigators in coded envelopes to maintain the anonymity and confidentiality of the respondents. Majority of the employees were males with the average education of graduation. The total time involved in the data collection process was eight months. The demographic details of the sample are given in Table I.

3.2 Measures

GI was measured through the six-item scale provided by Tang *et al.* (2018); The sample questions included "Clear developmental vision in environment management," "Mutual learning climate for green behavior."

GT was also measured through the four-item scale provided by Tang *et al.* (2018); the sample questions were "Develop training programs in environment management."

Demographics	Frequencies	Percentage
Age		
20–29	3	3.9
30–39	20	26.3
40–49	36	47.4
50–59	14	18.4
60 and above	3	3.9
Gender		
Male	52	68.4
Female	24	31.6

Table I. Demographic details

The perception of CSR was evaluated through the six-item CSR scale provided by Fatma *et al.* (2016). The sample questions were "communicates to its customer about its environmental practices."

The Cronbach reliability results are provided in Table II.

3.3 Analytical approach

In this study, exploratory factor analysis was carried out to evaluate the measures while confirmatory factor analysis was conducted to evaluate the good fit of the hypothesized model. Hierarchical regression analysis was conducted to test the direct and indirect effect hypothesis (Figure 1). SPSS and AMOS statistical packages were used to conduct the tests. Reliability and validity tests were also conducted to check the consistency of the measures used in the study (Gaur and Gaur, 2006).

4. Findings

This study aimed to analyze the extent of GI of an employee in a service industry and its relationship with perception of CSR with the intervening role of GT. To evaluate the suitability of the measures for this study, exploratory factor analysis for each scale was conducted. EFA was carried out by using the Promax oblique rotation method and the maximum likelihood technique to recognize the availability of dimensionality of the attributes of the variable used in the hypothesized model. Primarily, Kaiser–Myer–Olkin (KMO) test results were checked for sampling adequacy. Further, Bartlett's test for sphericity results was evaluated to verify the suitability of the factor analysis (Kaiser, 1974). KMO result for GI was 0.882, $p = 0.000$; for GT, 0.809, $p = 0.000$; for Perception of CSR, 0.833, $p = 0.000$. Barlett's test result for GI was 1,013.59; for GT, 770.84; for perception of CSR, 1,028.21 (Tobias and Carlson, 1969). These results indicated that the sample was adequate for further usage of scale in this context of the study. Cattell (1966) combined screen test indicated that all the items of each measure loaded onto a single factor, thus rejecting the idea of mentioning dimensions.

Supplementary to this, Cronbach's α test was carried out to examine the reliability of the measures. Cronbach's α estimates for each construct as shown in Table II.

	Composite reliability	Cronbach's α	AVE	MEAN (SD)	Correlation		
Green involvement	0.984	0.987	0.909	3.05 (1.64)	*0.954*		
Green training	0.992	0.993	0.968	2.73 (1.43)	0.144***	*0.984*	
Perception of CSR	0.991	0.990	0.948	2.82 (1.29)	0.361***	0.350***	*0.974*

Note: The values in diagonal are the square root of AVE estimates

Table II.
Descriptive and validity results

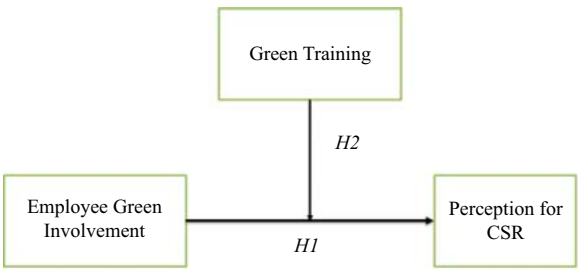

Figure 1.
Hypothesized model

To examine the validity of constructs, two tests were conducted—discriminant validity and convergent validity. To examine the convergent validity, factor loadings of average variance explained (AVE) estimates and composite reliability for each scale. The loadings for GI ranged from 0.888 to 0.994; for GT, it ranged from 0.986 to 0.991; and for the perception of CSR, it ranged from 0.947 to 0.983. As loadings were all above 0.40, composite reliability all above 0.70 and AVE estimates all above 0.50 (Fornell and Larcker, 1981) (see Table II), this showed that all the measures used in this study sustained the convergent validity. It means that items of each scales converged to that respective single construct. In other words, these results assured that each item represents expected factor structures and each variable was independent. To examine the discriminant validity, comparison of squared root estimates of AVE estimates of each construct was done with correlation estimates. As the correlation values of that respective columns and rows (see Table II) is less than the square root AVE estimates, this indicates the discriminant validity of the measures (Fornell and Larcker, 1981). It means the variables are differently observed by the respondents.

Next, to evaluate the suitability of hypothesized model, confirmatory factor analysis was carried out. The results given below in Table III indicate that model has a good fit.

The results showed that the hypothesized model has a reasonable fit with of $\chi^2/(\text{df}) < 3$ NFI > 0.90, CFI > 0.90 (Holmes-Smith, 2000). Though the RMSEA was not below 0.08, this might be due to the smaller sample size. Considering this model as fit, further hierarchical regression analysis was conducted, the results for which are given in Table IV. Supporting *H1*, GI has a positive and significant relationship with employee perception of CSR.

The significant relationship of employee GI with a perception of CSR shows that for every 1 unit of increase in green employee involvement, there is an increase of 0.348 unit of perception of CSR (see model 2). Significant association of GT on the perception of CSR indicates that every 1-unit increase in GT schedules improves the perception of CSR by 0.289 units.

Slopes for GI at each level of GT are given in Figure 2.

The values for quantitative moderators are the mean and/minus one SD from the mean (Aiken and West, 1991). The result indicates that at the low level of GT ($B = 0.11$, $p > 0.05$), there is no association between GI and perception of CSR. Though at the average level (to mean) ($B = 0.28$, $p < 0.05$), every GI tends to affect 0.28 units of perception of CSR. Similarly, for higher level (to mean) ($B = 0.44$, $p < 0.05$) of GT, every unit of GI affected 0.44 units of perception of CSR. Likewise, as the lower- and upper-class interval for above means is non-zero, this supports the indirect effect of high GT on high GI, leading to a high perception of CSR (LLCI = 0.0728, ULCI = 0.8185). Thus, it can be inferred that as the GT increases, the relationship between GI and perception of CSR gets more positive with the higher GT. Thus, *H2* is supported that GT has a moderating effect in strengthening the relationship between GI and perception of CSR (Figure 3).

5. Discussion

This study aimed to evaluate the employee behavior (GI) and its relationship with their perception (perception of CSR). The relationship was examined with an intervening role of HRD practices (GT).

Results of factor analysis supported each of the constructs as first-order constructs. This outcome explained that each of the items of the measures used in the study loaded onto

Table III. Confirmatory factor analysis results

	NFI	CFI	χ^2	Degree of freedom	χ^2/df
Estimates	0.936	0.965	196.213	94	2.08

Model No.		Perception of CSR β coefficient	R^2
1.	*Control variables*		
	Age	−0.007	0.003
	Gender	−0.118	
2.	*Control variables*		
	Age	−0.076	0.117
	Gender	−0.018	
	Independent variable		
	GI	0.348**	
3.	*Control variables*		
	Age	0.032	0.215
	Gender	−0.108	
	Independent variable		
	GI	0.268**	
	Moderator		
	GT	0.326**	
4.	*Control variables*		
	Age	0.009	0.241
	Gender	−0.104	
	Independent variable		
	GI (*A*)	0.271**	
	Moderator		
	GT (*B*)	0.289*	
	Interaction term (*A*×*B*)	0.164*	

Notes: GI, green involvement; GT, green training

Table IV.
Hierarchical regression analysis for hypothesis testing

single variable. Similarly, the correlation analysis provided that all the three constructs of the hypothesized model were positively and significantly correlated to each other, thus providing a basis for further regression analysis.

In congruence with *H1*, the regression results presented that employee's GI affected employee perception of CSR in positive and significant manner. This result supported the commitment–perception relationship literature (Srivastava and Dhar, 2016a, b). This finding showed, when employees are more involved in environment-related activities, they become more concern for environmental issues. Such awareness provides them to develop more strategies and measures to involve themselves in CSR activities.

Supporting *H2*, the regression results provided that green employee involvement and their perception about CSR is moderated by GT. This result indicates that when GT is higher, the involvement of employees toward developing a perception for CSR will improve. These results also supported an independent intervening role of attitudes toward HR practices in an organization.

6. Implications

6.1 Theoretical implications

Theoretically, the study has ensuing implications. The positive effect of GI on a perception of CSR indicates that companies should progressively focus on increasing employee

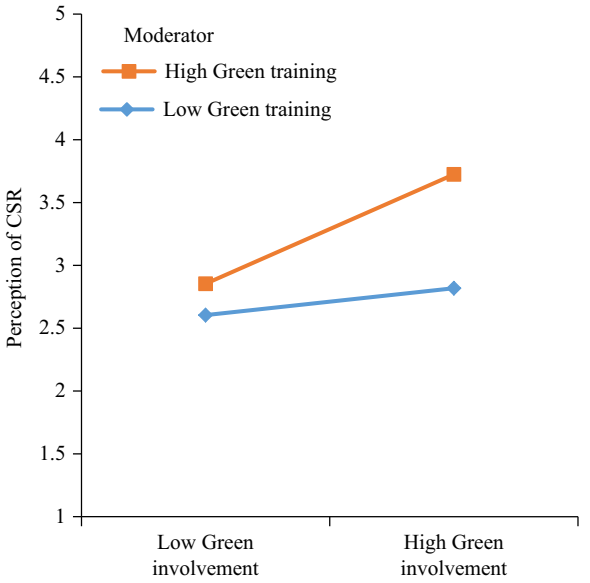

Figure 2.
Interaction effect of green involvement and green training

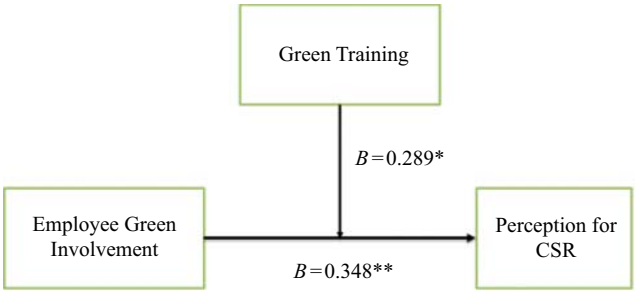

Figure 3.
Hypothesis results

orientation and involvement toward environment so that it can influence their perception of CS. This study contributed to ongoing literature by providing an employee's perspectives to CSR with specific emphasis on the environment rather than society. Further, the results of the analysis also showed the reciprocal relationship between behavior and perception, contradicting Brammer *et al.* (2007) and Lee *et al.* (2013), who supported perception causing behavior relationship.

The next result indicated that when GI interacted with GT, the subsequent positive effect on the perception of CSR was strengthened. In other words, when GT is high, the resultant positive association between GI and employee perception of CSR increases. This finding supports the moderating role of training on work outcomes (Srivastava and Dhar, 2016a, b; Flaxman and Bond, 2010). The results also supported the HRD literature on employee involvement and HR practices (El-Kassar and Singh, in press; Al Mehrzi and Singh, 2016).

The findings of this study may also extend the governance and stakeholder management literature as the perception of stakeholders like employees is very important for successful implementation of green initiatives (Singh *et al.*, 2017). Further adding to innovation and internationalization strategies of emerging market firm's studies, the findings suggest that when higher involvement is exhibited for green activities, the perception of employees

toward CSR will encourage them to innovate new green practices to resolve currently prevailing issues (Singh and Gaur, 2013; Singh *et al.*, 2010). The study also supported the findings of Gaur *et al.* (2018) who posited a resource-based view to meet CSR issues. In other words, the findings of this study add value to ongoing literature in the field and provide the diverse approach to deal with it in the future.

6.2 Practical implications

The outcomes of this study are very relevant, important and meaningful for the researchers and policy makers. It presents that the employee involvement in an organization can be enhanced by specific organizational initiatives. These initiatives may include involving employees in society-based activities and identifying and fulfilling the needs of the community. Further, this may also include involving employees in activities like making efforts to create the better environment and employee welfare, producing standard quality products for customers and complying with rules and regulations provided by the government and working within the legal setting. These activities and initiatives will surely induce effective performance by the employees. The study also encourages decision makers to design such employees-related policies which can ensure employees' morale boost-up. Additionally, it would influence employees to work in the committed manner and work effectively to uplift the organization market value. The practical implications of the study are as follows: the result implies that HR managers can build training framework in sync with green objectives of the organization for holistic results. The study also contributes by adding on employee perception of these activities or the importance of it. Here, it can be noted that delivery of training through engaging interventions as drama, could result in more effective learning *vis a vis* classroom setting (Shree, 2017). The current study pioneers the examination of employee perceptions in the light of GT, thus highlighting the importance of increasing awareness and sensitization toward green initiatives as a part of CSR.

7. Conclusion and future scope

The study outlines the fact that when employees are concerned about an organization's CSR efforts, their involvement can have a significant impact on the resultant judgments they make about such activities. Through GT, organizations could contribute to creating awareness and social consciousness amongst the employees, which, in turn, will affect their perception about CSR.

As the study is cross-sectional, future scholars are encouraged to conduct a longitudinal study. Another scope could be to conduct the similar study on a greater sample size with inclusion of more intervening (mediating and moderating) variables. A causal study of relationships between the various determinants can be another area for future research. The context was taken as a collectivist culture, i.e. India. So future study can be conducted in a country which differs in context.

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An analysis of the community perceptions of well-being

Special reference to nickel mining and processing industry

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Abstract

Purpose – The purpose of this paper is to develop and validate a measurement scale for the local community perceptions of community well-being (CWB) based on the presence of nickel mining activities in Indonesia.
Design/methodology/approach – The measurement uses the conceptual approach of CWB developed in Australia by Walton *et al.* (2014) and the multidimensional CWB model created by Kim and Lee (2014) in Korea, which applies social, economic, environmental, health, political and infrastructural dimensions. The basis of measurement in this study involves 490 communities living in neighborhoods where the nickel industry is located.
Findings – A six-dimensional scale of 29 items is proposed to measure CWB perceptions based on the presence of corporate social responsibility (CSR) by the nickel mining and processing industry.
Research limitations/implications – Despite attempting to sum up the scale by associating it with the distinctive social settings created in this study, this work did not cost much in communicating these scales. The predictive validity of the scales needs to be corroborated by new studies related to CWB construction (measured by CWB scales) with other variables specified in the literature.
Practical implications – This paper presents complete scale development and can provide policies for governments, particularly in Indonesia. Moreover, the CWB scale might be utilized by different entities (e.g. NGOs, open experts and social group media) to determine the view of genuine clients regarding the association's CSR execution.
Originality/value – Although CWB research has been done, the dimension and measurement scale of CWB in the area of recipient of the CSR program from the nickel mining and processing industry has not been studied in Indonesia. In addition, multivariate regression analysis has been frequently used for data analysis; the authors used SEM Smart-PLS as an alternative with paramount predictive accuracy.

Keywords Corporate social responsibility (CSR), Community perceptions, Community well-being, Community well-being scale

Paper type Research paper

1. Introduction

Most countries in the world differ in the way they measure the concept of well-being. Well-being is usually seen as a condition for individuals or groups, and it is often evaluated based on socially determined sets of ideals (Teghe and Rendell, 2005). In some previous studies, the concepts of economic affluence and happiness, life satisfaction, quality of life and social capital have been associated with community well-being (CWB)

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(Sung and Phillips, 2016). Beck *et al.* (1998) stated that social quality can be defined as the extent to which citizens can participate in the social and economic life of their communities in conditions that enhance their individual well-being and potential. Therefore, the social quality and CWB of each social group or community is assessed based on certain aspects, such as social, economic, environmental and political (Walton *et al.*, 2014).

Corporate social responsibility (CSR) is the commitment to maximize long-term economic, community and environmental prosperity through business practices, policies and resources (Du *et al.*, 2011). This definition provides an operational perception of CSR business practices, policies and resources related to economic, community and environmental dimensions. In a similar vein, it supports the idea that CSR is a multidimensional, reflective construction of three dimensions of economic development, social equity and environmental protection, according to an elementary dimension (Van Marrewijk, 2003). In addition, the definition of CWB combines the dimensions of social, economic, environment, political, health, and physical and residential well-being (McCrea *et al.*, 2014). Similarly, Cox *et al.* (2010) described CWB as the economic, social, environmental, cultural, and governance goals and priorities that are identified as important by a community, population group or society. CWB has been broadly studied in a range of research fields over many years. The notion of well-being became a debate among researchers, and it has been used interchangeably with quality of life, happiness and life satisfaction. Sung and Phillips (2016) stated that using CWB as an umbrella concept, related terms such as well-being, happiness, quality of life and community development play crucial roles in constructing CWB.

Knowing the dimensions of community welfare is expected to comprise a strategy for stakeholders (NGOs, governments), and related parties will facilitate community empowerment for the welfare of the community. Specifically, quantitative studies on the scale of the CWB have been conducted in the UK, Ireland and Greece (Christakopoulou *et al.*, 2001), the USA (Sirgy *et al.*, 2010), Spain (Forjaz *et al.*, 2011), Australia (Walton *et al.*, 2014) and recently by Kim and Lee (2014) in South Korea. Despite the CWB research done, the dimension and measurement scale of CWB in the area of the recipients of the CSR program from the nickel mining and industry has not been studied in Indonesia.

As a change assessment of mining activities, this study was conducted in Indonesia, and it is suspected that the different characteristic factors that cause changes in the size of the items of CWB dimensions will differ from these studies. This paper expands the scale and indicators of a previous research that play an important role in CWB, especially in measuring the impact of CSR implementation on the perfective community. Besides multivariate regression analysis (Walton *et al.*, 2014) and Rasch model analysis (Forjaz *et al.*, 2011), which was previously used for data analysis, we used SEM Smart-PLS as an alternative with paramount predictive accuracy (Bacon, 1999; Hwang *et al.*, 2010; Wong, 2010).

2. Literature review

2.1 Conceptualization: CWB

To date, well-being is still debated in the academics; there is no single universal CWB definition, but several definitions have been proposed in the literature. Wiseman and Brasher (2008) defined CWB as "the combination of social, economic, environmental, cultural, and political conditions identified by individuals and their communities as essential for them to flourish and fulfill their potential" (p. 358). Similarly, Prilleltensky and Prilleltensky (2006) defined CWB as the combination of the aspects of physical, geographical, cultural, economic, political and psychosocial needs. In contrast, Cox *et al.* (2010) argued that CWB affects economic, social, environmental, cultural and governance goals and priorities identified as important by a community, population group or society, and each incorporates economic, social and physical well-being factors (City of Calgary, 2010).

Subsequently, Cuthill (2004) described CWB as an outcome of the complex interrelationships between "democratic governance, economic development, environmental sustainability, and social equity and justice" (p. 8). He also pointed out that five key capital assets (i.e. social, human, physical, financial and natural capital) contribute to the development of CWB. In this paper, Cuthill (2004) claimed that, "CWB is the ultimate goal of all democratic governance, including that delivered by local government" (p. 9). The focus is more on the human and social capital achieved by citizen participation: from an outcome-based perspective, building human capability and social capital as a foundation for CWB. In a similar manner, Maybery *et al.* (2009) argued that one of the factors that are critical determinants for community resilience and well-being is social connectedness and social ties. From the survey, the authors in small inland rural communities in Australia demonstrate that these social capitals are the most valued in the community as a way to build CWB. A study by Finlay *et al.* (2010) reported that factors such as education, employment and working conditions, health care services, housing, social safety, communications, and special factors that depend on the community context are important for understanding community wellness. These factors contribute to the community health outcomes, especially in a distraught community, and improvement of these factors influences the renovation of a community.

Moreover, Forjaz *et al.* (2011) argued that CWB can be regarded as life satisfaction with local residence by considering attachment to it, social and physical environment, and services and facilities. This definition emphasizes the subjective evaluation of social welfare as a state existing at one point in time. Another definition of CWB is a natural environment, where human needs are accomplished and individuals and groups feel satisfied with their way of life (Armitage *et al.*, 2012).

2.2 Dimensions of CWB

Christakopoulou *et al.* (2001) argued that the welfare of a community can be measured in terms of six themes: residence, social, economic, political, personal and personal behavior. Similarly, Miles *et al.* (2008) conducted a study on the measurement of CWB, citing five policies on creating a CWB framework, namely economic, social, environment, cultural and government policies. Meanwhile, Beckley *et al.* (2002) stated that CWB can be measured based on education and income levels.

Morton and Edwards (2012) also argued that the CWB framework shown in the Community Indicator Queensland is a healthy, safe and inclusive community; a rich and vibrant cultural society; a resilient local economy in terms of competitiveness; a sustainable natural environment; and a democratic and engaged community. While Weaver and Habibov (2012) stated that human capital and social capital affect CWB, in a study of CWB under mining impact, Walton *et al.* (2014) and Kee (2017) measured that the CWB uses six meaningful dimensions: economic, social, environment, political, health, and service and facilities. In this study, we develop the CWB dimensions of Walton *et al.* (2014) and add an education dimension that is considered important (Murphy, 2010; Durand, 2015). And recently, Lee and Kim (2015) posited that CWB is a combination of five domain factors: social, economic, cultural, environmental and political factors. Table I illustrates the measurement of CWB.

3. Research method

In this section, we explain sampling design, item generation and selection of items of CWB dimensions, and then specify CWB indicators and development of new items. Finally, this is followed by preliminary measurement assessment (analysis of item validity) and testing of items (CWB scale), which are tested for content validity, reliability, convergent and discriminant validity, and their applicability to empirical studies based on the structural equation model.

Dimension of community well-being	Measurement of indicator	Author
Social, political and culture	Personal safety, community spirit, community cohesion, trust and reciprocity, community participation, informal social and interaction, decision making and citizen voice	Christakopoulou *et al.* (2001), Morton and Edwards (2012), McCrea *et al.* (2014), Kee (2017)
	Social interaction, family and home, and neighborhood	Sirgy *et al.* (2010)
Education	Facilities and human resources development	Murphy (2010), Durand (2015)
Economic or economic empowerment	Income sufficiency	Reeder and Rews (1990), Christakopoulou *et al.* (2001), Durand (2015)
	Financial support	Sirgy *et al.* (2010).
	Dynamic, resilient, economic local	Morton and Edwards (2012)
	Income sufficiency, employment and business opportunities	McCrea *et al.* (2014), Kee (2017)
	Economic growth	Ramsey and Smit (2002), Forjaz *et al.* (2011)
Environment and health	Environmental quality	Christakopoulou *et al.* (2001), McCrea *et al.* (2014), Durand (2015), Kee (2017)
	Health services	Sirgy *et al.* (2010), Morton and Edwards (2012) and McCrea *et al.* (2014)
	Appearance, climate, parks	Sirgy *et al.* (2010)
	Environment	Forjaz *et al.* (2011), Salvaris and Wiseman (2004), Wiseman and Brasher (2008), Cuthill (2002)
	Environmental quality and environmental sustainability	Walton *et al.* (2014)
	Green spaces, transportation, air quality, energy quality	Kim and Lee (2014)
	Physical and psychological health	Wan *et al.* (1982), Ramsey and Smit (2002), Etches *et al.* (2006)
Services and facilities infrastructure	Built environment services and facilities	Christakopoulou *et al.* (2001)
	Neighborhoods, education, leisure transportation and traffic	Sirgy *et al.* (2010)
	Community services	Forjaz *et al.* (2011).
	Sustainable built and natural environment	Morton and Edwards (2012)
	Services and facilities, appearance of built environment infrastructure, including roads	McCrea *et al.* (2014), Kee (2017)

Table I.
Dimension of community well-being constructs

3.1 Sampling design and item generation

This study was conducted in South East Sulawesi, Indonesia. The targets of this research were communities living around the nickel mining and processing industries. They had been exposed to nickel mining and processing activities for 45 years. There were 12 villages with a population of 6,573 people. The sampling frame of the study was based on the village who had benefitted from the CSR program (direct or indirect benefitted). The initial sample size of the study was 490, calculated using Krejcie and Morgan (1970) procedures. In this study, a standard scale development process based on the methodological proposal by Turker (2009), a new multi-item scale for measuring CWB, is designed, which includes items previously used in the literature on CWB. A total of 45 items have been obtained from the earliest researchers. In doing so, our aim is to propose an initial CWB scale with significant content validity.

The item previously used in the literature were selected by following the elimination technique of items used by Shimp and Sharma (1987), which considers five criteria to eliminate items, i.e. multiple arguments, connotation of response respondents, ambiguity, implied assumptions and more than one dimension. Based on these criteria, the number of items becomes 37 items compared with the original 45 items. Furthermore, to get the truth about the concepts of the variables measured then the validity of the content by the expert. In addition, interpretation of the item in the source language of the item to the destination language with the "standard" back translation method technique was done. Table II shows the CWB dimension and the items developed.

3.2 Selection of CWB items

In the following stage, we tested for scale reliability to detect poor item performance in measuring the CWB scale. The questionnaire was pretested in a pilot study on the local community, resulting in minor changes to some items. As this was an early stage of scale development, we decided to use a convenience sample of local community from a variety of statuses of societies who had used or received the CSR program. As much as 80 respondents were randomly selected from the local community and were given an instrument. The instrument was administered to 80 individuals, and 76 respondents answered completely. The pilot-test respondents consist of 25.7 percent women and 65.3 percent men with an average age of 37.4 years.

We used measurement of item validity by correlating item values and retaining items with factor loadings greater than 0.30 or less than −0.30. This method is considered a severe level (Suhr, 2012). Similarly, Comrey and Lee (1992) considered that the correlation coefficient (r) of each item value of 0.30 or more is acceptable for reliability. The reliability was assessed using the SPSS program with the standard of correlation coefficient values 0.35. So, the number of items of CWB deleted was three: E1-5, E1-6 and E6-4. These items have r values less than 0.35 while other items can be accepted, so the number of items selected is 34. Table III shows the reliability values of CWB items of preliminary measure.

4. Results

This section shows the results of the scale and indicators of CWB measurement, especially in measuring the impact of CSR implementation on the perfective community. The empirical results were based on the perception of recipients of the CSR program from nickel mining and industry in Indonesia.

4.1 Profiles of the respondents

The test item stage was conducted with 490 respondents with the same characteristics. Respondents were selected randomly from each area (12 villages). The proportion of the number of samples per village was based on the population. The demographic and socio-economic profiles of the respondents are presented in Table IV. The gender ratio of the respondents was almost balance: 57.5 percent were male and 42.4 percent female. About 43.2 percent were less than 35 years old and 33.5 percent were between 36 and 45 years old. The results showed that 30.4 percent of respondents attended primary and junior secondary school and 39.8 percent secondary school. Nearly half (49.6 percent) were private and self-employed and only 14.3 percent government servants. The vast majority of respondents (87.5 percent) were ordinary people and the gross monthly income distribution was almost equal.

4.2 Reliability and validity of CWB scale

In this section, we test the items using analysis of cross-loading, discriminant validity and reliability. The items that were refined (Table V) were tested with the aim to obtain the

Statement	New and adapted item
Social-culture aspect	
E1-1: every member of the community is more willing to help each other	Walton *et al.* (2014),
E1-2: every member of the community has an increasingly friendly relationship with the community	Christakopoulou *et al.* (2001)
E1-3: every member of the community works more if there are serious problems	
E1-4: you often visit someone's house	
E1-5: every member of the community is more willing to accept strangers	
E1-6: the symptoms of crime, such as theft, are diminishing in this village	New item
Economic empowerment aspect	
E2-1: the CSR presence of the company led to reduced unemployment in the village	New item
E2-2: enterprises in this village become more advance and independent	
E2-3: the strengthening of the local economy reduces the crime in this village	
E2-4: my income increased to finance life in this village	Walton *et al.* (2014)
E2-5: my income is more sufficient to finance my lifestyle	New item
E2-6: environmental mitigation activities in this village improved the farmer's productivity	
E2-7: businesses and industries in the village are getting better due to the support of capital and equipment from the company	
E2-8: more and more enterprise premises are established in this village	
Environmental aspect	
E3-1: the quality of the ground water is getting better for this village	Walton *et al.* (2014)
E3-2: the quality of river water is good for future life this village	New item
E3-3: the quality of the marine ecosystem is preserved for the future	
E3-4: noise due to the operations of the nickel mining and processing is increasingly reduced in this village	
E3.5: dust and gas due to the operations of nickel mining and processing has been increasingly reduced in this village	
E3-6: the life of flora fauna has improved in this village	
Health aspect	
E4-1: the community of this village who suffer from serious illness is decreasing	New item
E4-2: my home environment is getting more comfortable	
E4-3: I feel optimistic about the village community's cleanliness in the future	
E4-4: I feel relaxed and no longer stressful	
E4-5: I succeeded in overcoming my health problems	
E4-6: the health facilities in this village are getting better	
E4-7: the student's health status in this village is getting better	
Education aspect	
E5-1: students in this village are more comfortable learning	New item
E5-2: students in this village showed better performances	
E5-3: the number of dropout students in this village is declining	
E5-4: the more students in this village continue their study	
E5-5: the student attendance in this village is getting better	
Infrastructure aspect	
E6-1: traffic in this village is smoother and more regular	New item
E6-2: access to public transportation in this village is getting easier	
E6-3: the road accident is decreases from time to time	
E6-4: the community in this village who works outside the village is getting easier and faster	
E6-5: the farmers' products are more easily transported out to market	
E6-6: goods are getting easily transported into this village	
E6-7: the presence of community members at mosque is getting better	

Table II.
Indicator and item development of community well-being (37 items)

	Corrected item–total correlation	Cronbach's α of deleted item
Social		
E1-1	0.772	0.661
E1-2	0.682	0.720
E1-3	0.579	0.762
E1-4	0.460	0.814
E1-5	0.227	0.650
E1-6	0.187	0.740
Economic		
E2-1	0.607	0.780
E2-2	0.608	0.780
E2-3	0.616	0.780
E2-4	0.591	0.783
E2-5	0.533	0.791
E2-6	0.488	0.798
E2-7	0.414	0.810
E2-8	0.392	0.810
Environment		
E3-1	0.647	0.772
E3-2	0.617	0.776
E3-3	0.478	0.806
E3-4	0.626	0.774
E3.5	0.616	0.777
E3-6	0.485	0.804
Health		
E4-1	0.615	0.885
E4-2	0.676	0.877
E4-3	0.611	0.886
E4-4	0.705	0.874
E4-5	0.765	0.866
E4-6	0.734	0.870
E4-7	0.738	0.871
Education		
E5-1	0.745	0.817
E5-2	0.706	0.826
E5-3	0.729	0.820
E5-4	0.524	0.875
E5-5	0.728	0.824
Infrastructure		
E6-1	0.451	0.799
E6-2	0.532	0.786
E6-3	0.751	0.744
E6-4	0.305	0.866
E6-5	0.837	0.737
E6-6	0.824	0.734
E6-7	0.441	0.800

Note: Items E1-5, E1-6 and E6-4 were eliminated or deleted

Table III.
Validity value of community well-being item of preliminary measure

factor analysis that had convergent validity, which was highly standardized. Confirmatory factor analysis was used to detect items that threatened convergent validity because of low standardized loadings or high Lagrange multipliers (Cadogan *et al.*, 1999; Fornell and Larcker, 1981).

Description	Total	% of total
Gender		
Male	282	57.55
Female	208	42.45
Respondents' age (years)		
Less than 25	58	11.84
25–35	154	31.43
36–45	164	33.47
More than 45	114	23.27
Level of education		
Secondary school	195	39.80
Vocational school	64	13.06
Diploma holder	35	7.14
Bachelor degree	46	9.39
Doctor of philosophy	1	0.20
Other (primary school, junior high school)	149	30.41
Occupation		
Farmers/Fishermen	38	7.76
Government	70	14.29
Private/Self-employed	243	49.59
Former employee of firm	29	5.92
Unemployed and housewife	110	22.45
Work experiences (years)		
Less than 1	14	2.86
1–5	205	41.84
6–10	103	21.02
11–15	98	20.00
More than 15	70	14.29
Gross monthly income (IDR)		
Less than 500,000	88	17.96
500,000–1,000,000	81	16.53
1,000,000–1,500,000	113	23.06
1,500,000–2,000,000	64	13.06
More than 2,000,000	144	29.39
Social status		
Ordinary people	429	87.55
Community leader	4	0.82
Religious leader	2	0.41
Public figure	38	7.76
Custom leader	2	0.41
Local government	15	3.06

Table IV.
The demographic and socio-economic profiles of the respondents

Table VI illustrates the discriminant validity of the construct. Meanwhile, the square root of the AVE between each pair of factors is higher than the correlation projected between factors; it ratifies its discriminate validity (Hair *et al.*, 2014). The comparison of cross-loadings in Table VI shows that an indicator's loadings are higher than other loadings for its own construct in the same column and same row. Additionally, the results indicate that there is discriminant validity between all the constructs based on the loadings depicted in Table V.

Table VII shows the results of the reliability statistics of each item and the provisional decisions adopted. Each item identified as a candidate for elimination not only grants a better statistical fit to the model, but also has theoretical justification (Bagozzi, 1981).

Item	Sos-Cul	Eco-Emp	Envir.	Health	Educ.	Infra.
E1-1	0.774					
E1-2	0.688					
E1-3	0.798					
E1-4	0.598					
E2-1		0.642				
E2-2		0.740				
E2-4		0.750				
E2-5		0.680				
E2-6		0.723				
E2-7		0.723				
E3-1			0.807			
E3-2			0.790			
E3-3			0.824			
E3-4			0.692			
E3-6			0.746			
E4-1				0.643		
E4-2				0.770		
E4-3				0.752		
E4-4				0.775		
E4-5				0.776		
E4-6				0.679		
E4-7				0.660		
E5-1					0.788	
E5-2					0.787	
E5-4					0.525	
E5-5					0.726	
E6-1						0.649
E6-3						0.771
E6-7						0.764

Table V.
Factor loading after the testing of items

	Econ-Emp	Educ.	Envir.	Health	Infra.	Soc-Cul
Econ-Emp	0.711					
Educ.	0.356	0.715				
Envir.	0.504	0.308	0.773			
Health	0.560	0.459	0.582	0.724		
Infra.	0.469	0.444	0.482	0.577	0.730	
Soc-Cul	0.351	0.376	0.177	0.397	0.357	0.719

Table VI.
Discriminant validity of CWB constructs

The provisional purging of the scale was detained to determine Cronbach's coefficient α for each factor using the retained items and calculating the corresponding CR and average variance extracted (AVE) (see Table VII).

As observed, even with the elimination of the above-mentioned items, the new values of Cronbach's α and composite reliability support scale reliability. However, the AVE results show some deficiencies in the Social-Culture (Sos-Cul) dimensions, suggesting the need for elimination of items phase to improve the scale. Hair *et al.* (2014) argued that the factor loading or EVA should be higher than 0.50, so that EVA items under 0.50 should be eliminated until EVA value > 50.

Items must be eliminated to improve EVA value, and the measurement model that grants a better statistical fit to the model is: two items (E1-5 and E1-6) in the Sos-Cul dimension, one item (E6-4) in the infra dimension, one item (E2-8) in the economic empowerment (Eco-Emp)

Latent variable	Code	Loading > 0.5	EVA > 0.50	Composite reliability (CR) 0.60-0.90
Soc_Cul	E1-1	0.774	0.505	0.809
	E1-2	0.688		
	E1-3	0.798		
	E1-4	0.598		
Econ_Emp	E2-1	0.642	0.511	0.859
	E2-2	0.740		
	E2-4	0.750		
	E2-5	0.680		
	E2-6	0.723		
	E2-7	0.723		
Envir.	E3-1	0.807	0.598	0.881
	E3-2	0.790		
	E3-3	0.824		
	E3-4	0.692		
	E3-6	0.746		
Health	E4-1	0.643	0.525	0.885
	E4-2	0.770		
	E4-3	0.752		
	E4-4	0.775		
	E4-5	0.776		
	E4-6	0.679		
	E4-7	0.660		
Educ.	E5-1	0.788	0.533	0.803
	E5-2	0.787		
	E5-4	0.525		
	E5-5	0.726		
Infra.	E6-1	0.649	0.517	0.773
	E6-3	0.771		
	E6-7	0.764		

Table VII.
Results summary for reflective measurements for CWB scale

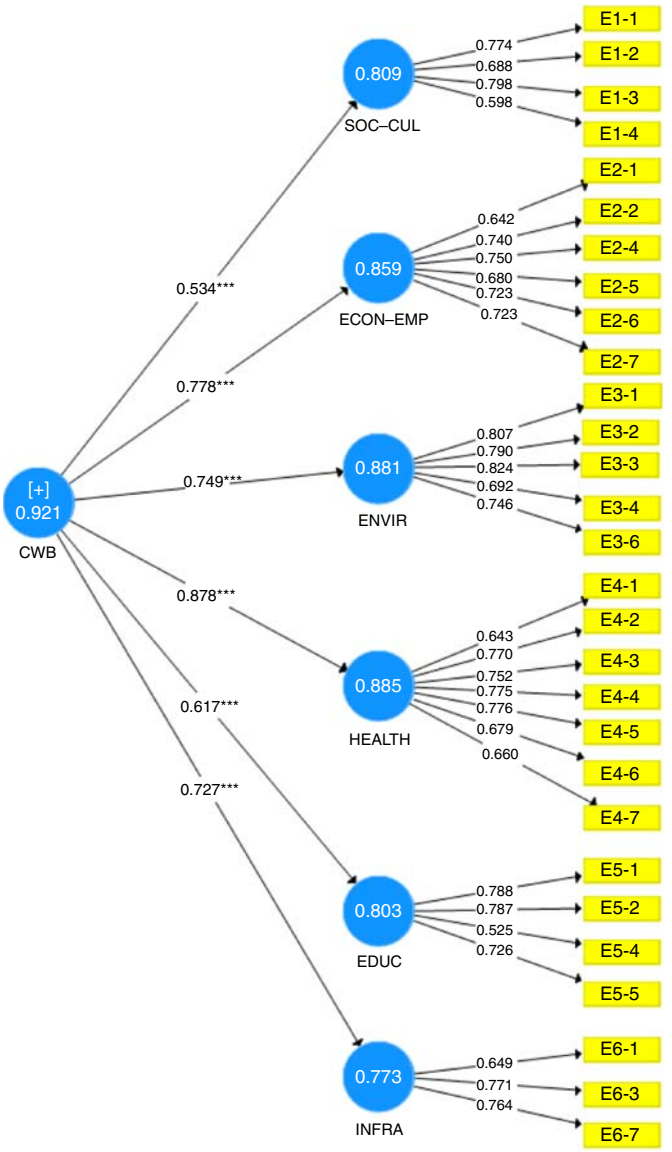
dimension, one item (E3-5) in the environment dimension, one item (E3-5) in the education dimension and four items (E6-2, E6-4, E6-5, E6-6) in the infrastructure. These items from the construct were identified as candidates for elimination because their EVA values were 0.35, 0.43 and 0.315. The results of items that were eliminated are presented in Table VII.

Data analysis was conducted with PLS 3.0. The procedure used of each item in the scale was evaluated, and reliabilities were determined for each of the six factors. We identified important instrumental factors from the literature, including CWB (e.g. Walton *et al.*, 2014; Christakopoulou *et al.*, 2001). Finally, exploratory and confirmatory factory analyses indicated the formation of 29 instruments (with six indicators total) in measuring CWB. All these reflectively measured the first-order facets of both the ID and the CWB showed CWB values for convergent validity and reliability (i.e. AVE above 0.50 and composite reliability above 0.70), as well as discriminant validity following the Fornelle and Larcker criterion (Fornell and Larcker, 1981; Henseler *et al.*, 2009) (Figure 1).

5. Discussions and conclusions

5.1 Theoretical discussion

The main contribution of this research is the development of the CWB scale, a valid measurement scale for community perceptions of CSR based on the six dimensions proposed: Sos-Cul, economics, environment, health, education and infrastructure; and some empirical studies followed to create a new scale and narrow down and test its reliability and



Note: ***$p<0.001$

Figure 1.
CWB scale after validation and final purging

validity through a confirmation approach. The latest version of the CWB scale consists of three items for Sos-Cul: five for economic, five for economic and six for environment, five for health, three for education and two for infrastructure dimensions. Table VIII presents the words and contents of each item in the final version of the CWB scale.

Table VII shows that the appearance of the item is good, the measurement of the loading factor and composite validity shows a very good value > 0.70 and an EVA value > 0.50 for each indicator and construct.

Statement	Code item
Culture-social aspect (Soc-Cul)	
Every member of the community is more willing to help with each other	E1-1
Every member of the community has an increasingly friendly relationship	E1-2
Every member of the community works more if there are serious problems	E1-3
You often visit someone's house	E1-4
Economic empowerment aspect (Econ-Emp)	
The CSR presence of the company led to reduced unemployment in the village	E2-1
Enterprises in this village become more advance and independent	E2-2
The strengthening of the local economy reduces the crime in this village	E2-4
My income increased to finance life in this village	E2-5
My income is more sufficient to finance my lifestyle	E2-6
Businesses and industries in the village are getting better due to the support of capital and equipment from the company	E2-7
Environmental aspect (Envir)	
The quality of the ground water is getting better for this village	E3-1
The quality of river water is good for this village	E3-2
The quality of the marine ecosystem is preserved for the future	E3-3
Noise due to the operations of the nickel mining and processing is increasingly reduced in this village	E3-4
The life of flora fauna has improved in this village	E3-6
Health aspect (Health)	
The community of this village who suffer from serious illness is getting less	E4-1
My home environment is getting more comfortable	E4-2
I feel optimistic about the village community's cleanliness in the future	E4-3
I feel relaxed and no longer stressful	E4-4
I succeeded in overcoming my health problems	E4-5
The health facilities in this village are getting better	E4-6
The student's health fitness in this village is getting better	E4-7
Education aspect (Educ.)	
Students in this village are more comfortable learning	E5-1
Students in this village showed better performance	E5-2
The more students in this village continue their study	E5-4
The student attendance in this village is getting better	E5-5
Infrastructure aspect (Infra)	
Traffic in this village is more smoothly and regularly	E6-1
The road accident is decreases from time to time	E6-3
The presence of community members at mosque is getting better	E6-7

Table VIII.
The result of validated community well-being items

All dimensions of CWB showed a good value, which illustrates that all the theories previously described were still closely related and supported the development of CWB item measurement, as shown by the composite validity value (Table VII).

Sos-Cul dimension, the way that the individual and local communities function socially, is intrinsic to its viability and its capability to solve the problems and exploit the opportunities that confront it. The dimension Sos-Cul contributes to CWB with a large composite validity value (CR = 0.80). Similarly with the Eco-Emp dimension, these dimensions are important in existence of local community; further availability of employment opportunities, income, local economic business and resource greatly supports the well-being of the community. This dimension has contributed to CWB with a large composite validity value (CR = 0.86). This result supports the dimensions of CWB provided by Walton *et al.* (2014), McCrea *et al.* (2014), Christakopoulou *et al.* (2001) and Sirgy *et al.* (2010). Likewise, the education dimension contributed to CWB with a large

composite validity value (CR = 0.80). This result supports the dimensions of CWB provided by Murphy (2010).

The environment dimension recognizes the meaning that the environment holds for people can run deep. The environment is not just a physical set of everyday experiences, but also has psychological significance for individuals. This dimension contributed to CWB with a large composite validity value (0.88). This result supports the dimensions of CWB provided by McCrea *et al.* (2014), Forjaz *et al.* (2011), Salvaris and Wiseman (2004), and Cuthill (2002). Further, health dimension can be considered to include physical and psychological health as well as social and economic well-being (Wan *et al.*, 1982; Ramsey and Smit, 2002; Etches *et al.*, 2006). Therefore, communities also need physical and psychological health to achieve well-being. Sirgy *et al.* (2010), McCrea *et al.* (2014) and Morton and Edwards (2012) pointed out that health service is an important aspect to measure the health dimension. This dimension has contributed to CWB with a large composite validity value (CR = 0.89).

The infrastructure dimension is necessary to support the individual and the community in all economic activity and social relation, and in their work. McCrea *et al.* (2014) pointed out that service and facilities include satisfaction with local schools, sports and leisure facilities, medical and health services, and community support services, as well as overall satisfaction with services and facilities in their local community. They have shown that one of the indicators of service and facilities is the appearance of the built environmental infrastructure, including roads. Meanwhile, Sirgy *et al.* (2010) cited neighborhoods' education and leisure transportation and traffic. Likewise, Morton and Edwards (2012) equally emphasized a sustainable built and natural environment. These dimensions contributed to CWB with a composite validity value (CR = 0.77). In summary, all dimensions discussed above supported the CWB construct; so dimensional CWB has a significant explanatory ability for community perceptions of CWB.

5.2 Managerial implications

The principle administration ramifications of this investigation were to give professionals solid and genuine instruments to quantify their view of group prosperity, specifically concerning the social, economic, environmental, health, social and infrastructure dimensions. The CWB scale can be a capable instrument to screen the adequacy of CSR programs when all is said and done. Moreover, the CWB scale might be utilized by different entities (e.g. NGOs, open experts and social group media) to determine the view of genuine clients regarding an association's CSR execution.

5.3 Limitations and future research

Despite attempting to sum up the scale by concerning it with the distinctive social settings created in this study, this work did not cost much in communicating these scales. The predictive validity of the scales needs to be corroborated by new studies related to CWB construction (measured by CWB scales) with other variables specified in the literature. In our study on the use of CWB construct and indicators, we constructed new and adopted or adapted such a dimension of CWB (Walton *et al.*, 2014) and collaborated with other researcher such as Ramsey and Smit (2002), McCrea *et al.* (2014), Durand (2015), Kim and Lee (2014), Sirgy *et al.* (2010), Christakopoulou *et al.* (2001), Forjaz *et al.* (2011) and currently, Kee (2017). While most of the items developed from several dimensions or indicators were designed by researcher as new items, other items were adopted mainly in Sos-Cul dimension. Scale measurements of variables aimed at different aspects of indicators and scales were previously conducted in some countries, such as Australia (Walton *et al.*, 2014) and America (Sirgy *et al.* (2010). Specifically in this paper, the items of CWB scale are centered around territories that have been the recipients of CSR programs from nickel mining and processing companies over a long term (over 30 years). This scale measures the community view of CWB based on the effects of CSR by the nickel industry practice.

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Environmental concern: an issue for poor or rich

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Abstract

Purpose – The purpose of this paper is to determine the role of environmental concern on brand preference. The authors also examine whether the proposed relationship is contingent upon the individual's income.
Design/methodology/approach – A conceptual model is proposed based on the theory of buyer behaviour and environmental concern. Model is empirically validated by conducting a survey using self-administered questionnaire. Measurements for each construct were adapted from literature. Partial least square based structural equation modelling is used for the hypotheses testing and confirmatory factor analysis is used for the validation of measurement model.
Findings – The authors found that brand preference is influenced by environmental concern and attitude towards the environment-friendly product. Further, social influence indirectly affects brand preference via environmental concern and attitude towards the environment-friendly product. The authors also found that income significantly moderates the relationship between social influence and environmental concern.
Originality/value – This paper provides useful guidance for the marketers of environment-friendly products for marketing to people with different income.

Keywords Brand preference, Income, Social influence, Environmental concern,
Attitude towards environment-friendly product

Paper type Research paper

1. Introduction

The topic of behavioural intention has been widely studied across industries. In recent years, the focus of many researches has shifted towards branding, the reason being that marketers are beginning to be more aware of the importance of branding in growing a business. Marketers understand that in order to make a business or company stand out in the market, creative branding is needed as widely seen in brands such as Ferrari, Lamborghini, Bentley, etc. which are amongst the top brands in the automobile industry. Green vehicles specifically hybrid cars have only been available in Malaysia for approximately 10 years (Teoh and Noor, 2015). With the current low purchase rate, hybrid cars are considered as a new product or a product in the infant stage of the product life cycle. Therefore, there is a need to study the market of green automobile in Malaysia.

Typically, consumers form preferences through brand attributes and their experiences engaging with brands. Consumers set expectations for a single product and this is achieved by the bundle of attributes promised by a company. They form a preference towards a brand when their expectations are met. Likewise, consumers will switch brand if the product performance is below expectation. Brand switching could happen due to technological advancement which enables consumers to get the latest information with minimal effort. In today's dynamic market environment, a strong brand helps sell products not only in domestic markets, but also in foreign markets (Gaur *et al.*, 2014; Singh *et al.*, 2018). Therefore, attributes of a product that have been promised are essential in shaping brand preference which ultimately leads to purchase intention as well as brand loyalty.

Apart from this, beyond consumers' increasing awareness of environmental issues, environmental concern and sustainability have also gained increasing attention from consumers and companies. Environmental issues such as air pollution caused by carbon

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emissions are closely related to human behaviour and activities. Over the years, carbon emissions by motor vehicles have been regarded as the main source of air pollution in Malaysia. As reported in Compendium of Environment Statistics 2016 (Department of Statistics Malaysia, 2016), 70 per cent of total air pollution in year 2015 is from motor vehicles. As a result, companies have begun to modify their behaviour in addressing this concern, for example, by using the opportunity to offer green products, which are believed to help improve and sustain the environment. Therefore, this study has chosen hybrid car as the green product.

People around the world are aware of the environment issues. Consumers behaviour is the main reason environmental issue happening. People are trying to solve the environmental issues by consuming green product. That is the reason of increasing numbers of minimalist and zero waste consumers around the world. According to a market survey (Lung, 2010), about 80 per cent of Malaysian consumers claimed that they are willing to pay more for green product. However, only 30 per cent of the total respondents were categorised as green consumers (Noor *et al.*, 2012). The reason of the contradict finding is mainly because of expenditure income as income determines an individual purchasing power. However, green products price is always expensive or higher than regular product. Therefore, green products become unaffordable by the consumers although they are ready to play a part in protecting the environment.

Most of the empirical studies have neglected the importance of brand preference before intention is shaped. Generally, consumers do purchase based on the preferer brands. Hence, before moving on to understand consumers' intention to purchase, we must first understand which brand is the preferred brand amongst consumers. As such, in this study, we aim to contribute to the literature on how psychological, environmental, social and socio-demographic factors could influence brand preference directly or indirectly.

2. Literature review

2.1 Theory of buyer behaviour

Theory of buyer behaviour has been widely used to examine consumer behaviour-related studies. This theory was developed by Howard and Sheth (1969) to investigate the variables affecting intention. It is also known as the Howard – Sheth model. The model is focussed on explaining brand choice behaviour specifically (Howard and Sheth, 1969). Therefore, it attempts to explain the role of a brand in decision making which is very much pertinent to this study. From the marketing perspective, the most important variable in the model is actual purchase where a purchase is made based on consumer preference. This model was developed by integrating various social, psychological and marketing predictors on consumer choice. According to Howard and Sheth (1969), the definition of alternatives in brands is made up of a small number of alternatives that the buyer is aware of. The alternative brands form an evoked set where consumers will always purchase based on this evoked set. This evoked set is essentially important where it could lead to the formation of brand preference as well as actual behaviour. That is the reason businesses or marketing campaigns always aim to establish their brand as one of the brands in the evoked set. Buyers usually make purchases based on the evoked set to satisfy their motives. Therefore, it is essentially important to make a brand the preferred brand for buyers before examining their intention.

Strong brand preferences are the result of well-established decision mediators from repeat purchase. Several decision mediators were identified by Howard and Sheth (1969). These included time pressure, financial status, personality traits, social and organisational setting, social class and culture. For example, social and organisational settings which include informal social groups (family, friends and referral groups) do affect consumers' decisions. In today's society, consumers actively search for information through social networking sites

which is another platform for discussions amongst group members. Hence, this indicates that social influence is an important variable or predictor in most behavioural studies. According to Howard and Sheth (1969), buyer behaviour is mostly influenced by the information available around the buyer. Information absence causes a longer decision-making process due to the uncertainty in terms of product characteristics, benefits and consequences especially in high involvement products. Buyers will then seek additional information in order to reduce the risks.

2.2 Brand preference

Brand preference does not always lead to actual behaviour or intention (Mellens *et al.*, 1996). However, it postulates loyalty towards the preferred brand expressed (Heilman *et al.*, 2000). Consumers would form preference towards a brand when the familiarity toward brand increase and may further affect purchase decision making (Heilman *et al.*, 2000). Anselmsson *et al.* (2008) found no evidence to indicate that consumers preferred domestic brands to international brands. However, Che *et al.* (2015) found that when there is a promotion resulting in price reduction, consumers are more likely to switch from premium (global) brands to economy (local) brands. It is also suggested that cultural, social, personal, and psychological factors should be combined in order to understand the role of each factor in developing brand preference (Ebrahim *et al.*, 2016). With this, psychological (attitude), environmental (environmental concern and fuel efficiency), social (social influence) and socio-demographic (income) factors will each be discussed in the following sections.

2.3 Attitude

Over the past decades, social psychologists have adopted the study of attitudes in terms of intra-individual cognitive structures. Individual cognitive has appeared in individuals, in the form of human individuality (Smith and Hogg, 2008). Attitudes are derived cognitively, which represents individuals' mind (Smith and Hogg, 2008). According to Ivancevich *et al.* (2010), attitudes are experiences that make an impact to individuals and then having responses to situations, people and objects that are related. Also, attitude would reflect on the social groups that is identified (Smith and Hogg, 2008). Ajzen (1985) proposed that positive attitude will lead to action.

In a study by Hsu *et al.* (2017), attitude has a significant effect towards green skincare products. This is reflective on this study which is specifically for hybrid cars (the green product in automobile industry). Also, in a recent study by Tan *et al.* (2017), it was indicative that consumer attitudes are the most effective predictors of the purchase of green products. Therefore, the following hypothesis is derived:

H1. Attitude towards environment-friendly products has a positive effect on brand preference.

2.4 Environmental concern

Over the years, environmental concern has played an important role in consumers' product and brand choice. In addition, the existence of the internet has given greater convenience to consumers in assessing information. Due to increased knowledge and information about environmental issues and green products, consumers have begun to develop greater environmental concern (Kwon *et al.*, 2016). Therefore, consumers who are more concerned about the environment are generally more familiar with the various green products available, will take the initiative to search for green products and will contribute to the consumption of green products. Thus, consumers with high environmental concern are more likely to prefer brands with green products to regular products.

Besides, consumers with environmental concern are more likely to look at product attributes which contribute to the environment before forming preferences. For instance, the main attribute of a hybrid car is that it offers consumers fuel efficiency. Therefore, the higher the environmental concern of consumers, the more likely they are to be concerned about fuel efficiency of the hybrid car. Over the years, researchers have carried out tests on the relationship between environmental concern and behavioural intention. The positive relationship between these constructs are confirmed by researchers (Albayrak *et al.*, 2013; Chan *et al.*, 2014; Chen and Tung, 2014; Hartmann and Apaolaza-Ibáñez, 2012; Tan *et al.*, 2017). However, none of the above-mentioned research have studied the influence of environmental concern on brand preference. Therefore, based on the above discussion, the following hypotheses are developed:

H2. Environmental concern has a positive effect on brand preference.

H3. Environmental concern has a positive effect on fuel efficiency.

2.5 Fuel efficiency

Product attribute has become an important consideration in the study of brand preference as it is known to affect consumers' choice as well as their preferences. According to the model by Fishbein (1965), attributes are important predictors which contribute to preference development. In a study by Chowdhury *et al.* (2016), an automobile is made up of a bundle of attributes (brand, price, car size and body style, engine power, fuel economy and fuel cost, and $C0^2$ emissions) but due to the limited green car models and brands available in Malaysia, fuel efficiency is chosen as the most prevalent product attribute. Several other researchers (Hensher *et al.*, 2011; McCarthy and Tay, 1989, 1998; Tay and McCarthy, 1991; Train and Winston, 2007) have also identified fuel efficiency as an important attribute that influenced consumer preferences and choices. Researchers have found that product-related attributes have a positive effect on consumers' brand preference (Cobb-Walgren *et al.*, 1995; Myers, 2003; Park and Srinivasan, 1994). Ebrahim *et al.* (2016) mentioned that consumers' perception about brand attributes lead to preferences which will then affect purchase intention or brand choices. Hence, the following hypothesis is developed:

H4. Fuel efficiency has a positive effect on brand preference.

2.6 Social influence

Social influence is the process of making real changes in feelings and actions when interacting with those who are perceived to be experts (Rashotte, 2007). It can also be theorised that it is the act of balancing personal interest with others (Goldsmith, 2015). According to Cialdini and Goldstein (2004) and Rashotte (2007), social influence can occur unconsciously, or indirectly whereby the majority could influence the minority and vice versa. For instance, the influences of a particular attitude from a large social group will affect individuals; and experts or teachers will influence a group of students when the teaching is consistent.

Dholakia *et al.* (2004) tested value perceptions (purposive value, self-discovery, maintaining interpersonal interconnectivity, social enhancement and entertainment value) with the social influence model (mutual agreement, group norms, mutual accommodation and social identity), and these were found to be significant with decision making and participation (desires, we-intention and participation behaviour). This indicates that social influence has a relationship with attitude. In Dagher and Itani (2012)'s research, social influences and environmental concern towards green purchasing behaviour were found to

be significant to each other. This research intends to find out if social influence has significance on environmental concern. Therefore, the following hypotheses are postulated:

H5. Social influence has a positive effect on attitude towards environment-friendly products.

H6. Social influence has a positive effect on environmental concern.

H7a. The relationship between social influence and brand preference is positively mediated by attitude towards environment-friendly products.

H7b. The relationship between social influence and brand preference is positively mediated by environmental concern.

H7c. The relationship between social influence and fuel efficiency is positively mediated by environmental concern.

H7d. The relationship between social influence and brand preference is first mediated by environmental concern and then by fuel efficiency.

2.7 Income

Ghani and Jan (2010) claimed that higher income groups have lesser restriction and problems in purchase especially impulse purchase. Among the socio-demographic factors, income may be the most significant predictor in consumer behaviour studies. This is because income determines the level of willingness to purchase and the expenditure income consumers have. However, according to Leong *et al.* (2018), income does not play a moderator role in the context of impulse purchase. Studies have indicated that incomes have significant influences on purchase (Akram *et al.*, 2016). However, very few studies have examined the moderating role of income in the relationship between social influence and environmental concern. Income plays an essential part in spending because it determines how much a person can afford to spend. For instance, individuals may have claimed that they are green consumers but due to low income, they face difficulty to act as green consumers as green products are generally more expensive than regular products. That may be the reason why in Lung's (2010) study, 80 per cent of Malaysians claimed to be green but the situation is not reflected in the statistics of actual green purchase. Besides, lower income groups tended to spend wisely by collecting reviews from their social groups regarding a product or service before spending because they are more financially restricted compared to higher income groups (Hernández *et al.*, 2011). Therefore, this paper anticipates that income may possibly moderate the relationship between social influence and environmental concern:

H8. The relationship between social influence and environmental concern is moderated by income.

3. Methodology

About 1,000 potential respondents were approached at automobile distributors' showrooms located in the most populated areas of Malaysia. This is because consumers who visited a showroom can be assumed to have interest in a brand and the intention to purchase a vehicle can be considered to be higher than those found in shopping mall. A total of 404 questionnaires were distributed to those who agreed to participate in the study out of which 306 respondents returned completed questionnaires. The questionnaire was made up of two sections, the first section comprising model-related questions while the second section consisted of demographic questions.

All responses were measured through a seven-point Likert-scale adopted from several studies as shown in Table I. Out of the 306 respondents, 147 were male while 159 were

Construct	Item	Source
Attitude (CA)	1. I like hybrid car because it is good 2. I like hybrid car because it is desirable 3. I like hybrid car because it is pleasant 4. I like hybrid car because it is wise 5. I like hybrid car because it is favourable 6. I like hybrid car because it is enjoyable 7. I like hybrid car because it is positive	Han *et al.* (2010)
Brand preference (BP)	1. I like this brand more than any other brand of hybrid car 2. This brand is my preference brand over any other brand of hybrid car 3. I would use this brand more than any other brand of hybrid car 4. This brand meets my requirements of hybrid car better than other brands 5. I am interested in buying a hybrid car from others brand. (R) (Deleted) 6. When it comes to making a purchase, this brand of hybrid car is my first preference 7. Brand is very important to define my choice of hybrid car	Hellier *et al.* (2003), Jamal and Al-Marri (2007), Overby and Lee (2006)
Environmental concern (EC)	1. Hybrid car will reduce effect of climate change 2. Hybrid car preserves the environment 3. Hybrid car will reduce the pollution level	Ozaki and Sevastyanova (2011)
Fuel efficiency (FE)	1. Hybrid car is better in fuel efficiency 2. Hybrid car is economical driving 3. Hybrid car consume less petrol	Ozaki and Sevastyanova (2011)
Social influence (SI)	1. I learned so much about hybrid car from my friends and family 2. Most members of my friends and family will expect me to buy hybrid car 3. I will follow the advice of my family that I should buy hybrid car 4. My friends recommend me that I should buy hybrid car	Sinnappan and Rahman (2011), Tan (2013)

Table I.
Measurement scales

female (refer Table II). Besides, 73.5 per cent of the respondents were aged between 21 and 38, 20 per cent were aged between 39 and 49 while the remaining respondents were above 50. Lastly, 43 per cent of the respondents had income between RM2,001 and RM4,000 while 35 per cent reported to be earning between RM4,001 and RM6,000. Majority of the respondents preferred the Toyota and Honda brands of hybrid cars which accounted for 29 and 24 per cent, respectively.

4. Data analysis

Since the conceptual model of this study involved multi-level mediation and moderation, SmartPLS 3.0 was employed to test the direct and indirect relationships as well as moderation effect. In order to test the validity of the measurement model, both convergent and discriminant validity was done (Gaur and Gaur, 2009). Once the validity and reliability of the constructs were confirmed, the structural model was tested using bootstrapping with a subsample of 5,000 (Hair *et al.*, 2016).

4.1 Measurement model

The measurement model used to describe the relationship between the indicators as well as the constructs and results are presented below.

Characteristics	Category	Frequency	Percentage
Gender	Male	147	48.0
	Female	159	52.0
Age	21–38	225	73.5
	39–49	61	19.9
	50 and above	20	6.5
Monthly Income	Less than RM2,000	25	8.2
	RM2,001–RM4,000	131	42.8
	RM4,001–RM6,000	108	35.3
	RM6,001 and above	42	13.7
Preferable brand	AUDI	37	12.1
	BMW	21	6.9
	Honda	73	23.9
	Lexus	40	13.1
	Mercedes-Benz	2	0.7
	Nissan	32	10.5
	Porsche	12	3.9
	Toyota	89	29.1
		306	100.0

Table II.
Respondents' profile

4.1.1 Convergent validity. In order to examine convergent validity, the loadings, AVE and composite reliability had to meet some threshold. According to Hair *et al.* (2016), in order to establish convergent validity, the loadings of the measured items must be above 0.7, AVE must be above 0.5 and composite reliability must be higher than 0.7. One of the brand preference item was dropped from the analysis because the loading was lower than 0.5 and the possible reason for this was because it was a negative item. As shown in Table III, the loadings were between 0.757 and 0.948, composite reliability was between 0.906 and 0.956, and average variance extracted was between 0.720 and 0.877. With this, the convergent validity of the measures in this study has been ascertained.

4.1.2 Discriminant validity. The use of Fornell – Larcker was found to be insufficient in assessing the discriminant validity because the criterion did not reliably detect the lack of discriminant validity in common research situations (Henseler *et al.*, 2015). Therefore, an alternative approach as suggested by Henseler *et al.* (2015) was used to assess the Heterotrait – Monotrait (HTMT) ratio. This study tested Forne discriminant validity using the Fornell – Larcker criterion (as shown in Table IV) as well as the HTMT ratio as shown in Table V. As shown in Table VI, all the values on the diagonals were greater than the corresponding row and column. Thus, the measures were discriminant based on the Fornell – Larcker criterion. On the other hand, there are two ways to assess discriminant validity using HTMT: as a criterion or as a statistical test. This study has used the first method to assess which is based on the HTMT value. According to Kline (2011), the $HTMT_{.85}$ value must be lower than 0.85 in order to ascertain discriminant validity. Referring to Table V, all the values were below 0.85. This indicates that discriminant validity has been ascertained. With this, the structural model is now ready to be tested.

4.2 Structural model

The use of the structural model is to examine the relationships between the constructs in the model. A bootstrapping procedure with a subsample of 5,000 was suggested by Hair *et al.* (2016) to look at the R^2, beta and the *t*-value. Additionally, effect sizes (f^2) and predictive relevance (Q^2) were also reported.

Construct	Item	Loadings	Composite reliability	Average variance extracted (AVE)
Brand preference	BP_1	0.860	0.939	0.720
	BP_2	0.883		
	BP_3	0.876		
	BP_4	0.854		
	BP_6	0.856		
	BP_7	0.757		
Attitude	CA_1	0.881	0.956	0.756
	CA_2	0.894		
	CA_3	0.894		
	CA_4	0.870		
	CA_5	0.861		
	CA_6	0.860		
	CA_7	0.825		
Environmental concern	EC_1	0.925	0.955	0.877
	EC_2	0.948		
	EC_3	0.936		
Fuel efficiency	FE_1	0.899	0.906	0.763
	FE_2	0.867		
	FE_3	0.854		
Social influence	SI_1	0.832	0.925	0.757
	SI_2	0.901		
	SI_3	0.845		
	SI_4	0.899		

Table III.
Convergent validity

Note: BP_5 was deleted due to low loading

	Attitude	Brand preference	Environmental concern	Fuel efficiency	Social influence
Attitude	*0.870*				
Brand preference	0.553	*0.849*			
Environmental concern	0.592	0.493	*0.936*		
Fuel efficiency	0.532	0.601	0.507	*0.874*	
Social influence	0.531	0.384	0.326	0.366	*0.870*

Table IV.
Discriminant validity (Fornell – Larcker)

	Attitude	Brand preference	Environmental concern	Fuel efficiency	Social influence
Attitude					
Brand preference	0.591				
Environmental concern	0.631	0.53			
Fuel efficiency	0.595	0.683	0.572		
Social influence	0.573	0.427	0.356	0.422	

Table V.
Discriminant validity (HTMT)

4.2.1 Direct effects. First, the direct relationship between the constructs in the model were examined. The predictors of brand preference, which were attitude ($\beta = 0.262$, $p < 0.01$), environmental concern ($\beta = 0.140$, $p < 0.05$) and fuel efficiency ($\beta = 0.391$, $p < 0.01$) were positively related to brand preference which explained 44.9 per cent of the variance in brand preference. Next, the predictor for fuel efficiency which was environmental concern ($\beta = 0.507$, $p < 0.01$) indicates that it is positively related to fuel efficiency which explained 25.7 per cent of the variance in fuel efficiency. Social influence was positively related to attitude ($\beta = 0.531$,

$p <$ 0.01) and environmental concern ($\beta = 0.313$, $p < 0.01$) which explained 17.1 and 28.2 per cent of the variance respectively. Thus, *H1–H6* were supported as shown in Table VI. According to Cohen (1988), R^2 value greater than 0.02, 0.13 and 0.26 suggested a weak, moderate and substantial model, respectively. As all the above R^2 values are above 0.13 and 0.26, this indicates a moderate and substantial fit to the model. Cohen (1988) suggested a range of the f^2 value whereby 0.02, 0.15 and 0.35 indicate small, medium and large effects, respectively. With the f^2 value in Table VI, it indicates that three relationships have small effect size, two relationships have medium effect size and one relationship has large effect size. Further to that, the predictive relevance of the model was also assessed using blindfolding procedure. The model is concluded to have sufficient relevance if Q^2 value is more than 0 (Hair *et al.*, 2016). As shown in Table VI, it is concluded that the model has medium predictive relevance where all the Q^2 values are ranging from 0.136 to 0.300 (Hair *et al.*, 2016).

4.2.2 Indirect effects. Next, the indirect relationships between the constructs in the model were assessed. The relationships between social influence and brand preference were mediated by attitude ($\beta = 0.139$, $p < 0.01$) and environmental concern ($\beta = 0.044$, $p < 0.05$). In addition, the relationship between social influence and fuel efficiency was mediated by environmental concern ($\beta = 0.159$, $p < 0.01$). Thus, *H7a–H7c* were supported (refer to Table VI). Furthermore, a multi-level mediation between social influence and brand preference was found. Environmental concern and fuel efficiency were found mediating the relationship as a single path ($\beta = 0.062$, $p < 0.01$). Hence, *H7d* was supported as shown in Table VI.

4.2.3 Moderating effect. Lastly, the interaction between social influence and environmental concern was created to test the moderating effect of income. When the interaction effect was entered into the model, the R^2 increased to 0.171 from 0.107, giving an R^2 change of 6.4 per cent. The interaction effect was significant ($\beta = -0.190$, $p < 0.01$). However, the finding shows a negative moderating effect between social influence and environmental concern. Thus, *H8* of this study was also supported (refer to Table VI).

5. Discussion

Based on the results of the hypotheses testing, various insights into brand preference were found with regards to the hybrid car as product. Through these findings, research questions were optimally addressed. First, the study demonstrated that social influence, environmental concern, fuel efficiency and attitude significantly influenced brand preferences directly and indirectly. Second, this paper's systematic review (Gaur and Kumar, 2018) of the extant

Hypothesis	Relationship	β	SE	*t*-value	R^2	f^2	Q^2
H1	Attitude → Brand preference	0.260	0.068	3.849***	0.449	0.072	0.300
H2	Environmental concern → Brand preference	0.140	0.062	2.257***		0.021	
H3	Environmental concern → Fuel efficiency	0.507	0.064	7.897***	0.257	0.346	0.185
H4	Fuel efficiency → Brand preference	0.391	0.059	6.605***		0.183	
H5	Social influence → Attitude	0.531	0.051	10.502***	0.282	0.393	0.196
H6	Social influence → Environmental concern	0.313	0.063	4.953***	0.171	0.117	0.136
H7a	Social influence → Attitude → Brand preference	0.139	0.038	3.694***			
H7b	Social influence → Environmental concern → Brand preference	0.044	0.022	1.965***			
H7c	Social influence → Environmental concern → Fuel efficiency	0.159	0.046	3.451***			
H7d	Social influence → Environmental concern → Fuel efficiency → Brand preference	0.062	0.020	3.064***			
H8	Social influence × Income → Environmental concern	−0.190	0.045	4.195***			

Notes: *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table VI.
Hypotheses testing

literature suggests that most prior studies focused on understanding purchase intention by adapted or adopted theory of planned behaviour (Dean *et al.*, 2012; Hsu *et al.*, 2017; Johe and Bhullar, 2016; Ko and Jin, 2017; Ng *et al.*, 2017; Tan, 2013; Tan *et al.*, 2017) has neglected the focus on brand preference (Che *et al.*, 2015; Chowdhury *et al.*, 2016; Ebrahim *et al.*, 2016). Fuel efficiency appears to be the most significant predictor for brand preference. This mean that consumers develop brand preference based on product attributes specifically fuel performance in hybrid cars. This finding is in line with the studies by Chowdhury *et al.* (2016) and Ebrahim *et al.* (2016).

Perhaps surprisingly, income was found to moderate the relationship between social influence and environmental concern. This shows that the higher the income, the weaker the relationship between social influence and environmental concern. This means that social influence is more prominent for people at the lower income group. This might be because people with lower income are found to be more collectivist or family oriented where family and friends are more important to them (Hofstede, 2001). On the other hand, people at the higher income group are more individualistic and are usually the ones to influence rather than be influenced. This result is consistent with findings by Fang (2010), who noted that tourists with high income are less likely to travel in a group thus indicating that higher income tourists are more individualistic and usually avoided travelling in a group.

Additional finding was found in this study through the preliminary question. One preliminary question was asked to identify the preferer automobile brand among the respondents. Surprisingly, Honda, the top hybrid car seller was not the most preferer brand. Toyota is the top preferer brand accounted 29.1 per cent followed by Honda (23.9 per cent), Nissan (10.5 per cent) and others included Lexus (13.1 per cent), AUDI (12.1 per cent), BMW (6.9 per cent), Porsche (3.9 per cent) and Mercedes-Benz (0.7 per cent).

6. Implications

Theoretically, this study fills the gap by building a model that studies brand preference based on psychological, environmental, social and socio-demographic factors. This is unlike the Fishbein's model which focused on testing product-related attributes without taking into consideration other situation factors. The findings of this study show the importance of other situation factors together with product attribute. However, each consumer will have different sets of attributes that they perceived as important. Therefore, marketers need to identify the most significant set of attributes that is able to build consumers' preference whenever marketing communication is held.

Furthermore, income does play an important role when purchasing high involvement products. This is because income reflects one's ability to afford products/services. Different income groups will have different concerns towards the environment. The results of this study show that higher income group tended to become the influencers whereas the lower income group tended to be influenced by family and friends due to the uncertainty (i.e. risk) they perceived. This indicates that income level is an important factor in the preservation of the environment. Therefore, the interacting effect of income has contributed to the model. This also allows marketers to be more discerning when devising marketing plans. By differentiating the income groups, marketers can use different strategies to target people from different income groups.

Marketers should then focus on fuel efficiency to gain consumers' brand preference as it was the most significant variable in this study. This is because Malaysian fuel price fluctuates from week to week. Therefore, fuel efficiency has become a concern for consumers when purchasing a vehicle. In order to increase consumers' preference towards a brand, marketers can provide information such as the average fuel consumption per kilometre and also make use of social media or social influencers to influence consumers' attitude towards hybrid cars, thus gaining consumers' brand preference. Social media sites can be used to promote green products and raise consumers' environmental concern. This study also found

that it was more effective to target low-income groups than high-income groups through social media as the low-income groups were found to be the most active social media users.

Any company who wants to enter the automobile market should refer to how Toyota builds its brand presence. By looking at how Toyota promotes its hybrid car and its promotion activities, marketers can gain useful insights to improve their strategies. Furthermore, this study will help marketers in product development through focussing on improving product attributes. However, companies need to be careful not to over promise as it could lead to dissatisfaction towards the brand. Product failure is also highly detrimental to a brand as consumers often share reviews citing the brand in question. A brand name is fragile as it can be built and destroyed through a single product. To build a brand and to increase its chances of being purchased, it must be a preferred brand by consumers.

7. Conclusion

This study aims to understand consumers' brand preference based on information at the pre-purchase stage. It focusses on the impact of various predictors on brand preference. It also focusses on the interacting effect of income between social influence and environmental concern. It further strengthens the Fishbein's model by incorporating the importance of product attributes on brand preferences. Yet, this does not imply that attitude and environmental concern should be neglected. Theoretically, consumers' brand preference can be formed using social, personal as well as psychological factors and researchers can look into different perspectives to analyse how consumers' brand preference form by adding other constructs to represent each factor. Besides, most of the previous studies examined the consumer behaviour rather than brand preference. Therefore, this study's findings have enriched the literature review where researchers can include brand preference in behavioural studies and examine how brand preference influences behaviour.

8. Limitations and future research

This study is limited to the automobile industry specifically for green vehicles. Due to the low usage rate of green vehicles, it was difficult sourcing for existing hybrid car users to participate in the study. Therefore, future research should extend the study by focusing on the existing hybrid car users to study their brand experience and how does the brand experience affect brand preference and whether the brand preference lead to brand loyalty. Future studies could also examine if these relationships vary depending on the home market institutional environment (Popli *et al.*, 2017; Singh and Gaur, 2009, 2013), including the role of the government (Gaur *et al.*, 2018), and the image associated with foreign brands that may suffer from liability of foreignness in host markets (Contractor *et al.*, 2016; Gaur, Vasudevan and Gaur, 2011; Gaur, Kumar and Sarathy, 2011). Also, further research should extend the framework to brand loyalty as brand preference is highly related to brand loyalty. To measure brand loyalty precisely, long term repeat purchase behaviour should also be observed.

Only one of the product attributes was included in this study and it was chosen based on the secondary source (empirical research on hybrid car). Future research should incorporate qualitative surveys, interviews or focus groups to collect the attributes concerned for a particular product or industry which are in the list of consideration when purchase decision is made. The role of overall market orientation (Gaur, Vasudevan and Gaur, 2011; Gaur, Kumar and Sarathy, 2011), as well as the umbrella branding of the firm (Gaur and Delios, 2015; Gaur and Kumar, 2009; Lee *et al.*, 2017) may also affect these relationships and need to be further investigated.

Hybrid cars will be less sustainable in the future as the hybrid technology only minimises carbon emission which is not a long-term solution. This technology will be replaced by electric technology; therefore, future research should look into the context of electric car, so that marketers are better able to understand consumers' acceptance level of electric cars (Figure 1).

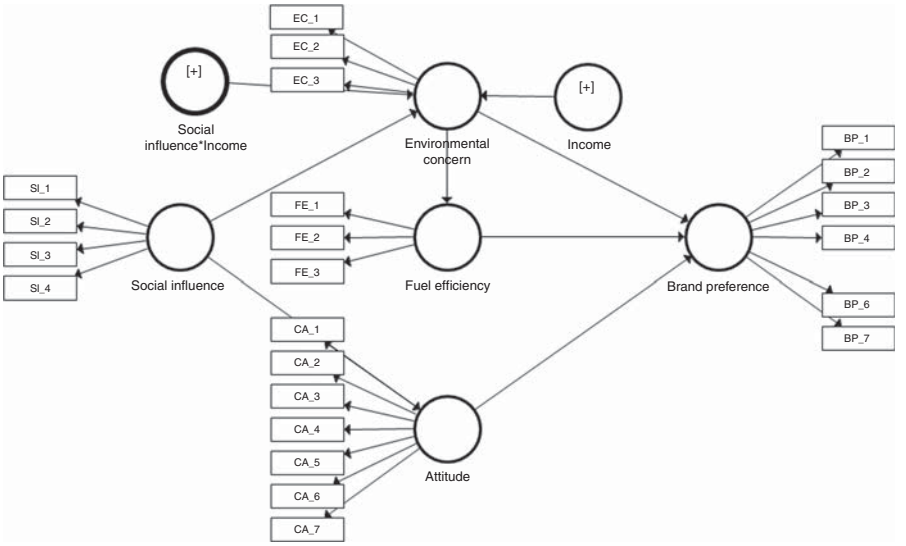

Figure 1.
Conceptual framework

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Consequences of consumers' emotional responses to government's green initiatives

Insights from a scenario-based experimental study

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Abstract

Purpose – A government's green initiatives are meant to prevent or reduce harm to society. Such initiatives can elicit positive emotions that may lead to generating a supportive public response to the government. The purpose of this paper is to understand the consumers' emotional response to government's actions toward making the society sustainable.

Design/methodology/approach – The scenario-based experimental design is used in this study where one between-subjects manipulation is created for the government's green actions, and one between-subjects control condition is created. A total of 140 respondents were assigned to experimental and 121 respondents were assigned to control groups using judgmental sampling. Partial least squares based structural equation modeling and confirmatory factor analysis was used for the testing of both structural and measurement model.

Findings – Positive emotions (i.e. gratitude, pride and happiness) that are evoked by the manipulated scenario are found to have a direct impact on the consumers' outcome behavior (i.e. positive word of mouth, identification with the government, interest in green initiatives of the government and interest in the government's actions to grow the nation).

Originality/value – The research contributes to the literature on the social sustainability by examining the impact of emotional responses to the government's green initiatives. This study shows that positive emotions can be evoked in the context of environmental quality by sending the right message to the consumers (i.e. the general public in this case).

Keywords Sustainability initiatives, Emotions, Emerging markets, Government actions, Green initiatives, Consumers' response

Paper type Research paper

Introduction

On October 2, 2014, a massive project worth 62,000 crore Indian Rupees (INR), popularly known as the "Swachh Bharat Abhiyan" (also known as "The Clean India Campaign") was launched by the Government of India with the aim or making India clean by October 2, 2019, the 150th birthday of Mahatma Gandhi. The aim of the project is to completely eliminate unhealthy conditions created by people defecating in the open and littering. In addition to constructing toilets, the campaign was also meant to spread awareness about the need for hygiene and attempts are being made to change individuals' attitudes toward public defecation. Government is also setting-up field monitors and staff to educate the public and enforce accountability measures. In the above backdrop, this research attempts to understand the consumers' emotional response to government's green initiatives such as the one discussed above toward making the society sustainable. Bhattacharya *et al.* (2009) conducted a study wherein they hypothesized that it is the psychological variables that mediate the effects of perceptions on the various outcome responses. According to them, an individual's perception of various corporate social responsibility (CSR) activities of the

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company produces benefits to the stakeholders, and it is these judged benefits that influence the relationship quality between stakeholders and the company, thereby leading to behavioral outcomes. At the macro-level, scholars have looked at the importance of perception of important groups of stakeholders on firm level actions and outcomes (Gaur *et al.*, 2018; El-Kassar and Singh, 2018; Gaur *et al.*, 2014; Popli *et al.*, 2017).

Xie *et al.* (2014) used a novel approach to capture the consumer responses. According to them, "consumer responses typically occur in unexpected contexts, under low involvement conditions and, with little time to think deeply." They posit that CSR actions of the organizations evoke various emotions. These emotions further mediate the effects of perceptions on consumer responses (Gaur *et al.*, 2011). Our approach is somewhat similar to Xie *et al.* (2014).

It has further been observed that different consumers respond to different CSR initiatives differently; however, there has been no empirical investigation showing how consumers respond to government actions. There has been an escalating research on consumer responses to CSR (Sen *et al.*, 2016). Despite growing research on the outcomes of sustainability or CSR (Bhattacharya *et al.*, 2009; Yoon *et al.*, 2006; Birgelen *et al.*, 2017), extant research on how emotions mediate the consumer responses to government's sustainability actions is scarce. In the green literature, the examination of emotions on consumer responses has been done in case of CSR initiatives but not for those government actions which appear to be similar to that of CSR. Infact, Peloza and Shang (2011) have identified 177 studies relating CSR to consumer stakeholder responses. But none of the research works identified in their study have focused on stakeholders' response to those types of government initiatives which are similar to the CSR initiatives taken by the corporate. As mentioned earlier, our study focuses only on the consequences of the emotions evoked by the Government's initiatives particularly for the development of sustainable society.

The New Fishlinger Centre for Public Policy Research conducted a research in 2016 to assess the attitude toward environmental issues. The research claims that the USA population believed environmental concerns to be more of the purview of the government rather than of an individual or of companies. Taking cues from this, we intend to emphasize the role of government green actions and how they influence felt emotions which further generate favorable consumer responses. Infact, Chyong *et al.* (2006) in their research stated, "many people have a high ecological concern but have the sentiment that the preservation of the environment is the prime responsibility of the Government." Chen and Chai (2010) posit that there exists a significant relationship between consumers' attitude toward the Government's role and their attitude toward green products. Thus, government plays a major role in preserving the environment. It is also documented in past research works that consumers support the increase in governmental spending for environmental causes and were willing to sacrifice economic growth for protection of environment (Gallup and Newport, 1990; Chen and Chai, 2010). Thus, environmental issues are very important to consumers and they evoke positive feelings in them (Stern and Dietz, 1994; Vining and Ebreo, 1992; Chen and Chai, 2010). Taking evidence from these research works, we intend to study the role of emotions in generating consumer responses to government's green actions.

Conceptual framework and hypotheses development

The government's green initiatives are intended to prevent or reduce harm to society. Such initiatives can generate positive emotions that may then lead to supportive public responses to the government. A systematic review of the extant literature (Gaur and Kumar, 2018) shows that positive emotions have not been studied much in comparison to negative emotions. Shaver *et al.* (1987) in their research posit that there are a large number of studies on negative emotions than on positive ones. In fact, for every single study on positive emotions, there are three to four studies on negative emotions (Ellsworth and Smith, 1988).

Much of the research to date has targeted mainly on negative emotions and not on positive emotions. Contrary to this, our study focuses on positive emotions.

We propose a conceptual framework which hypothesizes that government's sustainability initiatives evoke feelings of emotions (both moral and self-conscious). It is these emotions that mediate the effects of consumers' (in our study, general public) perception of government's green initiatives on their responses (see Figure 1). Although the emotions are not deliberative, Haidt (2012) states that, "they function as a kind of information processing of the moral significance of stimuli to which one is exposed." Since the study focuses on government's sustainability actions, the emotions that we examine are gratitude, pride and happiness/joy.

To date, gratitude has been identified as the only other-focused (Froh *et al.*, 2009; Raggio *et al.*, 2014), positive moral emotion with a good body of work in empirical literature. Pride is another positive emotion that has been studied but it comes in the category of self-conscious emotions. Brief mention of other-focused positive emotion of admiration, awe and elevation has been made in the work of Algoe and Haidt (2009). We focus on the positive emotions of gratitude and pride in our study because these fit in the context of the research very well. Xie *et al.* (2014) stated in their research that admiration is like more of an evaluation, hence it was not considered in our research.

Gratitude has been identified as a very important emotion in creating and maintaining positive social relations by a good number of researchers. McCullough *et al.* (2008) defined gratitude as "a positive emotion that typically flows from the perception that one has benefitted from the costly, intentional, voluntary action of another person." People are most likely to feel thankful when "(a) they have received a particularly valuable benefit; (b) high effort and cost have been expended on their behalf; (c) the expenditure of effort on their behalf seems to have been intentional rather than accidental; (d) the expenditure of effort on their behalf was gratuitous" (McCullough *et al.*, 2001). Gratitude stems from the perception that one has benefited because of the actions of another (Bono *et al.*, 2015). Initial research on gratitude has primarily focused on the perceived value of economic benefits that a customer gets out of the work of organization, however new research has begun to examine the important role of gratitude in generating positive responses for the organizations (Morales, 2005; Hasan *et al.*, 2017). Other studies also make it evident and also support the elicitation conditions for gratitude (Tsang, 2006; Tesser *et al.*, 1968; Okamoto and Robinson, 1997). Since gratitude is by and large elicited by "the perception that one is the beneficiary of another's intentionally-provided benefit" (Algoe and Haidt, 2009), we argue that consumers should feel thankful upon becoming aware of the sustainability initiatives taken by the

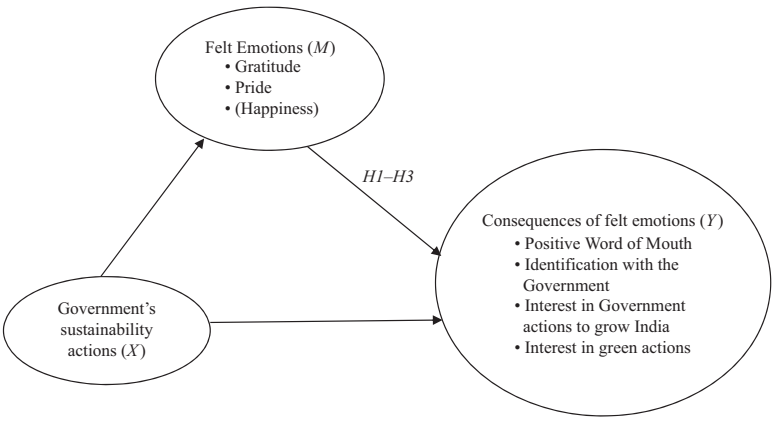

Figure 1.
Conceptual framework and hypotheses

government for their well-being, as they themselves and others, they care for, will be benefitted by such actions.

Pride, a positive self-conscious emotion has not been studied by researchers (Takahashi *et al.*, 2008). Pride basically refers to self-esteem, pleasure or joy derived from one's achievements. It basically arises when people believe that they themselves are responsible for desired outcomes (Leary, 2007). Based on this, we argue that since in a democratic form of government it is the people who decide, who will govern them automatically a sense of pride is instilled in them, when they experience that they and their loved ones are being benefitted by the actions of the Government. Hence, the feeling that they took a right decision leads to the elicitation of pride in the individual. As a self-conscious emotion, pride motivates a person to behave in a moral and socially appropriate ways (Tracy and Robins, 2004a).

Self-conscious emotions are deemed to be cognitive-dependent emotions (Izard *et al.*, 1999). This implies that such emotions are more cognitively complex than other basic emotions. Leary and Buttermore (2003) highlighted that these emotions require individuals to be capable of evaluating their own thoughts, feelings, intentions, memories and other internal states. Thus, it is believed that self-conscious emotions are exclusively experienced by adult individuals (Tracy and Robins, 2004b). Based on this, Lagattuta and Thompson (2007) concluded, that an individual needs to possess self-awareness and the ability to appraise and understand existing standards for him/her to experience such emotions.

The impact of gratitude, pride and happiness on consumer responses

With gratitude, pride and happiness as mediators, we took a similar perspective as that of Xie *et al.* (2014) for CSR. They found a significant direct effect of gratitude on various consumer responses. Also McCullough *et al.* (2001) posit, "Gratitude has three specific functions in that it serves as a moral barometer, a moral motive for beneficiaries, and a moral reinforcement for benefactors." Here the focus is on the fact that gratitude, pride and happiness motivate the beneficiaries to engage in pro-social behavior toward their benefactors and others. In this research, our objective is to expose the consumers to sustainable actions of the government which in turn will evoke gratitude, pride and happiness in them, thereby leading them to reward the government with goodwill. Thus, we suggest that concrete consumer responses to felt positive emotions will lead the consumers to convey positive word of mouth about the government, resisting negative information about the government. As stated by Fredrickson and Branigan (2005), positive emotions tend to broaden the consumers' foci thus identification with the government and investing in the actions of the government are also expected to be fostered. Therefore, the hypotheses for mediation are:

H1. The stronger the felt gratitude, the greater the positive responses toward the government's green initiatives.

H1a. The stronger the felt gratitude, the greater the positive word of mouth for the government.

H1b. The stronger the felt gratitude, the greater the interest individuals take in green initiatives.

H1c. The stronger the felt gratitude, the greater the interest individuals take in making contribution to grow India.

H1d. The stronger the felt gratitude, the more individuals identify themselves with the government.

H2. The stronger the felt pride, the greater the positive responses toward the government's green initiatives.

H2a. The stronger the felt pride, the greater the positive word of mouth for the government.

H2b. The stronger the felt pride, the greater the interest individuals takes in green actions.

H2c. The stronger the felt pride, the greater the interest individuals takes in making contribution to grow India.

H2d. The stronger the felt pride, the more individuals identify themselves with the government.

H3. The stronger the felt happiness, the greater the positive responses toward the government's green initiatives.

H3a. The stronger the felt happiness, the greater the positive word of mouth for the government.

H3b. The stronger the felt happiness, the greater the interest individuals takes in green actions.

H3c. The stronger the felt happiness, the greater the interest individuals takes in making contribution to grow India.

H3d. The stronger the felt happiness, the more individuals identify themselves with the government.

Method

Government's green initiatives were manipulated by creating experimental and control conditions. One between subjects manipulation was created for the government's green initiative (Clean India Campaign), and one between subjects control condition was created to produce two questionnaire versions in all. In other words, the respondents were randomly assigned to experimental and control groups. We created one stimulus group for the green actions of the government and a control group condition that simply described the regular actions taken by the government. The mediating, moderating and the dependent variables were the measured variables. We followed procedures for conditional effects proposed by Ringle *et al.* (2015) to test the hypotheses. The variables in our research design are shown in Figure 1.

Stimulus materials

Manipulating emotions directly is a herculean task. In any case, if one decides to do so it can raise ethical issues. Scenarios have been used to manipulate emotions indirectly by various psychologists in the past (e.g. Fischer and Roseman, 2007; Roseman, 1991). In our research, narrative version of both the experimental and control conditions was developed together with the help of three professionals with insights into the green actions of the Government of India. Thereafter, the narrative scenarios were pretested and revised post pretesting. The experimental condition focuses on the Clean India Campaign of the government and how it is beneficial for the society at large. The narratives begin with a brief description of the campaign, when was it launched and thereafter describes the pros of this campaign and how the campaign promises to transform the nation and make it a leader among the developing nations of the world. The narrative of the control condition consists of only a brief description of the campaign launched. The Appendix presents the full scenarios. Our objective was to have the stimuli corresponding to real world conditions. Realistic scenarios are important for surveying actual adult citizens (Xie *et al.*, 2014). In our case, we presented the scenarios to selected Indian youth based on judgmental sampling. We have used actual facts pertaining to the "Clean India Campaign" so that we can generate actual emotions in the target public.

We pretested our stimuli among the youth. A total of 58 youths, using a judgmental sampling technique, were assigned to the experimental and the control conditions, with 29 youths in each pretest group. Respondents read through their respective scenarios and responded to the question, "To what extent, do you think are the actions of the government effective?" on a scale of 1 to 7 (where 1 = "extremely ineffective" and 7 = "extremely effective"). Those who were given the scenario illustrating the green actions of the government had a much higher rating than those with the neutral scenario. A *t*-test was conducted and it indicated a significant difference between the groups thereby suggesting that the manipulation of green actions work.

Respondents and procedures

A survey was conducted wherein a questionnaire along with the scenario was distributed to the "youth" (subjects of the study) in India, excluding those who participated in the pretest. Young people are a precious resource for every nation. Although, there exists a considerable amount of ambiguity in the definition of young people and terms, such as, young, young adults, adolescents are often found to be used interchangeably. World Health Organization defines "adolescents as those in the age spanning from 10–19 years," and "youth are those in the age bracket of 15–24 years." The overlapping of age group of both of these is termed as "young people" covering the age group of 10–24 years. Adults are those in the age bracket of 24–60 years. The national Youth Policy of India (2003) defines the youth population as those in the age group of 15–35 years. But since the minimum age at which a person is eligible to cast a vote in India is 18 years, in our study we have taken the youth population in the age range from 18 to 35 years. There were 140 respondents for the government's green action condition and 121 in the control condition. Table I presents the demographic profile of the respondents.

	Experimental condition (140) (%)	Neutral (121) (%)	Total (261) (%)
Gender			
Male	52.9	52.1	52.5
Female	47.1	47.9	47.5
Age			
18–21	42.1	19.8	30.95
22–26	30.1	57.9	44
27–31	16.4	9.9	13.15
32–35	11.4	12.3	11.85
Education			
10 plus 2	6.4	2.5	4.45
Undergraduate	46.4	57	51.7
Graduate	45.7	40.5	43.1
PhD	1.4	0	0.7
Participation in last general election			
Vote casted	43.6	47.9	45.75
Vote not casted	56.4	52.1	54.25
Occupation			
Employed with government	3.6	9.1	6.35
Employed with private sector	15.7	37.2	26.45
Professional	6.4	9.1	7.75
Self employed	5.0	11.6	8.3
Student	67.9	26.4	47.15
Unemployed	1.4	6.6	4

Table I.
Demographic profile of the respondents

Measures

Measures for mediators and outcome variables are shown in Table II. Factor loadings, reliabilities and average variance extracted (AVE) are also presented (Gaur and Gaur, 2009).

Mediating variables. Gratitude was measured with two seven-point items anchored with "1 = I do not feel this at all" and "7 = I feel this very strongly." For instance, respondents were asked to indicate, "based on the information that you just read in the scenario, please express the degree to which you feel the following emotions?" and gratitude was measured by two items: "I feel grateful" and "I feel thankful." Similarly, six seven-point scale items

Variables	Items	Item loadings	Composite reliability	AVE	Chronbach's α
Gratitude	I feel grateful	0.95	0.95	0.91	0.90
	I feel thankful	0.95			
Pride	Deep inside I feel that I am good at contributing to government actions	0.72	0.88	0.55	0.82
	Deep inside I think I know what I have to do to contribute to government's mission of making India better	0.76			
	Deep inside I feel confident, that I know how to help in achieving the mission of Indian government	0.75			
	Deep inside I am now convinced that I can support government's actions	0.76			
	Deep inside I feel cheerful and excited because I can work toward making India better	0.74			
	Deep inside I feel unbeatable because I am determined to work toward government's mission of making India better	0.74			
Happiness	I feel very happy	*	*	*	*
Positive word of mouth	I intend to say positive things about this government to friends, relatives and other people	0.91	0.95	0.86	0.92
	I intend to recommend my friends, relatives and other people considering work for this government	0.95			
	I intend to speak well about the government to friends, relatives and other people	0.93			
Interest in green actions of the government	How likely would you implement green actions in your day to day life?	0.92	0.92	0.85	0.82
	How likely would you encourage other people to implement green actions?	0.92			
Interest in government actions to grow India	How likely would you contribute to the growth of India?	0.93	0.93	0.87	0.85
	How likely would you encourage other people to contribute to the growth of India?	0.94			
Identification with the government	How do the characteristics, goals and values, and ethic behavior of the central government correspond to your own characteristics, goals and values, and ethic behavior?	0.91	0.89	0.81	0.76
	How strongly do you identify yourself with the central government?	0.88			

Notes: Threshold values: loading > 0.7; CR > 0.7 and AVE > 0.5 (Hair *et al.*, 2017); *Single-item scale

Table II. Factor loadings, composite reliability and AVE of the measures

were used to measure pride, which were adapted from Verbeke *et al.* (2004) with "1 = I do not feel this at all" and "7 = I feel this very strongly." Happiness was measured using a single seven-point scale, i.e. "I feel very happy," with "1 = I do not feel this at all" and "7 = I feel this very strongly."

Outcome variables. A series of multi-item Likert type measures with seven-point scales were adopted from established literature to measure the outcome variables. Positive word of mouth was measured by three items; interest in government actions was measured by two items; interest in contribution to grow India was measured by two items; and identification with the government was also measured by two items. A number of these items have been used earlier in various contexts (e.g. Grappi *et al.*, 2013; Xie *et al.*, 2014).

Results

Measurement model assessment

Before testing the hypotheses, we ran a confirmatory factor analysis for our measures by the use of Smart partial least squares (PLS) 3.0 software. The fitness of the measurement model was assessed through standardized root mean square residual (SRMR). A value less than 0.08 is considered a good fit. Henseler *et al.* (2014) introduced an SRMR as a goodness of fit measure for partial least squares based structural equation modeling (PLS-SEM) that can be used to avoid model misspecification. The SRMR value for the model (experimental condition, mediators and outcome variables) was 0.05 ($p = 0.000$). Our findings show that an SRMR is good thereby confirming the fitness of our measurement model. Factor loadings of the items, AVE and composite reliability (CR) were used to evaluate the convergent validity of the measures (Hair *et al.*, 2017). We found that the factor loadings of all items fall within the threshold recommended by Hair *et al.* (2017). The CR values ranged from 0.81 to 0.95. The CR values also fall within the acceptable threshold of 0.7 (Hair *et al.*, 2017; Gupta *et al.*, 2018). The average variance extracted for all constructs ranged from 0.55 to 0.91 indicating that on an average the construct explained more than half of the variance of their indicators (Hair *et al.*, 2017). Table II shows the details of the various measures: factor loading, CR and average variance extracted. The discriminant validity of the variables was examined using the Heterotrait-Monotrait (HTMT) ratios as suggested by Henseler *et al.* (2014) and Hair *et al.* (2017) and also through Fornell Larcker criterion (Fornell and Larcker, 1981). Table III shows the highest ratio of HTMT value is 0.57 (< 0.85). Table III shows Fornell–Larcker analysis where the square root for each construct's AVE is greater than its highest correlation with any other construct. Thus, discriminant validity of the model is supported by both the methods. The results for both the convergent and discriminant validity of the measurement model confirmed the reliability and the validity of the scales.

Results of structural model analyses

We examined the hypotheses of our study using PLS-SEM.

Government responsible actions and emotions. In this part, we present the results of mediation effects of government's green actions on consumer positive responses toward the government. As shown in Figure 1, the experimental manipulation (X) is a scenario describing government's actions toward the environment, and the positive emotion of gratitude, pride and happiness are the mediators (M). Stakeholder's positive responses include four outcome variables (Y): positive word of mouth, interest in green actions of the government, interest in government actions to grow India and identification with the government. As shown in Figure 1, we tested whether gratitude, pride and happiness have a direct effect on consumers' positive responses, respectively (*H1*, *H2* and *H3*). The results are presented in Table IV.

	Gratitude	Happiness	Identification with the government	Interest in government actions to grow India	Interest in green actions	Positive word of mouth	Pride
Panel A. Discriminant validity based on HTMT ratio							
Gratitude							
Happiness	0.57						
Identification with the government	0.28	0.27					
Interest in government actions to grow India	0.32	0.34	0.35				
Interest in green actions	0.43	0.37	0.36	0.63			
Positive word of mouth	0.44	0.43	0.44	0.39	0.48		
Pride	0.48	0.49	0.45	0.25	0.35	0.46	
Panel B. Discriminant validity based on Fornell–Larcker criterion							
Gratitude	0.95						
Happiness	0.54	*					
Identification with the government	0.23	0.24	0.89				
Interest in govt. actions	0.28	0.32	0.28	0.93			
Interest in green actions	0.37	0.33	0.28	0.53	0.92		
Positive word of mouth	0.4	0.41	0.37	0.34	0.45	0.93	
Pride	0.41	0.44	0.36	0.21	0.29	0.40	0.76

Notes: Threshold: values < 0.85 (Henseler *et al.*, 2014). *Single item scale

Table III. Discriminant validity assessment

Hypothesis	Hypothesized path	β	*t*-statistics	*p*-values
H1a	Gratitude→Positive word of mouth	0.18	2.17	0.030
H1b	Gratitude→Interest in green actions	0.24	3.13	0.002
H1c	Gratitude→Interest in government actions to grow India	0.16	2.01	0.045
H1d	Gratitude→Identification with government	0.10	1.40	0.160
H2a	Pride→Positive word of mouth	0.23	3.47	0.001
H2b	Pride→Interest in green actions	0.13	1.71	0.088
H2c	Pride→Interest in government actions to grow India	0.06	0.89	0.369
H2d	Pride→Identification with government	0.30	4.48	0.000
H3a	Happiness→Positive word of mouth	0.20	2.50	0.013
H3b	Happiness→Interest in green actions	0.16	1.97	0.050
H3c	Happiness→Interest in government actions to grow India	0.23	3.52	0.000
H3d	Happiness→Identification with government	0.08	1.05	0.295

Table IV. Path coefficients

Impact of emotions on consumer responses. As shown in Table IV, we found significant direct effect of gratitude on positive word of mouth ($\beta = 0.18$, $t = 2.17$), interest in green actions of the government ($\beta = 0.24$, $t = 3.13$) and interest in government actions to grow India ($\beta = 0.16$, $t = 2.01$). However, gratitude did not show a significant direct effect on identification with the government ($\beta = 0.10$, $t = 1.40$). Thus, *H1a*, *H1b* and *H1c* are supported however *H1d* is not supported. Similarly, we found a significant direct effect of pride on stakeholder's positive responses. As shown in Table IV, Pride was found to affect positive word of mouth ($\beta = 0.23$, $t = 3.47$), interest in green actions of the government ($\beta = 0.13$, $t = 1.71$) and

identification with the government ($\beta = 0.30$, $t = 4.48$). Thus, *H2a*, *H2b* and *H2d* are supported. However, pride did not have any significant direct impact on interest in government actions to grow India ($\beta = 0.06$, $t = 0.89$). Thus, *H2c* is not supported. Also the direct effect of happiness on stakeholder's positive responses was also studied and it was found that happiness has a direct impact on positive word of mouth ($\beta = 0.20$, $t = 2.50$). Also happiness has a direct effect on interest in green actions of the government ($\beta = 0.16$, $t = 1.97$) and on interest in the government actions to grow India ($\beta = 0.23$, $t = 3.52$). However, happiness did not have any significant effect on identification with the government ($\beta = 0.08$, $t = 1.05$). Thus, *H3a*, *H3b* and *H3c* are supported but *H3d* is not supported. To sum up, gratitude, pride and happiness do have a direct effect on positive consumer responses.

Discussion

In the green literature, there is much of research relating consumer responses to CSR activities of the companies; however, there is a little or no empirical research which has focused on consumer responses to government green actions. The present study proposes and tests a model to better understand this relationship. This model has assessed how individuals experience various positive emotions of gratitude, pride and happiness when they are exposed to the various green actions of the government. It is the experience of these emotions which further leads him to respond favorably toward the government (positive word of mouth, taking interest in actions of the Government, identification with the government and interest in the government's actions to grow the nation).

The results indicate that a causal order exists in generation of consumer responses. First, consumers experience various green actions of the government. Second, the experience of these green actions evokes certain positive emotions in the consumers, and finally, the elicitation of these positive emotions further pushes the consumers to respond in a favorable manner toward the government in the form of various consumer responses, discussed above.

All these experiences of government green actions contribute to generation of positive emotions in line with previous studies (Xie *et al.*, 2014; Gaur *et al.*, 2018). Findings also corroborate the impact of positive emotions on consumer responses. Past research works in the context of CSR have shown that generation of positive emotions leads to positive consumer responses. Our research also targets those green actions of the government that appear to be similar to CSR activities of the non-governmental business firms.

By investigating the role of emotions in generating consumer responses to sustainability initiatives by the government, we are able to demonstrate that the results of our study are consistent with the past research works that show that gratitude is an emotion that is successful in immediately prompting the consumers to reward in some manner (Smith, 1976; Algoe and Haidt, 2009). Gratitude that has been labeled as "parent of all virtues" (Cicero, 1851) was found to play a significant role in mediating the experience of government's green initiatives and consumer responses.

In line of these authors' assertions, the results of our study bring to the forefront that gratitude does nurture pro-social behaviors between the consumers and the government. This further encourages the recipient to reciprocate in some form or the other (Algoe and Haidt, 2009). This reciprocation further leads to building of trust and thereby preserving the relationship (Bartlett and DeSteno, 2006). As in our case, the reciprocation is in the form of various consumers' responses generated on being exposed to the green initiatives of the government like positive word of mouth, interest in contributing to green actions of the government and interest in government actions to grow the nation. Also this leads to building of trust which further motivates the individual to go in for positive word of mouth for the government. Thus, felt gratitude by and large mediates the impact of government's green initiatives on consumer positive responses toward the government. Similarly, happiness that

was tested as a basic emotion also had a direct impact on generating positive word of mouth, interest in green actions and interest in government actions to grow India when stakeholders were exposed to the situation of government's sustainable actions.

Pride has been considered as the most important emotion when it comes to motivating social behavior. The basic reason behind this is that, pride has been found to play a leading role in initiating action toward attainment of social status and socially valued achievements (Tracy and Robins, 2007). Williams and DeSteno (2009) also brought to the forefront, that those individuals who feel pride display more dominant behaviors. In our research, it can be seen that when an individual feels pride on experiencing the government's green initiatives, it further leads to generating positive word of mouth, interest in green actions of the government and identification with the government as various behavioral outcomes in the form of consumer responses. Our results are in line with the feedback mode of emotion and behavior (Baumeister *et al.*, 2007), which states that pride-motivated behaviors are likely to lead to outcomes that beget additional feelings of pride, which may further reinforce the use of these behaviors and strengthen behavioral tendencies over time (Cheng *et al.*, 2010). The positive response – identification with the government was not generated by either gratitude or happiness however pride was successful in generating this consumers' response.

Finally, Lindebaum and Jordan (2012) posit that positive emotions result in universally positive outcomes, which are consistent with our research where in it has been brought to light that when an individual experiences positive emotions as in gratitude, pride and happiness that leads to the generation of positive consumer responses.

Theoretical contributions

By investigating the role of emotional processes as instigators of consumer responses toward government's sustainable actions and the contingencies governing the functioning of the motivators, our study makes important contributions to the "Green" research in a number of ways. Importantly, it contributes to green research by examining the moral and self-conscious emotional processes in decision making. We found that positive emotions enact stakeholder responses to green actions of the government. Our research builds upon recent basic psychological research and answers the question: How green actions of the government influence stakeholder responses as outcomes? We specify and show the effects of perceived responsible actions of the government on stakeholder responses and how these stakeholder responses are further affected by the moral emotion gratitude, basic emotion happiness and self-conscious emotion pride.

Our study also broadens and deepens the recent research on the mediating role of emotional processes (Xie *et al.*, 2014; Grappi *et al.*, 2013; Romani *et al.*, 2013) in the social responsibility literature. We try to highlight the role of government in taking green actions and how sustainability initiatives of the government can lead to consumer responses as outcome variables. Research to date has not focused much on positive emotions as far as the CSR literature and the green literature is concerned. Thus, we tried to deepen our understanding of the conditions under which pride, gratitude and happiness can lead to generation of positive stakeholder responses.

Second, we broadened our research by taking both moral as well as self-conscious emotions. Research to date has focused either on moral emotions or on self-conscious emotions. These emotions have not been studied together. Pride as a self-conscious emotion has not been studied much. Despite its centrality to social behavior, pride has received little attention in the social-personality literature, even relative to other self-conscious emotions such as shame or guilt (Tracy and Robins, 2007). Also, past studies have focused only on CSR activities. No evidence has been found of research focusing on green initiatives of the government. Corporate green actions have been studied much but it is increasingly important to study government's green actions too as "mounting public

sensitivity and growing stakeholder pressures focuses on preserving the environment" (Leonidou *et al.*, 2013).

Third, we have tried to broaden the extant social responsibility research and have tried to identify the various consumer responses for government actions. Past research (Xie *et al.*, 2014; Sen and Bhattacharya, 2001) has tried to identify consumer responses to green actions of the corporate. However, our research has identified the various consumer responses that stimulate the decision making process to government's green actions.

Finally, all hypotheses were tested on the data collected from youth in India as they are the ones who have been identified to be most affected by the actions of the government.

Implications of the research

Our findings have implications for the government of our country, especially when it comes to policy formulation or launching programs and campaign for the environment. The mediating role of emotions between the green actions of the government and consumer responses brings to the forefront the importance of emotional processes in consumers' interpretation and response to the government actions. This is where the government has to pay much of attention. It is important for the government to understand specific emotions engendered in consumers by their green initiatives, because these emotions have strong action consequences which can be linked to multiple positive responses that the consumers will take toward the government. The findings of the role of gratitude, pride and happiness suggest that government should monitor the green actions taken by them and communicate this effectively to the stakeholders so as to reinforce the "felt thankfulness" and try to "capitalize" on these positive feelings. It is obvious that this would have a positive impact on increasing the vote bank also. Also, the government can provide the youth with opportunities to reciprocate with different acts of support which will further lead to strengthening the government–public relationship. This will help the government develop a competitive edge and overall image, goodwill, positive word of mouth will increase.

Second, our research findings reveal that consumers are willing to engage in multiple reactions to the green initiatives of the government. For example, they support the government by investing into the green activities of the government, by investing to grow the nation, by identifying themselves with the government and so on. This means that the government should understand the possible actions that individuals can take upon being exposed to information regarding green actions and try to manage multiple ties between the consumers and the Government.

Finally, an important implication of this research is word of mouth. We found that youth responded with positive word of mouth when they were exposed to positive actions of the Government. Berger (2013) posits that word of mouth "is the primary factor behind 20 to 50% of all purchasing decisions" and "it is at-least ten times more effective than advertising." Stimulation of positive word of mouth among the public can definitely act as a strategy to influence the public and get re-elected in the future elections. Thus, government should view this as an opportunity and try to improve the communication with the stakeholders at large.

Limitations and future directions

One of the limitations of our study is that emotions were measured by the use of language-based scenarios. It can be appropriate to measure emotions through various other methods like facial responses, fMRI or autonomic nervous system responses. It can also be possible that future research can manipulate emotions directly (see for example Raghunathan and Pham, 1999), instead of using only scenarios.

Second, we have limited our research only to the youth in India and have considered them as important stakeholders. Other stakeholders could also be identified and their

responses could also be studied to strengthen generalizability (Armstrong and Green, 2013; Judge *et al.*, 2010). Third, we have not done a comparative study of the emotions raised among youth in rural areas and in urban areas within India. There can be a considerable amount of difference in the emotions felt and the consumer responses. Fourth, the use of celebrities in supporting government actions and thereby in generation of emotions and consumer responses could also be studied as celebrity endorsement can have an impact on felt emotions. Fifth, how the youth can further practice voice behavior (Bozionelos and Singh, 2017) by providing innovative suggestions for improvements to the government can also be studied. Finally, while India is an important context, the role of government and other stakeholders in a society varies a great deal in other emerging economies such as China and Korea (Singh and Gaur, 2009; Lee and Gaur, 2013; Lee *et al.*, 2017; Pattnaik *et al.*, 2018). Other studies could study these alternate contexts to examine the role of the government.

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Appendix. Research material

Narrative scenario for government's green initiative

On October 2, 2014, Prime Minister Modi launched a 62,000 crore rupees project known as the Swachh Bharat Abhiyan (The Clean India Campaign) to create "Clean India" by October 2, 2019, the 150th birthday of Mahatma Gandhi. The project aims to completely eliminate unhealthy conditions produced by people defecating in the open. Roughly 600m Indians presently defecate in the open as everyday practices. The Clean India Campaign will provide all families presently in need with washroom facilities by 2019. In addition to constructing toilets, the campaign will create universal awareness of the need for healthy hygiene, change existing attitudes toward public defecation and the need to use toilets and set-up field monitors and staff to educate the public and enforce accountability measures.

The initial communication of the Clean India Campaign began with Prime Minister Modi recruiting nine famous personalities to endorse the program. Each personality was asked to contact nine others and so on to spread the word and create an accelerating growth in public awareness and opinion leader endorsement. More formal social media, advertising and publicity programs are to follow.

To guarantee the success of the Clean India Campaign, the World Bank has agreed to provide $1bn to sustain initial marketing efforts. The tangible goal of the Clean India Campaign will be to convert the estimated 600m Indians who now defecate regularly in the open to use flush toilets over the next five years. This will be seen most visibly at first in clean streets and open spaces. Moreover, as recently

documented by university students and think tank reports, serious health and social problems historically associated with public defecation will be curtailed. These include the elimination of bacteria, viral and parasites breeding grounds, and the reduction of such second-order consequences as malnutrition, stunted bodily and mental growth, compromised immune systems and the prevalence of various diseases and illnesses. Even such social problems as petty crime and more serious crimes as rape and murder are likely to decline as well. The Clean India Campaign promises to transform India and make her a leader among developing nations around the world.

Narrative scenario for control condition

On October 2, 2014, Prime Minister Modi launched a project known as the Swachh Bharat Abhiyan (The Clean India Campaign) to create "Clean India" by October 2, 2019, the 150th birthday of Mahatma Gandhi. The project aims to improve sanitation around India.

This project is one in a long line of sanitation efforts, the two most recent being the Central Rural Sanitation Program begun in 1986 and the Total Sanitation Project of 1999 (renamed Nirmal Bharat Abhiyan). Many government agencies are coordinating their efforts with the new Clean India Campaign.

Also in September 2014, the government began an international marketing strategy called, "Make in India," which is designed to attract investment from businesses around the world. This campaign is a key initiative of the government.

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Silk Road Economic Belt strategy and industrial total-factor productivity

Evidence from Chinese industries

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Abstract

Purpose – The purpose of this paper is to assess the effectiveness of the Silk Road Economic Belt (SREB) strategy and its role of industrial productivity in China.
Design/methodology/approach – To identify the causal effect of this strategy on industrial sustainable development, the authors first use the slacks-based measure model to calculate industries' total-factor productivity (TFP) considered with CO_2 emissions as undesirable output on the provincial level. Then, the authors use the PSM-DID method to identify the difference of TFPs between provinces and industries before and after the implementation of SREB strategy.
Findings – However, the authors find that there is no difference or even a relative decrease in TFPs of industries in target provinces after the implementation of the strategy, which reveals that the SREB strategy does not play a positive role of the industries' sustainable development in years of 2014 and 2015.
Originality/value – The value of this result is to identify the short-term impact of SREB strategy and to seek for probable causes and appropriate solutions.

Keywords CO_2 emissions, SBM model, International expansion,
Provincial industries' total-factor productivity (TFP), PSM-DID method,
Silk Road Economic Belt (SREB) strategy

Paper type Research paper

1. Introduction

Since the reform and opening-up policy, China has conducted a series of development strategies to promote marketization, internationalization and regional economic development, such as the "Great Western Development Strategy" in 1999, "Rise of Central China Plan" in 2004 and so on. However, it is doubted that whether such international expansion strategies have promoted a sustainable growth of economy or just an overdraft of the regional environment and resources by researchers. As by-products of the economic growth, environmental pollution is also a serious problem which may act as a brake on economic growth in the future (Cao and Wang, 2017). For the formulation of the Silk Road Economic Belt (SREB) strategy, Chinese Government puts the green sustainable development ideology in the first place to avoid target provinces and countries being "pollution heaven". In this paper, the most important question we discuss is whether the SREB strategy can promote the total-factor productivity (TFP) of target provincial industries in a green way.

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The SREB strategy was put forward by President Xi, and together with 21st Century Maritime Silk Road, he composed the Belt and Road Initiative (BRI) strategy in the end of 2013. Different from 21st Century Maritime Silk Road, the SREB strategy aims to improve regional economy of the southern and western provinces with comparatively lower economic development level. Compared with eastern coastal areas, they are backward in internationalization and economy growth but possess abundant resources. SREB strategy is implemented immediately by the Chinese Central Government and 13 provincial governments with the aim to prepare for the "seamless connectivity" in the transport, energy, information and communications technology (ICT) industries between target provinces and countries. The government provides fiscal, financial and investment support policy as well as remove customs and transportation barriers between targeted provinces and countries to encourage firms to undertake international investments. The main purposes of this strategy are promoting the free mobility of the economic factors, relocating resources efficiently, deepening the integration of the marketing and facilitating the sustainable development of economic growth. To some extent, it is a new way of international expansion accompanied with further marketization.

At the government level, EM governments encourage local firms to expand internationally through various political incentives and measures (Luo *et al.*, 2010; Gaur *et al.*, 2018). These supports help EM firms overcome the liability of foreignness and conduct international expansion, despite their disadvantages of being ownership-specific (Luo and Tung, 2007). In China, further marketization removed institutional constraints on economic activities and created new growth opportunities for firms. It increased the competitive intensity, forcing firms to focus on scale and efficiency in their operations in existing industries, and influence firm's strategic choices such as expansion and internationalization (Carney *et al.*, 2011; Upadhyay and Ghosh, 2016).

At the firm level, EM firms often face unfavorable industry environments at home country, which force them to escape their home markets to seek for international opportunities (Cuervo-Cazurra, 2012). Environmental factors of home country can make some industries unattractive because of the quality and availability of factor inputs and the intensified competition of domestic markets (Singh *et al.*, 2017). In China, in part industries, the problems of overcapacity, shortage of resources, low industrial concentration and unreasonable product mix are serious. The SREB strategy may be a good way to solve these problems. Firms of 13 targeted provinces benefit from the SREB strategy which encourages local firms to escape stifling industry environments from their home markets.

In today's dynamic environment, international expansion offers an important growth strategy (Gaur *et al.*, 2013). During the foreign direct investment (FDI) process, when an acquisition is announced, it reflects the potential for future growth in the acquirer's industry to the market, resulting in positive market reactions to the whole industries (Gaur *et al.*, 2013). What is more, internationalization means that firms will meet with increased competition from both domestic and foreign firms. In the past, EM firms could survive and prosper by selling copycat products (Gaur and Kumar, 2010). In recent years, they must pay attention to innovation to gain long-run competitiveness advantages (Singh and Gaur, 2018). Increased competition makes firms to pursue innovation to gain better long-term performance.

During the internationalization process, group-affiliated firms are easier to get competitive advantages (Pattnaik *et al.*, 2018). Group-affiliated firms benefit from the preferential access to local resources, cheaper capital and the internal labor markets to conduct their internationalization efforts. Affiliation to a business group also helps firms to control different parts of the value chain and deal with the environmental uncertainties (Gaur and Kumar, 2010). All these superior competitive advantages make it easier for group-affiliated firms to conduct international expansion. Findings from Singh and Gaur (2013) suggest that group-affiliated firms are trying to improve the development

ability to retain competitive advantages in the changed institutional environments. Investments in innovation and international expansion in search of markets and resources aboard are some of the strategies that firms can implement to retain competitive advantages (Kumar *et al.*, 2012; AlShaima *et al.*, 2016; Al Mansouri *et al.*, 2018).

Target locations of the SREB strategy include totally 13 domestic provinces. The empirical analysis in this paper appeals to a panel data set from 2010 to 2015. In this paper, we use TFPs considered with CO_2 emissions to assess industrial sustainable economic growth. We focus on 32 industries' TFPs at the provincial level to measure the effect of sustainable economy growth and international expansion of the SREB strategy and to ask for an explanation of whether the implementation of this strategy leads to any bias against non-target industries in SREB target provinces as compared to non-SREB target provinces. The SREB strategy effect is identified by comparing the industries' TFPs of target and non-target provinces according to each province's intrinsic exposure to the strategy, which is divided by the strategy itself.

Our paper contributes to the literature in three ways. We first add to the abundant literature on the theory of economic growth by Robert M. Solow. Increasing TFP considered with CO_2 emissions is a key factor in sustainable development of the economy. Based on Solow's theory of economic growth, due to the economic law of decreasing marginal product, the economic entity with low initial output per capita will grow in a faster speed. That is, the output growth rate and initial output level present negative correlation among different economic systems. Before the implementation of the SREB strategy, compared with eastern developed provinces, the output per capita of most target provinces of "Silk Road Economic Belt" is lower all the time. In this paper, we will assess whether the growth ratio of sectorial TFPs of these provinces follows this economic law.

Second, we regard the SREB strategy as a new way of international expansion as it removes barriers and provide financial supports for firms to conduct internationalization. In this paper, we access the policy effects of industries performance and explain the results from the government, business group and firm level. We enrich the recent international expansion literature from Chinese perspective and focus on the influence of the SREB strategy which captured the world's attention. In this paper, we evaluate the effects of the SREB strategy on industrial performance. To some extent, it is also an assessment of the strategy's impact on the firms' international expansion.

Third, we further build on recent efforts to address the problem of whether the sustainable-oriented strategy, SREB, can bring different efforts on different provincial industries. We use PSM-DID method to analyze different TFPs in 32 industries of target and non-target provinces before and after the implementation of the SREB strategy. This is a two-stage method. The PSM method helps us find appropriate control groups which satisfy the common trend hypothesis of DID method. The DID method works out the real difference caused by the SREB strategy in different industries of target and non-target provinces. There are few literatures using the PSM-DID method to analyze TFPs and the effect of SREB strategy on the provincial sector level.

1.1 SREB strategy

The BRI is a development strategy which is comprised of SREB and 21st Century Maritime Silk Road. It was launched by the Chinese Government with intentions of promoting economic cooperation among countries and Chinese provinces along the Belt and Road routes. The SREB strategy is one significant component of it.

The research on the BRI in the literature includes mainly two aspects. One group of studies reviews intentions, frameworks, assessments and its issues. Many studies hold positive opinions, while others raise concerns about the surplus capacity shift, environmental pollution effect and sustainable development. Berger (2015) provided a detailed examination of the

causes and consequences of serious overcapacity in eight industries (crude steel, electrolytic aluminum, cement, refining, chemicals, flat glass, shipbuilding, and paper and paperboard). Michael (2017) doubted whether the Chinese Government was using this strategy to offload pollution consequences of high-polluting industries such as bloated steel and cement onto developing countries to escape environmental pressure at home. Some foreign researchers also considered that the BRI would do much to help China with its huge overcapacity problems in many industries, especially steel, glass and cement. The other group of studies is quantitative analyses of the BRI. For the moment, this kind of research is limited. Du and Zhang (2017) employed a difference-in-differences (DID) method to estimate the effects of the BRI on Chinese overseas direct investment. However, this research did not conduct a balancing test which is necessary before DID analyzes. Duan *et al.* (2018) evaluated the impact of the SREB strategy on the energy investment risk assessment. Brugier (2014) analyzed the aspect of energy security. Abudureyimu and Han (2014) studied about the clean energy development of Xinjiang, which was under the influence of the SREB strategy. Ze and Chen studied the energy cooperation question between BRI countries. Han *et al.* (2018) used σ-convergence considered with spatial effects to examine the effects of BRI on energy efficiency convergence and got the result that the conduction of BRI could have a positive effect on energy efficiency convergence across the countries.

Above all, some of the shortcomings of the previous studies are addressed in this paper. First, we use the PSM-DID method to analyze the SREB strategy effect, which can make DID analyze conform to balancing test. Second, although there are various studies among TFP and energy efficiency, no one addressed the difference of TFP caused by the SREB strategy.

The strategy specifically targets industries such as transport, energy, ICT and so on in targeted 13 provinces which are selected by its export-oriented geographical and strategic location. The strategy has increased cooperation in the exploration and development of coal, gas, oil, metal minerals and other conventional resources, and aims to create an integrated industrial chain of resource and energy cooperation among target regions.

The essence of SREB strategy is to establish international pathway and economic corridor of Chinese capital and to promote economic growth of all covering countries and regions. The practical significances for Chinese target provinces are to strengthen regional cooperation, activate stock economy and soak up historic excess capacity. China aims to improve the division of labor and distribution of industrial chains by encouraging the related industry chains to develop in concert. It improves R&D, production and marketing system, industrial supporting capacity to facilitate the development and internationalization of regional industries. China also pays attention to the ecological progress in conducting industrial investment and development, conserving eco-environment, protecting biodiversity and tackling climate change. China tries its best to make the Silk Road an environment-friendly strategy. For northwest and northeast target provinces: based on the regional advantages, Xinjiang, which connects with Central, South and West Asia, is the core transportation hub, business and commerce logistics as well as cultural science and education center of "One Belt." Shanxi, Gansu, Ningxia and Qinghai are aimed to be inland opening provinces with the goal of creating strategic channels, trade and logistics hubs for industrial and cultural exchanges opening to South, Central and West Asian countries. Inner Mongolia connects with Russia and Mongolia. It improves the railway links to strengthen the cooperation between China's Heilongjiang, Jilin and Liaoning and Russia's Far East regional transport and to advance the construction of a Eurasian high-speed transport corridor with the goal of building key windows opening to the north.

For southwest target provinces: Guanxi connects with other countries of Association of Southeast Asian Nations and it is also a link between "One Belt" and "One Road" regions. Based on the opening-up of the Pearl River-Xijiang Economic Zone and the Beibu Gulf Economic Zone, Guangxi plays a new strategic role of the opening-up and development of

the mid-south and southwest regions of China. Yunnan is a bridge connecting South and Southeast Asia. The government has promoted the construction of international transport corridors with its neighboring countries. Tibet links with Nepal. For inland target provinces: target provinces of upstream and midstream of the Yangtze River push the cooperation with Russia Federal district of Volga river. They establish the coordination mechanism of railway transportation and port clearance between China and European countries and build transport corridors to connect with these countries. Inland target provinces also have created a new processing trade mode, which is aimed to deepen the industry cooperation with countries along "Belt and Road" routes.

The practical significances of SREB for covering provinces are to give full play of regional comparative advantages of Chinese target provinces and to make them more open to promote the international expand and economic growth. In the 13 provinces, the governments have conducted several policies which contribute to these. The policies include fiscal support policy, financial support policy, investment and trade cooperation support policy, customs support policy and transportation support policy with the concept of green growth and sustainable development through the whole strategy. First, the government conducts fiscal support policy. Based on the SREB strategic plan, the Chinese Government makes adjustment of the fiscal policy. It pours more money into infrastructure construction (such like road, bridge, port, wharf and other public works) of target provinces. Some local governments even use public–private joint management, finance discount and other measures to absorb more capital into the construction of SREB. Second, investment and trade cooperation support policy; the Chinese Government eliminates investment and trade barriers as well as establishes free trade areas to facilitate more free investment and trade environment. Third is customs support policy; the Chinese Government negotiates with relative countries to strengthen the cooperation of customs to realize interconnection with target provinces to promote regional economic development. Fourth is transportation support policy; the government advances the transportation infrastructure (include oil and gas pipeline, port of shipping, railway, highway and cross-sea channel) between relative countries and target provinces. Local governments also offer fiscal subsidy to promote international transport service to facilitate interconnection and interwork with relative counties.

Theoretically, the increase of fiscal support can offer initial capital guarantee of the development of target provinces. The credit financing support can solve the problem of domestic insufficient investment caused by a low saving ratio. And tax preference policy plays an active role in absorbing exogenous investment. All these policies are intended to promote the international expansion and economy growth of target provinces, but whether they could promote the economy with less pollution and higher efficiency is the question we are concerned about in this paper.

1.2 Total-factor productivity (TFP)

Since the reform and opening-up policy, great achievements have been made in China's internationalization and economic development. However, the economic growth of China depends mainly on large-scale government investment and a large amount of productive factor input. The low TFP was not enough to support sustainable economic growth (Krugman, 1994). The growth rate of TFP and its contribution to output growth were regarded as the main basis for judging the transformation of economic development mode and the improvement of economic quality.

However, the traditional TFP did not consider the pollution and resource loss caused by economic growth, and thus distorted the evaluation of social welfare changes and economic performances, and then may lead to misleading policy suggestions.

Chung *et al.* (1997) put forward the directional distance function to measure TFP of a Swedish pulp mill. The method regarded pollution emission as the undesirable output to

calculate green TFP considered with environmental factors. In our paper, we regard capital and labor input as productivity factors, main business income as desirable output and CO_2 emissions as undesirable output.

In the firm level, a lot of literatures use financial and innovation index to measure firm performance, such as Singh and Gaur (2013) as well as Popli *et al.* (2017) used return on assets (ROA) to measure firms' profitability. The ROA index reflects firm's effectiveness in transforming assets into net profit (Banalieva, 2014). Lee *et al.* (2017) used innovation index to examine the performance implications of business group. From his point of view, technological appropriability indicates the capacity of firms to retain the added value and the intended outcome of R&D activities can form the basis of the firm's competitive advantage. Both these financial and innovation indexes are appropriate measurements of company's performance. TFP is not a perfect indicator. When scholars calculated TFPs of countries from emerging East Asia, the result tended to present huge gap due to different computational methods (Young, 1992; Kim, 1994; Collins and Bosworth, 1996; Chen, 1997; Felipe, 1999). What is more, the TFP indicator cannot present the performant caused by institutional and market structure changes as well as the technological progress, which is in different path with developed countries (Hendricks, 2000; Stiglitz, 2001). This may lead to an underestimation of the performance of firms in China. However, in our paper, we would like to consider both inputs and outputs perspectives. Especially, CO_2 emission is the bad output that we would like to consider into the counting process to reflect the sustainable development performance. Based on this consideration, TFP is a suitable indicator for us to measure the performance of industries in this paper.

There are three advantages of using TFPs with undesirable output to assess the effectiveness of SREB strategy. First, it uses comparatively accurate data to calculate the sustainable development of economy. Contrary to TFP data, it considers the effect of pollutant emission, which is believed by many scholars to correct the higher evaluation of Chinese productivity (Elsadig, 2012; Chen and Golley, 2014). Many scholars used TFPs with undesirable output to recalculate the productivity of Chinese economy and drew numerous useful conclusions (Jeon and Linbin, 2004; Watanabe and Tanaka, 2007; Elsadig, 2012; Chen and Golley, 2014; Zhao *et al.*, 2015). Second, increasing TFP with undesirable output is a critical factor to conduct coordinated development of economy and environment. Ignoring environmental issues would hinder the sustainable development in the future. Thus, TFP with undesirable output should be considered first during the process of policy making (Rusiawan *et al.*, 2015). And it is also a relatively comprehensive index to measure the effect of policy on sustainable economy development. Third, all the data used by the calculation of TFPs with undesirable output can be collected at the sector and province level and are available both before and after the SREB policy, which is key to our identification method.

Stochastic frontier analysis and data envelopment analysis (DEA) are currently two of the most conventional methods for industrial TFP measurement. In this paper, the DEA method is employed to evaluate TFPs with its main advantage of no need to assume the specific form of the production function. DEA, first proposed by Charnes *et al.* (1978), is one of the most popular methods to evaluate the relative efficiencies of decision-making units (DMUs) (Wang and Sun, 2018). It is a joint-activity total-factor framework based on a DEA method, which is regarded as more appropriate for energy efficiency evaluation (Hu and Wang, 2006). However, as by-products in the production process, emissions of fossil energy, such as CO_2 emissions, could not be neglected, and the efficiency should be measured in the joint production framework (Färe *et al.*, 2007). Ignoring undesirable outputs would cause enterprises to mention a desirable output (e.g. GDP) but neglect environmental issues, which would hinder sustainable development. Therefore, an evaluation without an undesirable output would be biased and therefore might mislead

policy makers (Zhou and Ang, 2008; Mandal, 2010). Recently, several studies have taken into account undesirable outputs, particularly CO_2 emissions, when evaluating energy efficiency. Wu *et al.* (2012) constructed both static and dynamic energy efficiency performance indexes for measuring industrial energy efficiency performance with CO_2 emissions in China based on a Shepherd sub-vector input distance function for energy use. Choi *et al.* (2012) employed a non-radial slacks-based DEA model to estimate the energy efficiency incorporating CO_2 emissions in China, and potential emission reductions and marginal abatement costs of energy-related CO_2 emissions were also computed.

With regards to how to address undesirable outputs based on a DEA model, there are several methods. First, some scholars treat undesirable outputs as inputs (Shi *et al.*, 2010; Yang *et al.*, 2015), which is not consistent with the production process and may violate the material balancing equation (Førsund, 2009). The second treats undesirable outputs the same as desirable outputs, which does not consider environmental constraint correctly. In fact, undesirable outputs are by-products with a negative externality, which should be distinguished from desirable outputs. There are several methods to distinguish between desirable outputs and undesirable outputs in an efficiency evaluation framework. The first approach is "multiplicative inverse", proposed by Scheel (2001), which regards the reciprocals of undesirable outputs values as an output. The second approach transforms undesirable outputs variables by multiplying them by "−1" and then converting the negative values of the undesirable outputs into positive values by some method (Seiford and Zhu, 2002; Chen *et al.*, 2015). The first approach is not consistent with realistic logic, and the second one has to be used based on the condition of variable returns to scale (VRS), which restricts their applicability. The other method is the weak disposability of outputs based on the directional distance function, which was proposed by Chung *et al.* (1997), to solve the treatment of undesirable outputs when evaluating relative efficiency and productivity (Zhang *et al.*, 2011; Wu *et al.*, 2012; Chen and Golley, 2014); however, it ignores the slack issues, and it is based on radial and output-oriented conditions, which may induce limitations and biases (Chen, 2015).

The traditional radial DEA models above have input and output changes of the same proportion but cannot fully consider the slack issues of inputs and outputs, and the efficiency may be overestimated when there exist non-zero slacks (Fukuyama and Weber, 2009). Therefore, many studies have tried to develop non-radial models. As the most typical and widely used method that addresses both input and output slacks in efficiency measurements (Choi *et al.*, 2012), the slacks-based measure (SBM), proposed by Tone (2001), is utilized in many studies regarding its relative efficiency evaluation (Rao *et al.*, 2012; Song and Guan, 2014; Zhang *et al.*, 2015; Chen, 2015; Ai *et al.*, 2015), and it will be employed in this paper to assess industrial performance.

2. Empirical methodology

2.1 SBM model

In radial DEA models, the measurement of the degree of inefficiency includes only the proportional reduction (or enlargement) of all inputs (or outputs). With the exception of this improved part, the distance of the inefficient DMU to the most effective target contains slack improvement, which cannot be embodied in the efficiency measurement of traditional DEA models. To solve this problem, Tone (2001) proposed an SBM model:

$$\min \rho = x = \frac{1-1/m_0 \sum_{i=1}^{m_0} s_i^- / x_{ij}}{1+1/n_0 \sum_{r=1}^{n_0} s_r^+ / y_{ij}}, \tag{1}$$

$$\text{s.t.}\begin{cases} X\lambda + s_i^- = x_j, i = 1, 2, 3, ..., m_0 \\ Y\lambda + s_r^+ = y_j, r = 1, 2, 3, ..., n_0 \\ s_i^-, s_r^+, \lambda \geqslant 0 \end{cases},$$

where there are m_0 inputs and n_0 outputs in each DMU; x_{ij} and y_{rj} represent the ith input and rth output of DMUj, respectively; X and Y are the corresponding vectors of input and output; and s_i^- and s_r^+ denote input excess and output shortfall, respectively, which can be called slacks. Because this present paper focuses on not only the conservation of energy use but also the reduction of CO_2 emissions, we choose a non-radial SBM model to assess the related efficiency in consideration of undesirable output, CO_2 emissions.

2.2 SBM-undesirable output model

Because desirable and undesirable outputs are jointly produced in a production process, production technology should be considered. We put each province, regarded as a DMU, in the same technological structure to construct production frontiers. Assuming that each DMU applies capital stock (K), labor (L) and energy (E) as inputs to produce desirable outputs (Y) and CO_2 emissions (C), the production technology can be defined as follows:

$$T = \{(K, L, E, Y, C) : (K, L, E \text{ can produce}(Y, C))\}. \tag{2}$$

According to the environmental technology first defined by Färe (1989), there are two assumptions about production technology. The first is about the weak disposability of outputs, which indicates that undesirable outputs can increase under control if inputs are given and proportional reductions in desirable outputs and undesirable outputs are possible. The second is the null-jointness of desirable and undesirable outputs, which implies that if we want to remove all CO_2 emissions, the only way we can do is to quit production. Hence, we should consider the weak disposability and null-jointness hypothesis, which can be described as:

$$\text{If}(K, L, E, Y, C) \in T \text{ and } 0 \leqslant \theta \leqslant 1, \text{then } (K, L, E, \theta Y, \theta C) \in T, \tag{3}$$

$$\text{If}(K, L, E, Y, C) \in T \text{ and } C = 0, \text{then } Y = 0. \tag{4}$$

The production possibility set can be defined as follows:

$$P(x) = \{(y, c) | x \text{ produce } (y, c), x \geqslant X\lambda, y \leqslant Y\lambda, c \geqslant C\lambda, \lambda \geqslant 0, x > 0, y > 0, c > 0. \tag{5}$$

On this basis, a non-radial and non-oriented SBM model can be proposed according to Cooper *et al.* (2007) that corresponds to the constant returns to scale technology; it satisfies all production technologies and has a greater discriminating ability than the VRS model (Zhou and Ang, 2008):

$$\min \rho = x = \frac{1 - 1/M \sum_{m=1}^{M} s_m^- / x_{mj}}{1 + \left[1/N + K\left(\sum_{n=1}^{N} s_n^{y+} / y_{nj} + \sum_{k=1}^{K} s_k^{b-} / b_{kj}\right)\right]}, \tag{6}$$

$$\text{s.t.}\begin{cases} \sum_{j}^{n}\lambda_j x_{mj}+s_m^{x-}=x_{mj_0}, m=1,...M, \\ \sum_{j}^{n}\lambda_j y_{nj}-s_n^{y+}=y_{nj_0}, n=1,...N, \\ \sum_{j}^{n}\lambda_j b_{kj}+s_k^{b-}=b_{kj_0}, k=1,...K, \\ \lambda_j, s_m^{x-}, s_n^{y+}, s_k^{b-}\geqslant 0. \end{cases}$$

First, suppose there are j DMUs (DMUj, $j=1,\ldots, J$), and each of them represents a region of China. Each DMU uses m inputs x_{mj}, $m=1,\ldots, M$, M to produce n desirable or desirable outputs, y_{nj} and discharge k undesirable or undesirable outputs b_{kj}, $k=1,\ldots, K$. In Equation (6), λ_j ($j=1,\ldots, J$) is the non-negative intensity variables associated with each DMUj by incorporating the inputs and outputs. s_m^{x-}, s_n^{y+} and s_k^{b-} are slack variables associated with inputs, desirable outputs and undesirable outputs, respectively. The numerator and denominator of the target function ρ evaluate the average distance from the actual inputs and outputs to the production frontiers. This target function includes the slack variables of inputs and outputs s_m^{x-}, s_n^{y+} and s_k^{b-}, which denote the excess of inputs and the shortfall of outputs. The production unit is completely efficient when, $\rho=1$ and $s_m^{x}=s_n^{y+}=s_k^{b-}=0$, which indicates that the problem of the excess of inputs and the shortfall of outputs does not exist. $\rho<1$ denotes that there is an efficiency loss in the production unit.

2.3 Propensity score matching – difference-in-differences (PSM-DID)

The purpose of matching is to pair each industry in target provinces with same sector in non-target provinces that have not been influenced by the SREB strategy based on some observable variables, in such a way that the non-target industries' productivity dynamics can be studied to generate the counterfactual for the industries in targeted. This type of matching process is preferable to randomly or indiscriminately choosing the control group because it is less likely to induce estimation bias by picking industries with markedly different characteristics. Since matching involves comparing control and treated industries across a number of observable characteristics which can influence TFP (e.g. foreign capital, scale, sector characteristics), it is desirable to perform the matching on the basis of a single index that captures all the information from those variables. We adopt the method of propensity score matching (PSM) proposed by Rosenbaum and Rubin (1983), which suggests the use of the probability of receiving treatment (SREB) conditional on those characteristics, to reduce the dimensionality problem. Accordingly, we first identify the probability (or propensity score) of being acquired using a probit model. Foreign capital, scale (proxied here by total assets) and state of operation (presented by total loss of loss-suffering enterprises and stocks) are control variables observed in the time period before SREB. The choice of control variables is influenced by the empirical literature on TFP, and then we use stepwise regression method to calculate whether they are obvious in our case. The different matching estimators proposed in the literature (such as nearest neighbor matching and kernel matching estimators) differ from each other in the choice of the weighting function they employ. In this paper, we choose the Gaussian kernel function.

Because we have longitudinal data of TFPs, we do not employ this matching estimator in levels but rather use a DID matching estimator on the matched industries instead. This is motivated by recent studies which argue that standard matching estimators are usually unsatisfactory but, in combination with the DID methodology, can have the potential to

"improve the quality of no experimental evaluation results significantly" (Blundell and Costa Dias, 2000). The DID matching estimator has the additional advantage of eliminating unobserved time-invariant differences in TFP between industries of target and non-target provinces that standard matching estimators fail to eliminate (Smith and Todd, 2005). We employ variants of this DID matching estimator for the empirical analysis below.

3. Description of the data

Because the five provinces of 21st Century Maritime Silk Road are also influenced by One Belt One Road strategy, we remove these five provinces (Shanghai, Hainan, Zhejiang, Guangdong and Fujian). Because of the lack of data, we delete one target province – Tibet.

All the data of capital, labor, main operation income, total asset, foreign capital, stock and total loss of loss-suffering enterprises from 2010 to 2015 are collected from China Industry Statistical Yearbook and CSMAR Database. TFP measurement mainly involves the input indicators of capital and labor. At present, scholars generally use the "Perpetual Inventory Method" to calculate capital stock with the formula. Since subdivided industrial data are difficult to obtain and calculate the net value of fixed assets is consistent with the perpetual inventory method, this paper calculates the difference between the original value of fixed assets and the cumulative depreciation by referring to the approach from Dong *et al.* (2012). The net value of fixed assets is deflated to the constant price as of the year 2010 in accordance with the price index. The number of employed persons is used as labor input. The data on the number of employed person in the subdivided industries of China are not continuous. The labor data for the years 2012 cannot be acquired directly, and thus we obtain it by averaging based on the labor data of the preceding and succeeding years. The desirable output is generally represented by industrial added value. Due to the data missing after the year 2012, this paper employs the main operation income of industries and deflates it to the constant price as of the year 2010 in accordance with the producer price index for industrial products. Besides, data of total assets, foreign capital and total loss of loss-suffering enterprises are deflated to the constant price as of the year 2010 in accordance with the price index. The data of stock are deflated to the constant price as of the year 2010 in accordance with the producer price index for industrial products. The CO_2 emissions data come from Ceads database.

4. TFP evaluation

4.1 The result of TFP evaluation

Table I presents the basic statistics of sectoral TFPs from 2010 to 2015. Based on the calculation of sectoral TFP, we can see that part of resource-related industries, such like coal mining and dressing sector and petroleum and natural gas extraction sector, owns lower mean TFP and higher standard difference. However, petroleum processing and coking sector gain high mean TFP and high standard difference at the same time. Other industries, such like tobacco processing sector, gain the highest TFP. The top five mean TFP industries are tobacco processing, smelting and pressing of non-ferrous metals, electric equipment and machinery, transportation equipment, ferrous metals mining and dressing as well as rubber and plastic products. The bottom five industries are garments and other fiber products, textile industry, coal mining and dressing, petroleum and natural gas extraction, non-metal minerals mining and dressing as well as non-metal mineral products.

4.2 Basic statistical analysis

According to the requirement of following research, we divide all the TFP results into four groups: The first group includes all sectoral TFPs of non-target provinces before the policy implementation (TB PC); the second one is constituted with sectoral TFPs of target provinces before the policy implementation (TB PT); the third one is made up with sectoral

ID	Industry	Mean	SD	Min.	Max.	p25	p50	p75
1	Coal mining and dressing	0.17	0.13	0.05	1	0.1	0.14	0.2
2	Petroleum and natural gas extraction	0.19	0.15	0	1	0.11	0.15	0.2
3	Ferrous metals mining and dressing	0.26	0.1	0	0.5	0.2	0.27	0.33
4	Non-ferrous metals mining and dressing	0.22	0.09	0.06	0.46	0.16	0.21	0.26
5	Non-metal minerals mining and dressing	0.2	0.06	0.05	0.31	0.15	0.2	0.25
6	Food processing	0.3	0.06	0.12	0.44	0.26	0.3	0.34
7	Food production	0.22	0.05	0.1	0.34	0.18	0.22	0.25
8	Beverage production	0.22	0.05	0.11	0.33	0.19	0.22	0.25
9	Tobacco processing	0.51	0.12	0.04	1	0.46	0.51	0.59
10	Textile industry	0.18	0.07	0.05	0.4	0.12	0.16	0.22
11	Garments and other fiber products	0.16	0.06	0.05	0.37	0.13	0.16	0.19
12	Leather, furs, down and related products	0.26	0.11	0.11	0.62	0.19	0.23	0.3
13	Timber processing, bamboo, cane, palm fiber and straw products	0.24	0.07	0.08	0.38	0.19	0.24	0.29
14	Furniture manufacturing	0.22	0.08	0.03	0.43	0.16	0.22	0.27
15	Paper making and paper products	0.21	0.07	0.06	0.36	0.15	0.21	0.26
16	Printing and record medium reproduction	0.21	0.07	0.05	0.35	0.15	0.22	0.26
17	Cultural, educational and sports articles	0.24	0.11	0	0.6	0.2	0.23	0.29
18	Petroleum processing and coking	0.4	0.15	0.1	1	0.29	0.41	0.47
19	Raw chemical materials and chemical products	0.24	0.07	0.13	0.48	0.19	0.23	0.29
20	Medical and pharmaceutical products	0.23	0.06	0.09	0.38	0.19	0.23	0.27
21	Chemical fiber	0.25	0.13	0.03	0.63	0.17	0.23	0.3
22	Rubber and plastic products	0.26	0.06	0.15	0.49	0.22	0.26	0.29
23	Non-metal mineral products	0.2	0.05	0.08	0.33	0.16	0.21	0.24
24	Smelting and pressing of ferrous metals	0.31	0.06	0.18	0.53	0.26	0.31	0.35
25	Smelting and pressing of non-ferrous metals	0.33	0.11	0.1	0.64	0.25	0.33	0.38
26	Metal products	0.24	0.07	0.1	0.4	0.19	0.24	0.29
27	Ordinary machinery	0.21	0.06	0.09	0.34	0.17	0.21	0.26
28	Equipment for special purposes	0.24	0.07	0.07	0.39	0.19	0.23	0.28
29	Electric equipment and machinery	0.32	0.11	0.18	1	0.25	0.31	0.36
30	Electronic and telecommunications equipment	0.25	0.14	0	0.68	0.16	0.23	0.33
31	Instruments, meters, cultural and office machinery	0.23	0.14	0.06	1	0.15	0.19	0.27
32	Transportation equipment	0.28	0.1	0.07	0.62	0.22	0.27	0.33
Total		0.25	0.12	0	1	0.18	0.24	0.3

Table I.
Basic statistical analysis of sectoral TFP

TFPs of non-target provinces after the policy implementation (TA PC); and the last one contains sectoral TFPs of target provinces after the policy implementation (TA PT). We do basic statistical analysis by groups and the results are presented as Table II.

It can be seen from Table II that the average TFPs of non-target provinces (control group) is relatively higher than that of non-target provinces (treatment group) not only before the implementation of SREB strategy. It is obvious that the sectoral TFPs of target (treatment group) and non-target (control group) provinces have grown about 15 and 14.5 percent, respectively, after the implementation of SREB strategy. The standard difference (SD) of non-target provinces is almost the same before and after the policy while it further expands target provinces.

GG	Mean	SD	Min.	Max.	p25	p50	p75
TB PC	0.25178	0.10823	0.00492	1	0.18307	0.23342	0.29033
TB PT	0.2267	0.11321	0	1	0.15157	0.21015	0.27766
TA PC	0.28997	0.10854	0.05787	0.70294	0.22026	0.27455	0.33037
TA PT	0.25963	0.129	0	1	0.18115	0.24098	0.30636
Total	0.25078	0.11626	0	1	0.17617	0.23541	0.29789

Table II.
Basic statistical analysis of sectoral TFPs by groups

The minimum value of TFPs is improved in non-target provinces, while it is still 0 for non-target provinces. However, the max TFPs of non-targeted provinces decrease from 1 to 0.7 while the number of targeted provinces is still 1. For the average value of lower 25, 50 and 75 percent, the number of non-targeted provinces is higher and improves more than targeted provinces, and the gap of increase rate is higher and higher. It can be also seen from Figure 1.

5. PSM-DID analysis

5.1 Stepwise regression analysis

Based on related literature reviews and previous studies, the factors that can influence TFPs are FDI, industry scales and state of operation. In this paper, total assets (otc) present scales of sector, foreign capital (ofdi) presents FDI, total loss of loss-suffering enterprises (oloss), total liability (olia) and stocks (pstock) present state of operation. Based on previous literature, we choose these variables and do stepwise regression to distinguish the obvious variables in our research background. The results can be seen from Table III. We drop ofdi because it is not an obvious variable among other sectoral TFPs influential factors.

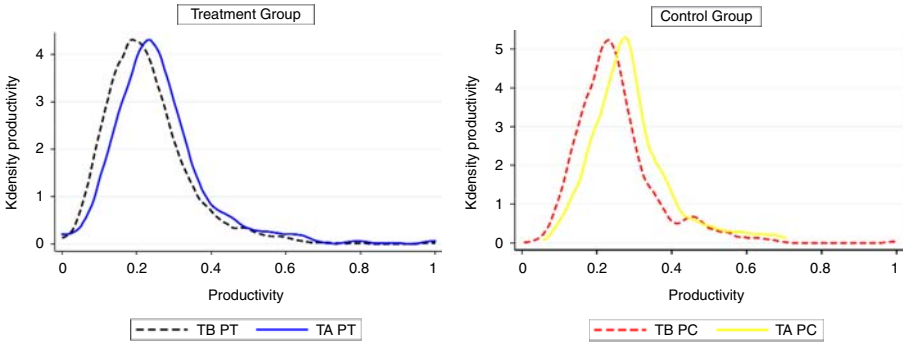

Figure 1.
k-density distribution of sectoral TFPs by groups

Control variables	Coef.	*t*	*p*	R^2	Adj-R^2
otc	0.0000199	11.64	0.000	0.0341	0.0338
otc	0.000016	8.10	0.000	0.0379	0.0374
ofdi	0.0003737	3.91	0.000		
otc	0.0000624	6.97	0.000	0.0450	0.0442
ofdi	0.0002896	3.00	0.003		
olia	−0.0000752	−5.32	0.000		
otc	0.0000129	1.44	0.151	0.1237	0.1228
ofdi	−0.0001747	−1.82	0.068		
olia	−0.0000692	−5.11	0.000		
pstock	0.000514	18.56	0.000		
otc	0.000022	2.40	0.016	0.1287	0.1276
ofdi	−0.0001398	−1.46	0.144		
olia	−0.0000965	−6.56	0.000		
pstock	0.0005212	18.85	0.000		
oloss	0.0008417	4.70	0.000		

Note: $p = 0.1443 \geqslant 0.1000$ removing ofdi

Table III.
The result of stepwise regression

5.2 Balancing tests

The PSM method will provide a reliable method for estimating the SREB policy effect, conditional on the propensity score, the potential outcomes y^1 and y^0 are independent of the incidence of treatment. Under the assumption of independence conditional on observables, the pre-treatment variables should be balancing between the treatment and control groups. The lack of balancing will lead to a possible misspecification of the propensity score estimation. Hence, as what is emphasized by Rosenbaum and Rubin (1983) and Dehejia and Wahba, it is important to verify that this balancing condition is satisfied by the data.

The balancing test examines the standardized difference for all variables as described in Smith and Todd (2005). Note that the lower the standardized difference, the more balanced or similar the treatment and control groups will be in terms of the variable under consideration. For each variable entering the propensity score model, we perform a formal paired *t*-test between acquired and matched comparison to satisfy ourselves that no significant differences exist.

Table IV reports the balancing test results based on Gaussian kernel matching. The standardized differences between acquired and comparison sample are all less than 8 percent in the matched sample. The substantial bias reduction as a result of adopting the matching method is also apparent from the figures in Table IV. We also do *t*-test of average treatment effect of treated group (ATT) to see whether an obvious difference between the treatment group and control group. The result presents that the absolute value of *t*-test of ATT is 1.9, which is less than 1.96. So, according to this result, we can see that there is no obvious difference between them (Table V).

We can also see the matching results visually from the following figures (Figure 2).

Table IV.
Balancing tests from kernel matching

Variable	Mean Treated	Mean Control	% bias	*t*-test *t*	*t*-test $p > t$	$V(T)/V(C)$
otc	362.67	373.67	−1.1	−0.42	0.672	0.84
olia	206.2	209.99	−0.6	−0.24	0.809	0.74
pstock	46.824	46.937	−0.1	−0.03	0.972	1.20
oloss	2.9185	2.7371	1.8	0.59	0.553	1.28

Table V.
Average treatment effect of treated group (ATT)

Variable sample	Treated	Controls	Difference	SE	*t*-test
Productivity unmatched	0.22669838	0.251779	−0.025080928	0.004477	−5.6
ATT	0.226334146	0.235417	−0.00908242	0.004769	−1.9

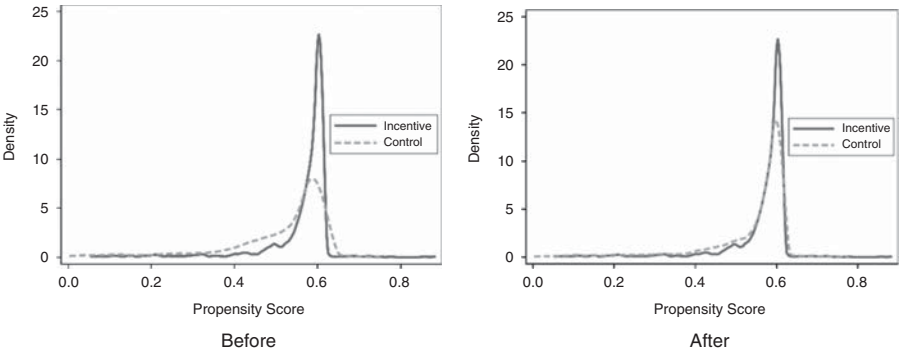

Figure 2.
Density of distribution of propensity score before and after matching

5.3 DID estimates

Having established that conditional on the propensity score, the comparison and treatment groups of firms are comparable, we now present the DID results in Table VI.

It is obvious that after the implementation of the SREB strategy, the TFP of industries of target provinces presents negative results, which theoretically means that after the conduction of this strategy, the industrial TFPs considered with CO_2 emissions show obvious decrease tendency in the years of 2014 and 2015. To dig out deep-rooted causes, we do PSM-DID in industries' level.

As we can see from Table VII, there are positive but not obvious differences caused by SREB strategy in industries of coal mining and dressing, petroleum and natural gas extraction, tobacco processing, leather, furs, down and related products, timber processing, bamboo, cane, palm fiber and straw products. While there are even obvious negative influences caused by the strategy in industries such as beverage production, printing and record medium reproduction, raw chemical materials and chemical products, rubber and plastic products, non-metal mineral products, metal products, ordinary machinery, equipment for special purposes, electric equipment and machinery as well as transportation equipment, all other differences caused by the strategy are not obviously negative.

However, all these industries which present a decrease of TFPs after the implementation of SREB strategy are comparative advantage industries of target provinces. The industries of these target provinces are mainly composed of energy and resource industries, raw material industries, light industry industries with agricultural products as raw materials, and mechanical and electrical industries.

For energy and resource industries, coal mining and dressing, petroleum and natural gas extraction industries show no obvious positive difference. Ferrous metals mining and dressing, non-ferrous metals mining and dressing, non-metal minerals mining and dressing, petroleum processing and coking, smelting and pressing of ferrous metals, smelting and pressing of non-ferrous metals industries present no obvious negative differences. For non-metal mineral products and metal products, their TFPs show obvious decrease which is caused by the SREB strategy.

For raw material industries, raw chemical materials and chemical products, rubber and plastic products industries both present obvious negative trend caused by the SREB strategy.

Number of observations in the diff-in-diff: 3,824

Group	Before	After	Total	
Control	1,124	626	1,750	
Treated	1,334	740	2,074	
Total	2,458	1,366	3,824	
Outcome var.	Productivity	SE	|t|	$P > \|t\|$
Before				
Control	0.235			
Treated	0.226			
Diff ($T-C$)	−0.009	0.005	−2.03	0.043**
After				
Control	0.283			
Treated	0.260			
Diff ($T-C$)	−0.024	0.006	3.90	0.000***
Diff-in-Diff	−0.014	0.008	1.90	0.058*

Notes: R^2: 0.03. Means and standard errors are estimated by linear regression and inference. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table VI. Difference-in-differences estimation results

ID	Industry	Productivity (DD)	SE	|t|	$P > \|t\|$
1	Coal mining and dressing	0.034	0.053	0.65	0.519
2	Petroleum and natural gas extraction	0.052	0.075	0.69	0.492
3	Ferrous metals mining and dressing	−0.03	0.037	0.82	0.416
4	Non-ferrous metals mining and dressing	−0.024	0.029	0.82	0.415
5	Non-metal minerals mining and dressing	−0.011	0.03	0.35	0.726
6	Food processing	−0.01	0.024	0.43	0.669
7	Food production	−0.019	0.017	1.14	0.257
8	Beverage production	−0.042	0.017	2.51	0.014**
9	Tobacco processing	0.042	0.039	1.07	0.288
10	Textile industry	−0.032	0.026	1.24	0.217
11	Garments and other fiber products	−0.018	0.02	0.88	0.383
12	Leather, furs, down and related products	0.112	0.071	1.59	0.116
13	Timber processing, bamboo, cane, palm fiber and straw products	0.023	0.03	0.77	0.441
14	Furniture manufacturing	−0.012	0.039	0.32	0.748
15	Paper making and paper products	−0.025	0.027	0.93	0.356
16	Printing and record medium reproduction	−0.083	0.044	1.91	0.060*
17	Cultural, educational and sports articles	−0.019	0.065	0.29	0.77
18	Petroleum processing and coking	−0.009	0.056	0.15	0.878
19	Raw chemical materials and chemical products	−0.058	0.025	2.35	0.020**
20	Medical and pharmaceutical products	−0.027	0.019	1.39	0.166
21	Chemical fiber	−0.02	0.066	0.3	0.767
22	Rubber and plastic products	−0.058	0.025	2.34	0.022**
23	Non-metal mineral products	−0.054	0.025	2.13	0.035**
24	Smelting and pressing of ferrous metals	−0.038	0.025	1.53	0.129
25	Smelting and pressing of non-ferrous metals	−0.031	0.04	0.76	0.446
26	Metal products	−0.072	0.025	2.84	0.005***
27	Ordinary machinery	−0.052	0.021	2.42	0.017**
28	Equipment for special purposes	−0.059	0.021	2.81	0.006***
29	Electric equipment and machinery	−0.061	0.029	2.1	0.038**
30	Electronic and telecommunications equipment	−0.034	0.067	0.51	0.614
31	Instruments, meters, cultural and office machinery	−0.02	0.049	0.41	0.686
32	Transportation equipment	−0.064	0.037	1.75	0.084*

Table VII.
The difference-in-differences results

Notes: Means and standard errors are estimated by linear regression and inference. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Most of the energy and resource industries as well as raw material industries need huge energy and resources input and produce a large amount of CO_2 emissions. The obvious decrease of TFPs calculated with CO_2 emissions caused by SREB strategy reveals the practice that after the implementation of the SREB strategy, provincial government takes advantages of all the preferential policies to facilitate the development of competitive industries; however, the efficiency of production does not improve or even under the condition considered with CO_2 emissions, that is, the efficiency of production decrease. Besides, the prices of energy and resource as well as part raw materials are controlled by China's Government. So even the government makes much financial support, it finally offers subsidy to the development of eastern region through the reduction of the prices of energy, resource and raw materials. These industries in target provinces which supply these production gain quite limited income that leads to no obvious or even a decrease in differences caused by the SREB strategy.

For the light industry, industries with agricultural products industries, industries like tobacco processing, leather, furs, down and related products, timber processing, bamboo, cane, palm fiber and straw products present positive grow non-obviously. Food processing

and food production industries show no obvious growth. The beverage production sector, because of the production of alcohol, which is a competitive sector in some targeted province but with large amount of CO2 emissions, experience obvious decrease of TFPs.

For mechanical and electrical industries, ordinary machinery, equipment for special purposes, electric equipment and machinery as well as transportation equipment industries all present negative trends caused by the strategy. Because of preferential policies such like financial and financial credit support attract, some mechanical and electrical industries move from eastern developed regions to the target provinces. However, the tolerant environment policies of target provinces indulge the emission of CO_2 and suppress technology improvement.

6. Discussions

The empirical results suggest that after the implementation of SREB strategy, the TFPs considered with CO_2 emissions of target provinces present comparative negative growth in years of 2014 and 2015. Based on the principles of DID, it shows the result that even though the implementation of the SREB strategy brings many advantages of development and internationalization of target provinces, under the consideration of CO_2 emissions, the increase of TFPs of target provinces' industries cannot catch up with non-target provinces'. In details, the negative result is mainly caused by industries of beverage production, printing and record medium reproduction, raw chemical materials and chemical products, rubber and plastic products, non-metal mineral products, metal products, ordinary machinery, equipment for special purposes, electric equipment and machinery as well as transportation equipment.

The result indicates that in target provinces, the growth of TFPs which is calculated with CO_2 emissions does not satisfy the theory of economic growth proposed by Robert M. Solow, which states that output growth rate and initial output level present negative correlation in different economic systems. There are many reasons leading to this consequence. In this paper, the reasons will be presented from two perspectives – the macro perspective based on the government level which pay more attention on domestic regional development and the micro perspective based on firm behavior and international expansion.

6.1 Reasons from government level

First, because of the lower technology development and relatively tolerant emission standards, when we calculate the TFPs considered with CO_2 emissions, the effect caused by the policy decreases and even presents negative results. Most of the target provinces are west and middle provinces in China, compared with east provinces, their development level is low. However, because of comparatively inexactitude conduction of the environment protection law, the lower resource cost (such as lands and so on) and government preferential policies, many enterprises with high pollutions and low technologies transferred from east to target provinces.

Second, the target provinces have industrial advantages in the energy and resources industries, and their economic growth is also highly dependent on these industries. However, due to the government's control of energy and resource prices, the target provinces gain small income. At the same time, as the by-product, these industries cause a large amount of CO_2 emissions, which also results in a decline of TFPs.

Third, because of the low level of education and backward views, the SREB strategy does not come into play in an expected way. Under the incentive system of Chinese-style decentralization, local governments always pay more attention to the growth of GDP and ignore sustainable development in order to obtain political achievements. Our TFPs, with the calculation of CO_2, decrease the growth. The rich energy resources of target provinces make it easier for local governments to obtain more fiscal revenue through investment in

fixed assets and resource extraction (Upadhyay and Ghosh, 2016). This may lead to the crowding-out effect of innovation and human capital investment, which will further hinder the sustainable development of economic growth and lead to a clear "resource curse effect."

Fourth, through the implementation of various preferential measures, the SREB strategy has promoted fixed-asset investment in target provinces, there is no effective institution to guarantee the full play of "political dividend." If the government aims to make full use of the growth-driven effects of the strategy, it needs to provide long-term and stable policy guarantees. However, in the actual implementation process, the SREB strategy has not been legally determined from the national level to insure the long-term strategic position of the strategy.

Time lag should also be considered when we dig out the reasons. Because of the lack of data, we can only test the short-term effect of SREB strategy in the years 2014 and 2015. For some policies, it may need more time to make effect. However, based on the short-term influence, we can compare the different effects between the SREB strategy and other policies taken before in the initial stage, and then identify problems immediately and find out solutions.

To solve above problems, we should take measures during the implementation of the SREB strategy. First is to improve the technology level of production to reduce the CO_2 emissions and increase the productivity. Talents in this aspect play an important role. Thus, we should improve the conditions of facilities and salaries. Based on the economic development situation in target provinces, the government should support this. Second, it is necessary for China's Government to reform the pricing system of energy and resource. In the implementation process of the SREB strategy, the development of energy resources industries occupies an important position. Reforming the existing pricing system enables the backward regions of target provinces to rely on their own advantages to accumulate capital and promote economic development effectively. What is more, target provinces should also develop industries with low pollution emissions. Third, it is necessary to reform the performance appraisal system of officials and a long-term performance evaluation mechanism for regional economic and social sustainable development. Fourth, both macro and micro policy support systems need to be conducted to make the SREB strategy institutionalization in a national level to guarantee the full play of "political dividends" in the long term. The long-term effect caused by the policy will be the real performance which presents the officials' contribution.

6.2 Reasons from firm level

There are various reasons that industries of targeted province present comparative negative performance in years 2014 and 2015 at the firm level. From a resource-based perspective, firms from emerging market such like China have weaker technology, capital, marketing and management (Lall, 1983; Wells, 1983; Almatrooshi *et al.*, 2016). Many of them operate in home markets with insufficient competition because of government regulatory mechanisms (Kumar and McLeod, 1981; Gaur and Kumar, 2010). These firms lack international experience and recognized brand names, and this will make them struggle to survive in the international context (Hitt *et al.*, 2000). What is more, emerging markets always have weaker institutions, intellectual property protection laws and relatively inefficient labor and capital markets. Many of them have opaque or capricious regulations, corruption and political risks (Luo and Tung, 2007).

However, the weaker institutions can also be a competitive advantage for Chinese firms. Firms from China have followed SREB strategies to internationalize. Based on location advantages, they invest in geographically proximate countries. Institutional environments in these countries are also riskier, due to the uncertain economy and political systems (Gaur *et al.*, 2014). Compared with firms from developed countries, Chinese firms have advantages

in these markets because they are more familiar with these markets and know how to deal with risks which they may also meet in the domestic market.

Many firms in China do not have high-level technology. They tend to conduct international expansion by innovation investment to develop cutting-edge technology. Innovation capabilities help firms keep competitive advantage in foreign markets (Anand and Kogut, 1997; Singh, 2009; Singh and Gaur, 2018). Investments in R&D help translate both tangible and intangible resources into innovative products, which, in turn, lead to a long-term competitive advantage (Buckley and Casson, 1976; Morck and Yeung, 1991; AlShaima *et al.*, 2016; Al Mansouri *et al.*, 2018). However, investments in innovation projects are risky for several reasons. First, investments require huge investments and the outcome of these investments is very uncertain because innovation activities have a high possibility of failure (Mudambi and Swift, 2014). Even if the innovation results in a good outcome, as a result of the longer time horizon for returns (Lee and O'Neill, 2003), the innovation itself may become outdated from a commercial point of view. In this paper, we can only measure two years' effects caused by the SREB strategy. During this period, most firms which conduct international expansion are under the process of fix assets or innovation investment with less or even no profit. This may lead to the negative TFP performance.

Affiliation with business groups provides firms with reputation and resources (Gaur *et al.*, 2014). Group-affiliated firms also can access to capital (from internal and foreign), labor and product markets more easily than firms that are unaffiliated. Group-affiliated firms have such resource advantages from their stronger domestic market position, and this provides affiliated firms a risk-taking ability to enter international markets (Gaur *et al.*, 2014). Based on this experience, we suggest that it is a better choice for Chinese firms to constitute business group to realize the effective flow and utilization of resources. What is more, cross-subsidization across business group will make it easier for affiliated firms to bear risks such as short-term losses (Gaur *et al.*, 2014).

7. Conclusions

As an important part of Chinese most influential regional economic development strategy (One Belt One Road) since China's Reform and Opening-up policy, the SREB strategy provides a quasi-natural experiment. To study whether the SREB strategy can promote the sustainable development of regional economic and international expansion, this paper first uses the SBM model to measure TFPs under the consideration of carbon dioxide emissions, then adopts the PSM-DID method to evaluate the net effect of the SREB strategy on the industry-level TFPs of target province. According to the results above, it can be found that the SREB strategy does not have a positive effect on the sustainable development of industries in target provinces, and even has negative effects on the TFPs of part-advantageous industries in the target provinces. Lower technology development, highly dependence on resource industries, the incentive system of Chinese-style decentralization and lacking stable policy guarantees are main reasons of it. What is more, at the firm level, institutional deficiency, in the first stage of innovation and fix asset investment and lack of efficient resource flow within business group, can also cause this result. During the implementation of the SREB, it is necessary to start with system reforms to break through the policy traps and promote the sustainable development of economy and international coordination in target provinces and countries. Entrepreneurs should identify international market opportunity and take advantage of firm's resources to conduct international expansion (Al-Ali *et al.*, 2017).

In the end, this paper can only tell the effect caused by the SREB strategy in the years 2014 and 2015. However, sometimes the effect of the policy (such as the innovation investment effect) has a time lag. So, the effect of the strategy remains to be further investigated.

We can just measure the short-term effect in 2014 and 2015. Only by further promoting the strategy and adjusting existing problems can it truly promote a sustainable development of sectoral productivity in target provinces.

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