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Environmental pressures and performance: An analysis of the roles of environmental innovation strategy and marketing capability

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ABSTRACT

The purpose of this study is to explore the relationship between environmental pressures (i.e. environmental regulation and stakeholder pressures) and performance considering the mediating role of environmental innovation strategy and the moderating role of marketing capability. Both primary data collected from 121 UK-based manufacturing firms and secondary data on financial performance of the firms is used to test the proposed relationships. The results show that environmental innovation strategy fully/partially mediates the relationship between environmental regulation/stakeholder pressures and environmental performance, and partially mediates the effect of environmental regulation on financial performance. The results also indicate that marketing capability significantly moderates the relationship between environmental regulation and environmental innovation strategy. Drawing upon contingency theory and dynamic capability view, by testing the mediation and moderation effects, the results of this study provide managers with valuable guidance for developing environmental innovation strategy.

1. Introduction

It is widely accepted that firms face pressures from various stakeholders (e.g. government, customers and suppliers) on implementing environmental initiatives (Delmas and Toffel, 2008; Sarkis et al., 2010; Yu and Ramanathan, 2015). However, the outcome of taking proactive environmental initiatives on the performance of firms is often contradictory. Traditionally, it has been argued that there is an inherent conflict between environmental protection and firm performance (Eiadat et al., 2008). Porter and van der Linde (1995, p. 98), however, argue that "properly designed environmental regulation can trigger innovation that may partially or more than fully offset the costs of complying with them". In other words, discovering win-win solutions to environmental regulation requires firms to perform proactive search for innovative solutions (Porter and van der Linde, 1995). To generate win-win solutions that promote economic and environmental benefits, firms have begun to place a heavy emphasis on innovation, and in particular, on environmental innovation strategy (Amores-Salvadó et al., 2015; De Marchi, 2012; Doran and Ryan, 2012; Eiadat et al., 2008). *Environmental innovation strategy* is defined as "a class of manufacturing practices that include source reduction, pollution prevention, and the adoption of an environmental management system" (Eiadat et al., 2008, p. 133). The literature has recently given increased attention to the important role of environmental innovation strategy in helping firms achieve sustainable competitive advantage (Ambec et al., 2013; Eiadat et al., 2008; Lanoie et al., 2011). However, research examining the environmental pressures–environmental innovation strategy–performance relationship has been limited (Eiadat et al., 2008), and to date there has been little empirical investigation of the mediating role of environmental innovation strategy.

In addition, the influence of environmental innovation strategy on firm performance is not straightforward. For example, a firm that has higher capability to utilize its scarce resources to achieve the desired outcomes is likely to achieve higher performance (Eisenhardt and Martin, 2000; Teece et al., 1997). Such "inimitable" capabilities often include superior knowledge about the market, customers, and supply chain network that is imperative to design and implement any environmental innovation strategy. *Marketing capability*, defined as the integrative process in which a firm uses its market knowledge, customer and supplier-sensing abilities, and relationship building with all its stakeholders is one such significant differentiator for the firm to achieve superior performance (Nath et al., 2010; Yu et al., 2014). Extant literature is rather limited to explore how marketing capability can moderate the environmental pressures–environmental innovation strategy–performance relationship.

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To address the two research gaps, this study draws on two distinct theories. In order to understand the mediation role of environmental innovation strategy, this study uses contingency theory (CT). The fundamental premise of CT is that a firm can achieve superior performance by selecting an appropriate organizational strategy (such as environmental innovation strategy) to fit the environment (such as environmental regulation and stakeholder pressures) (Van de Ven and Drazin, 1985; Walker and Ruekert, 1987). Although CT has been widely used in the strategic management literature, its application to understand the mediation role of environmental innovation strategy is scarce (Eiadat et al., 2008). To explore the moderating role of marketing capability, this study uses dynamic capability view (DCV) theory. DCV states that a firm can achieve better performance if it can respond quickly to the dynamic changes in the environment (Jarvenpaa and Leidner, 1998; Teece et al., 1997). As changes in the environment represent the changes in competition, customer needs and other stakeholder demands, therefore understanding the influence of marketing capability is critical. Extant studies in DCV to explore the role of environmental pressures on firm performance often overlook the potential role of organisational capabilities such as marketing (Mariadoss et al., 2011; Weerawardena, 2003).

In doing so, the study attempts to contribute to both research and practice. From research perspective, this study contributes to both CT and DCV literature in their application towards environmental competitiveness issues. First, governmental regulations and stakeholder pressure have made firms to respond to environmental changes dynamically. Therefore, understanding the mediating role of environmental innovation strategy and moderating role of marketing capability is now imperative. Second, the mediation and moderation framework used in the study aims to explain how the influence of environmental pressures on performance is rather dependent on the ability of the firm to respond based on their innovativeness towards developing a long-term environmental strategy and adapting to the marketing needs. From practice perspective, this study provides guidelines to managers on how to improve on two key determinants, i.e. environmental innovation and marketing capability, to open up win-win opportunities to business and governments alike. Many firms frequently miss the win-win opportunities (Horbach, 2008) in dynamic environments because they have little guidance on how an environmental innovation strategy can be formulated to respond to the increasing government regulation and stakeholder pressures. Our study aims to shed some light on the marketing capabilities that managers must seek to develop in order to develop effective environmental innovation strategy for performance improvement in a dynamic environment. In addition, from methodology perspective, the moderation and mediation effects are assessed based on the analysis of both primary and secondary data, which will help extend previous work and minimize the impact of common method variance (O'Sullivan and Abela, 2007; Roth, 1992). We supplement the primary data captured through questionnaire survey with secondary data on aspects of financial performance from the Financial Analysis Made Easy (FAME) database.

The remainder of this paper is organized as follows. First, the theoretical background and research hypotheses are described. Second, the study design and methodological procedures are presented. Third, the findings of the study are presented, and managerial implications are discussed. Finally, we conclude with a brief summation, the main limitations, and suggestions for future research.

2. Theoretical background and research hypotheses

2.1. Contingency theory and dynamic capability view

CT is a major theoretical lens used to view organizations (Sousa and Voss, 2008). The CT argues that performance is a function of the congruence between an organization and its environment, strategy, and structure (Lawrence and Lorsch, 1967; Venkatraman, 1989; Venkatraman and Prescott, 1990). In its most rudimentary form, the CT holds that organizations adapt their structures and strategies in order to maintain fit with changing contextual factors, so as to attain high performance (Donaldson, 2001). Miles and Snow (1978) state that firms that have a match with their environmental context can improve their performance, but those that have a mismatch, or respond too slowly to change, court failure and poor performance. This suggests that organizations should match their structures and processes to the environment in which they operate, in order to maximize performance (Donaldson, 2001; Lawrence and Lorsch, 1967). Firms often face a multitude of growing environmental pressures and demands from different stakeholder groups that is quite challenging to manage (Delmas and Toffel, 2008; Kassinis and Vafeas, 2006). How firms respond to the increasingly dynamic market characterized by government environmental regulation and stakeholder pressures has become a critical concern on developing environmental innovation strategy. However, research that investigates whether an environmental innovation strategy mediates the relationship between environmental pressures and performance has been very limited (Eiadat et al., 2008). Using the CT as a theoretical lens, our study addresses this gap in the literature by investigating the mediating role of environmental innovation strategy.

Although the resource-based view (RBV) has been reviewed as an influential framework that explains how competitive advantage is achieved through firm resources and capabilities (Corbett and Claridge, 2002), it has not adequately explained how and why certain firms have competitive advantage in dynamic and competitive environments (Eisenhardt and Martin, 2000). Therefore, some scholars have defined the DCV, which extends the RBV to dynamic or highly volatile markets (Eisenhardt and Martin, 2000; Teece et al., 1997). The DCV suggests that a firm pursuing long term competitive advantage in increasingly demanding environments needs to develop new capabilities to identify opportunities and to respond quickly to them (Jarvenpaa and Leidner, 1998). Dynamic capability is "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (Teece et al., 1997, pp. 516). While recent research has demonstrated the importance of environmental innovation strategy in gaining firm competitive advantage (Ambec et al., 2013; Eiadat et al., 2008; Lanoie et al., 2011), little has been done to examine the specific organisational capabilities that can moderate the relationship between environmental pressures and environmental innovation strategy. The present study bridges this research gap by exploring the moderating role of marketing capability.

Grounding our research in the theoretical perspectives of the CT and DCV, we intend to investigate whether environmental innovation strategy mediates the relationship between environmental pressures (environmental regulation and stakeholder pressures) and performance (environmental and financial), and whether marketing capability moderates the relationship between environmental pressures and environmental innovation strategy. Furthermore, this study aims to understand the diversity of antecedent factors that affect a firm's decision to develop an environmental innovation strategy, rather than focusing solely on the government regulation factor (Eiadat et al., 2008; Henriques and Sadorsky, 1996). The conceptual model is presented in Fig. 1 and discussed in more detail below.

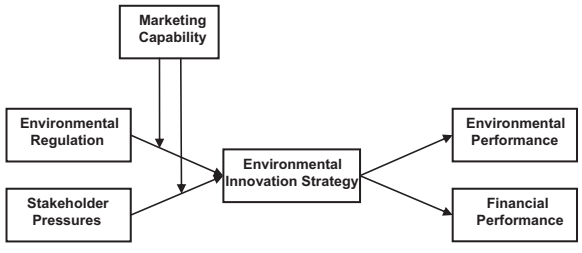

Fig. 1. Theoretical model.

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2.2. Environmental innovation strategy and its mediating effect

Environmental regulations are critical in limiting the effects of economic activity on the natural environment (Blohmke et al., 2016). However, they can impose a very significant cost on businesses and on manufacturers in particular (Palmer et al., 1995). Porter (1991) argues that environmental regulations positively influence performance defying the traditional view that environmental regulations are harmful to the economic competitiveness. Environmental regulations, rather than uniformly penalising all firms, in fact can provide an opportunity for firms to become more innovative and ultimately to improve their financial performance (Porter, 1991). As a response to growing environmental pressures from markets and state regulations, implementing sustainable development in firms requires new ways of thinking and acting and the development of new products, processes, and technologies (Mariadoss et al., 2011). Innovation-based sustainability strategies can be new products, processes, and technologies that are intended to reduce environmental impact of business activities, or improve energy and material efficiency (Mariadoss et al., 2011; Montabon et al., 2007). Following Eiadat et al. (2008), in the present study we define *environmental innovation strategy* as various environmental management practices a firm implements in order to respond to the increasing environmental pressures, which include setting annual targets for energy conservation, recycling or waste reductions, formulating clear environmental mission statements, adopting environmental management system, building separate environmental department/team, and providing training programmes for employees (Montabon et al., 2007; Oltra and Jean, 2009; van den Bergh, 2013). Porter and van der Linde (1995) provides a more comprehensive and dynamic point of view, as the combination of environmental pressures with innovation strategies may lead to improved firm performance (Costantinia and Mazzantib, 2012).

In accordance with the CT, there is a significant relationship between the environment and a firm's strategy (Henderson and Mitchell, 1997), the external environments determine firms' strategic actions and which in turn determines their economic performance (Scherer and Ross, 1990). The concept of fit between external environment and elements of strategy has served as an important building block for theory construction in strategic management, which can be operationalised as mediation (Venkatraman, 1989). Drawing upon the principles of the CT, we argue that environmental innovation strategy mediates the relationship between environmental pressures and performance. Environmental innovation strategy should be developed in the context of the current environment (Chassagnon and Haned, 2015). Firms that are exposed to environmental regulation and that are receptive to the environmental demands of stakeholders are more likely to adopt an environmental innovation strategy because they understand that such a strategy will lead to improved environmental and financial performance (Eiadat et al., 2008; Lai et al., 2012; Oltra and Jean, 2009). The mediation perspective decomposes the effects that market-structure characteristics have on firm performance into direct effects versus indirect effects (Hair et al., 2006). Mediation tests specify the existence of a significant intervening mechanism (environmental innovation strategy) between an antecedent variable (environmental regulation and stakeholder pressures) and the consequent variable (environmental and financial performance). As such, the mediator variable accounts for a significant proportion of the relationship between the predictor and the criterion variables (Venkatraman, 1989). The way firms integrate environmental concerns into their strategies while consolidating their competitive advantage is through environmental innovations (De Marchi, 2012).

2.2.1. Environmental regulation and performance

Environmental regulation is defined as "a set of characteristics for government environmental policies aimed at mitigating a firm's impact on the natural environment and creating a context where a firm will engage in environmental innovation" (Eiadat et al., 2008, p. 134). There have been many previous studies that examined the environmental regulation–performance relationship, but the results were ultimately inconclusive (Eiadat et al., 2008; Horbach, 2008; Triebswetter and Hitchens, 2005; Zhu et al., 2007). For instance, Zhu et al. (2007) find that the existence of regulatory pressures improves the performance of Chinese manufacturing firms. Using a case study of three German industrial plants, Triebswetter and Hitchens (2005) find no evidence of a significant impact of environmental regulations on economic competitiveness. A possible explanation for the inconclusive or even contradictory results is that most studies have overlooked the possibility that environmental innovation strategy may mediates the relationship between government environmental regulation and performance (Eiadat et al., 2008). Previous research has argued that well-designed environmental regulations stimulate innovation which consequently increases firm performance (Costantinia and Mazzantib, 2012; Porter, 1991; Porter and van der Linde, 1995). Consistent with the CT, environmental innovation strategy can improve a firms' competitiveness (e.g. profit growth and pollution reduction), but the effect is indirectly, and is mediated by environmental innovation strategy (Eiadat et al., 2008). Hence, we posit the following hypotheses.

H1. Environmental innovation strategy mediates the relationships a) between environmental regulation and environmental performance and b) between environmental regulation and financial performance.

2.2.2. Stakeholder pressures and performance

Stakeholder pressures could motivate firms to take more consideration of environmental issues and may encourage them to incorporate environmental practices into their management strategies (Sarkis et al., 2010). Stakeholder pressures have the capacity to affect a firm's decision to adopt environmental innovation strategies. The better a firm manages its relationship with various stakeholders, the better will be its performance outcomes (Donaldson and Preston, 1995; Freeman, 1984). Gupta (1995) suggests that the perceived environmental consciousness of a company involves balancing key stakeholders' expectations with environmental performance. Firms that aim to react to stakeholder pressures by implementing various environmental innovation strategies and practice can promote good financial performance and reduce negative environmental impact (Berrone and Gomez-Mejia, 2009; Yu and Ramanathan, 2015). Following Eiadat et al. (2008) and Porter and van der Linde (1995), we view environmental innovation strategy as a mediator that stimulates the effects of stakeholder pressures on environmental and financial performance. Hence, we offer the following hypotheses.

H2. Environmental innovation strategy mediates the relationships a) between stakeholder pressures and environmental performance and b) between stakeholder pressures and financial performance.

2.3. Moderating effect of marketing capability

Marketing capability is defined as the integrative process, in which a firm uses its tangible and intangible resources to understand complex consumer specific needs, achieve product differentiation relative to competition, and achieve superior brand equity (Day, 1994; Dutta et al., 1999; Song et al., 2007). Marketing capabilities include knowledge of the competition and of customers, as well as skill in segmenting and targeting markets, in advertising and pricing, and in integrating marketing activity (Song et al., 2007). A firm develops its marketing capabilities when it can combine individual skills and knowledge of its employees along with the available resources (Vorhies and Morgan, 2005). A firm that spends more resources to interact with customers can enhance their "market sensing" abilities (Narsimhan et al., 2006). Such capabilities, once built are very difficult to imitate for competing firms (Day, 1994). Thus, marketing capability is considered to be an

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important source to enhance competitive advantage of firms. The role of being "market-driven" and its impact on firm performance has been an active area of research in marketing discipline (Song et al., 2008). Song et al. (2007) suggest that marketing capability helps a firm to create and retain strong bond with customers and channel members. Marketing capability creates a strong brand image that allows firms to produce superior performance (Ortega and Villaverde, 2008). The marketing literature suggests that firms use capabilities to transform resources into outputs based on their marketing mix strategies and such marketing capabilities is linked to their business performance (Vorhies and Morgan, 2003). Drawing upon the nature of the DCV, we argue that marketing capability can be generally viewed as a prototypical dynamic capability. In line with this perspective, we intend to investigate whether marketing capability moderates the relationships between environmental pressures (environmental regulation and stakeholder pressure) and environmental innovation strategy.

As noted above, the DCV suggests that uncertain and turbulent environments help firms achieve competitive advantages through increasing causal ambiguity, which, in turn, impairs competitors' ability to imitate resources or resource combinations (Eisenhardt and Martin, 2000; Noda and Collis, 2001). The DCV helps to highlight the most critical capabilities management needs to sustain for competitive advantage (Cetindamar et al., 2009). It could enhance the understanding of the benefits of marketing capability because this perspective aims to explain how firms can adopt environmental innovation strategy to cope with the increasing environmental pressures. According to the DCV, it can be argued that firms that possess higher marketing capability are more likely to trigger the adoption of an environmental innovation when they are faced with the increasing environmental pressures than firms with a lower level of marketing capability since such firms could differentiate products/services from competitors and build successful green brands than those with a lower level of marketing capability. Being market driven helps the firm to create a superior bonding with the customers, supply chain members and other external stakeholders. Since environmental pressures come from regulatory authorities, stakeholders including customers and suppliers, therefore firms with superior marketing capability can adapt better to the changes in environmental needs. Firms with better marketing capability also have superior market-sensing ability. Hence, such firms are expected to take a more proactive stance towards any possible changes in the environmental regulatory framework before others have responded. Hence, marketing capability acts as a moderating force on the relationship between environmental pressures and environmental innovation strategy. Based on the above argument, we propose the following hypotheses.

H3. Marketing capability moderates the relationships a) between environmental regulation and environmental innovation strategy and b) between stakeholder pressures and environmental innovation strategy.

3. Research method

3.1. Data collection

This study created a unique dataset that involved primary data from managers responsible for environmental initiatives of firms and secondary data from established financial databases. Data for environmental pressures (environmental regulation and stakeholder pressures), environmental innovation strategy and performance (environmental and financial) were obtained from a questionnaire survey of UK-based manufacturing firms. Data for marketing capability were gathered from the FAME database. The use of both types of data allows researchers to verify and extend previous empirical work and limit the effects of common methods variance (Roth, 1992; O'Sullivan and Abela, 2007). We discuss the data collection in the following sections.

3.1.1. Questionnaire survey

The survey data were gathered during September 2009–March 2010. Before executing the survey, several academics from the field of operations management reviewed the initial measurement scales and provided feedback. We then conducted a pilot-test with several manufacturing managers to ensure that the questions were clear, meaningful, relevant and easy to interpret (O'Leary-Kelly and Vokurka, 1998). Minor changes to the scales were made accordingly. To test the proposed conceptual framework, 3000 manufacturing firms were randomly selected from the FAME database (based on SIC 10-32 codes in the UK). We first sent the questionnaire to 2000 manufacturing firms in September 2009. Follow-up calls were made to encourage completion and return of the questionnaires and to clarify any questions or concerns that potentially had arisen. In spite of reminders, we managed to get only 125 completed questionnaires. In order to improve sample size, we contacted another 1000 firms in February 2010 resulting in 50 more responses. After deleting unsatisfactory responses, the survey sample size was 167. The effective response rate of 5.6% is comparable to other survey-based environmental management studies (e.g. Chiou et al., 2011; Green et al., 2012). We augmented this primary data from secondary data from FAME (see Section 3.1.2 below). Out of the 167 responses to our survey, 46 firms did not have complete information in the FAME database. Thus, the final sample consisted of 121 firms. This sample size ($n = 121$) is comparable to other studies (e.g. Hsu et al., 2016, $n = 125$; Tachizawa et al., 2015, $n = 71$; Vachon and Klassen, 2008, $n = 84$).

In order to confirm that data collected from our survey (the 121 companies) represented the population of manufacturers in the UK, we compared data on the three organizational characteristics (turnover, cost of sales, total assets, number of employees, profit, and return on total assets in 2008) of our respondent companies with corresponding data on all manufacturing firms in the UK. The data were obtained from the FAME database. We found no statistically significant differences between the groups. Therefore, the representativeness of the sample is adequate.

A profile of the respondents is reported in Table 1. Our respondents typically hold relevant positions such as CEO, general manager, safety,

Table 1
Demographic characteristics of respondents.

	Number of respondents	Percent (%)
Industry		
Fabricated metal products	27	22.3
Automotive	11	9.1
Others[a]	80	66.1
Not reported	3	2.5
Total	121	100%
Annual UK sales (in million pounds)		
2–5 M	5	4.1
5–10 M	17	14.0
>10 M	93	76.9
Missing	6	5.0
Number of employees		
<50	5	4.1
50–250	72	59.5
251–500	14	11.6
501–1000	13	10.7
>1000	15	12.4
Missing	2	1.7
Firm age		
2–5	2	1.7
5–10	7	5.8
10–25	23	19.0
>25	88	72.7
Missing	1	0.8

[a] Others include a variety of manufacturing industry, such as composite material and component manufacture, industrial electronics manufacture, aerospace/defence engineering, manufacture of particle and material instrumentation, specialty organic chemical manufacture, manufacturing of plastic based products, and manufacturer of construction equipment.

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health and environmental manager, quality manager, operations and production manager, and environmental systems manager. Most of the respondents (77.2%) were corporate managers with more than five years of work experience in the same company. Thus, it is reasonable to expect that the respondents could be familiar with their firms and have sufficient knowledge to complete the survey.

We assessed non-response bias using the approach suggested by Armstrong and Overton (1977). One way of checking non-response bias is to compare the responses of late respondents with those of early respondents. We performed *t*-tests to verify whether there were substantial differences between the two sets of samples. We found no statistically significant difference for all questions in the questionnaire. Thus, we confirmed that non-response bias was not an issue with our study. Because we obtained data from a single respondent per firm using the self-reported questionnaire, the potential for common method bias was assessed. Harmon's one-factor test using exploratory factor analysis (EFA) was conducted (Podsakoff et al., 2003). The results of EFA indicate five distinct factors with eigenvalues above 1.0 and explaining 66.478% of total variance. The first factor explained 28.519% of the variance, which is not majority of the total variance. The finding suggests that the common method bias does not appear to be a problem in this study. Furthermore, a combination of both primary and secondary data was designed to limit the effects of common methods variance (Roth, 1992).

3.1.2. FAME database

Financial data used to measure marketing capability were obtained from the FAME database. We collected data for the year of 2008 because the questionnaire survey was carried out during September 2009–March 2010. Managers that responded to the survey must have evaluated environmental pressures, environmental management initiatives and performance based on their experiences in 2008.

3.2. Measures

3.2.1. Measures for environmental pressures, environmental innovation strategy and performance

We conducted extensive literature review to identify valid measures for related constructs and adapted existing scales to measure environmental regulation (Majumdar and Marcus, 2001; Rothwell, 1992), stakeholder pressures (Delmas and Toffel, 2008), environmental innovation strategy (Montabon et al., 2007), environmental performance (Darnall et al., 2010; Delmas and Toffel, 2008; Montabon et al., 2007), and financial performance (Antoncic and Prodan, 2008; Darnall et al., 2008; Tanriverdi and Lee, 2008). A five-point Likert scale (1 = "strongly disagree"; 5 = "strongly agree") was used for all the above constructs. The measurement items are presented in Table 2.

We conducted principal component analysis with varimax rotation on environmental pressures, environmental innovation strategy, and performance measures in order to examine the underlying dimensions of the constructs (Hair et al., 2006). As shown in Table 2, the Kaiser-Meyer-Olkin (KMO) values were >0.60, indicating the suitability of data for factor analysis (Hair et al., 2006). The factor analysis reveals that five factors with eigenvalues greater than one were extracted and all items had factor loadings >0.50, which provide support for unidimensionality (Hair et al., 2006). Furthermore, the Cronbach's alpha for all constructs exceeded the recommended threshold of 0.70, suggesting that the scales were reliable (Hair et al., 2006; Nunnally and Bernstein, 1994).

3.2.2. Measures for marketing capability

In line with previous research (e.g. Ahmed et al., 2014; Nath et al., 2010; Ramanathan et al., 2016; Yu et al., 2014), data envelopment analysis (DEA) was used to evaluate marketing capability. DEA is a mathematical programming technique commonly used for estimating the efficiencies with which different decision-making units are able to

Table 2
Factor results of environmental regulation, stakeholder pressures, environmental innovation strategy and performance (environmental and financial).

Items	Factor loadings
Environmental regulation ($\alpha = 0.780$)	
My company faces regulations in a variety of areas (water, air, solid waste, radioactivity, etc.)	0.597
My company faces a number of environmental regulations that sets a standard (e.g. *X* ppm of a certain pollutant) which must be met or an absolute threshold which must not be exceeded	0.751
My company faces a number of environmental regulations that offer economic incentives. Examples include pollution offsets, pollution credits, subsidies, etc.	0.594
My company faces a number of environmental regulations that offer economic disincentives. Examples include pollution charges for exceeding pollution limits	0.699
My company faces a number of environmental regulations that stipulate specification standards (that specifically recommend a particular technology to be used)	0.730
My company faces a number of environmental regulations that forced us to integrate pollution control in our production processes	0.767
Eigenvalue = 2.883; % of variance explained = 48.056%; Kaiser–Meyer–Olkin measure of sampling adequacy = 0.823	
Stakeholder pressures ($\alpha = 0.770$)	
Customers put pressure on management of my company in adopting environmentally friendly practices	0.753
Supply chain partners (e.g. supplier) put pressure on management of my company in adopting environmentally friendly practices	0.754
Actions by competitors have put pressure on management of my company in adopting environmental friendly practices	0.820
Marketing department of my company puts pressure on management in adopting environmental friendly practices	0.753
Eigenvalue = 2.373; % of variance explained = 59.335%; Kaiser–Meyer–Olkin measure of sampling adequacy = 0.752	
Environmental innovation strategy ($\alpha = 0.911$)	
My company sets annual targets for energy conservation, recycling or waste reductions	0.796
My company has a clear environmental mission statement to guide environmental decision making	0.860
My company has a clear environmental management (information) system to collect data on environmental impacts	0.913
My company has an environmental manager and/or a separate environmental department/team with well defined responsibilities	0.856
My company regularly provides training programmes to our employees to improve their awareness in protecting the environment	0.881
Eigenvalue = 3.715; % of variance explained = 74.305%; Kaiser–Meyer–Olkin measure of sampling adequacy = 0.880	
Environmental performance ($\alpha = 0.736$)	
My company has achieved important environment related certifications (e.g. ISO 14000)	0.768
My company has regularly achieved targets imposed on energy conservation, recycling or waste reductions	0.826
Due to its environment friendly practices, my company has saved significant amount of money in the past (not including the achievements in terms of energy conservation, recycling or waste reduction)	0.757
On an average, overall environmental performance of my company has improved in the past five years	0.676
Eigenvalue = 2.302; % of variance explained = 57.552%; Kaiser–Meyer–Olkin measure of sampling adequacy = 0.737	
Financial performance ($\alpha = 0.877$)	
On an average, sales of my company have been growing over the past five years	0.809
On an average, my company has improved its market share in the last five years	0.825
My company has increased its product portfolio in the last five years	0.860
My company has reached new product markets in the last five years	0.836
My company has reached new geographical markets in last five years	0.772
Eigenvalue = 3.369; % of variance explained = 67.383%; Kaiser–Meyer–Olkin measure of sampling adequacy = 0.759	

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Table 3
Variables and measures for marketing capability.

Marketing capability	Variables	Measures	Mean[a]	S.D.[a]
Inputs	Stock of marketing expenditure	Sales, general and administrative expenses	42,805.463	185,658.742
	Relationship expenditure	Cost of receivables	24,235.793	192,888.445
Outputs	Sales	Turnover	238,954.587	962,789.551

[a] Value in thousands of GBP.

convert their resources (usually called inputs in the DEA literature) to good performance (usually called outputs) (Banker et al., 1984; Charnes et al., 1978; Cooper et al., 2007). Dutta et al. (1999) define a firm's capability as its ability to deploy available resources (inputs) to achieve the desired objectives (outputs). Thus, this study used an input-output framework to measure marketing capability. Table 3 summarizes the inputs and outputs used to measure marketing capability. As shown in Table 3, the output for marketing capability is sales, and the inputs are marketing expenditure and relationship expenditure. The archival financial data have been used in previous research to measure marketing capability (e.g. Ahmed et al., 2014; Nath et al., 2010; Ramanathan et al., 2016; Yu et al., 2014). The stock of marketing expenditure is the total amount of money that a firm spends on its marketing activities such as market research and sales efforts (Dutta et al., 1999; Narsimhan et al., 2006). The relationship expenditures were measured by cost of receivables, which includes expenditures a firm used to build and maintain relationships with customers (Dutta et al., 1999). Table 4 reports the means, standard deviations, and correlations of the theoretical constructs.

3.2.3. Control variables

We included three control variables in our analyses, including industry type, firm size and firm age. Firm size was measured by annual sales, and firm age was evaluated by the number of years a respondent firm has been in existence. We controlled for firm size and age because larger and older firms are expected to have more experience and resources for developing environmental innovation strategy for performance improvement (Darnall et al., 2010). Industry types were controlled because of their possible effects on marketing capabilities and environmental innovation strategy that manufacturers develop.

4. Results

4.1. Mediation test

To test the mediation effect of environmental innovation strategy proposed in our conceptual framework (Fig. 1), we used the causal steps approach proposed by Baron and Kenny (1986), which has been most widely used in empirical research to assess mediation (MacKinnon et al., 2002). The results of meditation analysis are reported in Table 5. All regression models reported in Table 5 had variance inflation factors (VIF) values <2.0, which was well below the recommended maximum level of 10 (Mason and Perreault, 1991). Thus, multicollinearity does not exist among all independent variables. As illustrated in Table 5, the result of Model 1 indicates that both environmental regulation ($\beta = 0.222$, $p < 0.05$) and stakeholder pressures ($\beta = 0.252$, $p < 0.05$) have significant positive effects on environmental innovation strategy. Further, Model 2 reveals that environmental innovation strategy is significantly and positively related to environmental performance ($\beta = 0.686$, $p < 0.001$). Model 2 also indicates that environmental regulation significantly affects environmental performance ($\beta = 0.203$, $p < 0.05$). However, the impact becomes insignificant ($\beta = 0.048$, n.s.) when environmental innovation strategy is added. The full set of the results provide support for the full mediation of environmental innovation strategy on the environmental regulation–environmental performance relationship (Baron and Kenny, 1986). Hence, H1a is supported. In addition, as shown in Model 2, stakeholder pressures are positively and significantly related to environmental performance ($\beta = 0.371$, $p < 0.001$). The impact of stakeholder pressures on environmental performance remains significant ($\beta = 0.202$, $p < 0.05$) when environmental innovation strategy is added, but the influence is reduced. The results provide support for the partially mediating effect of environmental innovation strategy on the relationship between stakeholder pressures and environmental performance. Thus, H2a supported.

Model 3 presents the results for H1b and H2b. Environmental innovation strategy is positively related to financial performance ($\beta = 0.196$, $p < 0.10$). The significant effect of environmental regulation on financial performance becomes insignificant ($\beta = 0.126$, n.s.) when the mediator (i.e. environmental innovation strategy) is added, which provides full support for H1b. However, Model 3 shows that stakeholder pressures are not significantly related to financial performance. Thus, H2b is not supported.

4.2. Moderation test

To test the moderation effect of marketing capability proposed in our conceptual framework (Fig. 1), we used a moderated multiple regression analysis: (1) control variables, (2) main effect variables, and (3) moderating variables (Hair et al., 2006). Table 6 reports the results of the moderated regression analysis. To minimize the threat of multicollinearity, we orthogonalised the interaction terms by regressing each interaction term on its composing variables and using the residuals in the main regression (Liu and Yang, 2009; Dawande et al., 2008). The VIF values for all independent variables were <2, suggesting that multicollinearity is not an issue (Mason and Perreault, 1991). In all three models, the dependent variable is environmental innovation strategy. As shown in Table 6, the coefficient of cross product term (environmental regulation × marketing capability) is significant ($\beta = 0.209$, $p < 0.10$), indicating that marketing capability significantly

Table 4
Descriptive statistics and correlation analysis.

	Mean	S.D.	1	2	3	4	5	6
1. Environmental regulation	3.338	0.765	1.000					
2. Stakeholder pressures	3.053	0.769	0.055	1.000				
3. Environmental innovation strategy	3.686	0.880	0.225*	0.314**	1.000			
4. Environmental performance	3.660	0.736	0.246*	0.430**	0.790**	1.000		
5. Financial performance	3.752	0.745	0.128	0.187*	0.267**	0.322**	1.000	
6. Marketing capability	0.158	0.177	0.291**	0.137	0.145	0.212*	0.152	1.000

** $p < 0.01$ (2-tailed).
* $p < 0.05$ (2-tailed).

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Table 5
Results of regression analysis for mediation of environmental innovation strategy.

	Model 1 – environmental innovation strategy		Model 2 – environmental performance			Model 3 – financial performance		
	Step 1			Step 2	Step 3		Step 2	Step 3
Controls								
Industry type	−0.010	0.075	−0.078	0.024	−0.025	0.119	0.176†	0.161
Firm size	0.127	0.101	0.199†	0.165†	0.097	0.297**	0.282**	0.262**
Firm age	0.070	0.038	0.057	0.013	−0.011	0.036	0.017	0.010
Direct effects								
Environmental regulation		0.222*		0.203*	0.048		0.170†	0.126
Stakeholder pressures		0.252*		0.371***	0.202**		0.139	0.090
Mediating effects								
Environmental innovation strategy					0.686***			0.196†
R^2	0.024	0.132	0.054	0.224	0.633	0.107	0.153	0.186
Adjust R^2	−0.008	0.082	0.022	0.180	0.607	0.077	0.105	0.130
F-value	0.752	2.667*	1.688	5.030***	24.718***	3.601*	3.177*	3.316**

*** $p < 0.001$.
** $p < 0.01$.
* $p < 0.05$.
† $p < 0.10$.

moderates the relationship between environmental regulation and environmental innovation strategy. Thus, H3a is supported. However, H3b is rejected with the interaction term (stakeholder pressures × marketing capability) being insignificant ($\beta = -0.037$, n.s.), which indicates that marketing capability is not a moderator of the relationship between stakeholder pressures and environmental innovation strategy. Furthermore, we plotted a figure to demonstrate the moderating effect of marketing capability using the simple slope analysis (Aiken and West, 1991). Fig. 2 shows that firms with higher marketing capability are more likely to adopt environmental innovation strategy when they are faced with government environmental regulation.

5. Discussion and implications

5.1. Implications and contributions to theory

The theoretical framework for this study is valuable for extending our understanding of environmental management practices by empirically testing the environmental pressures–environmental innovation strategy–performance relationship from multiple perspectives. From the CT and DCV perspectives, this study offers unique theoretical arguments describing the relationship by considering the mediating effect of environmental innovation strategy and the moderating effect of marketing capability. In essence, the mediation and moderation is verified empirically by using the multiple perspectives.

Table 6
Results of regression analysis for moderation of marketing capability.

	Model 1	Model 2	Model 3
Controls			
Industry type	−0.010	0.077	0.066
Firm size	0.127	0.090	0.086
Firm age	0.070	0.041	0.078
Independent variables			
Environmental regulation		0.178†	0.173
Stakeholder pressures		0.231*	0.233*
Marketing capability (moderator)		0.155	0.148
Interaction effect			
Environmental regulation × marketing capability			0.209†
Stakeholder pressures × marketing capability			−0.037
R^2	0.024	0.153	0.190
Adjust R^2	−0.008	0.095	0.113
F-value	0.752	2.620*	2.488*

Note: Dependent variable is environmental innovation strategy and moderator variable is marketing capability.
* $p < 0.05$.
† $p < 0.10$.

Our empirical results provide evidence in support of the view that managerial perceptions of environmental pressures motivate firms to take more consideration of developing environmental innovation strategy in order to improve environmental and financial performance (Donaldson and Preston, 1995; Sarkis et al., 2010). The empirical evidence is generally consistent with Porter's (1991) theoretical argument that correctly formulated environmental regulation and stakeholder pressures will both protect the natural environment and generate internal benefits for the firms (Crotty and Smith, 2006). Thus, we conclude that there seems to be significant win-win opportunities that exist for the UK manufacturers that seek to conduct strategic responses to environmental regulation and stakeholder pressures (Porter, 1991; Porter and van der Linde, 1995). While some studies (e.g. Walley and Whitehead, 1994) have argued that win-win solutions are rare in the area of environmental programs, our finding of significant positive relationships between environmental innovation strategy and environmental and economic performance improvement is very encouraging. Furthermore, the moderating and mediating effects were examined using a combination of both primary and secondary data, which helps extend previous work and reduce the impact of common method variance (O'Sullivan and Abela, 2007; Roth, 1992).

Our finding of the mediating effect of environmental innovation strategy is important since the mediation has largely been ignored in previous research. Previous empirical studies (e.g. Kassinis and Vafeas, 2006; Sarkis et al., 2010; Zhu et al., 2007) have focused on examining the direct effect of environmental pressures on implementing environmental management practices and improving firm performance. Our study reveals that environmental innovation strategy fully mediates the effect of environmental regulation on environmental performance, partially mediates the link between stakeholder pressures and

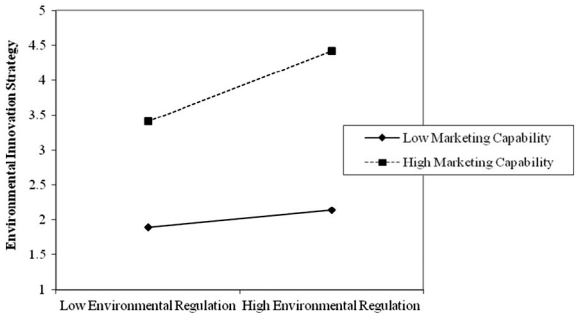

Fig. 2. Moderating effect of marketing capability on the relationship between environmental regulation and environmental innovation strategy.

environmental performance, and partially mediates the environmental regulation–financial performance relationship. This finding has been echoed in the literature in related contexts (e.g. Eiadat et al., 2008) but our results provide direct evidences on the positive mediating role of environmental innovation strategy in the UK context. Supported well by the CT (Donaldson, 2001; Sousa and Voss, 2008), our findings indicate that the necessity for "fit" between strategy and business environmental characteristics continues to be a major tenet of management thought (D'Aveni, 1995), which is also true of the field of environmental management practices. Thus, the findings of the mediator of environmental innovation strategy refine the premise that the better the fit between a firm's strategy and the industry characteristic (such as environmental regulation stringency and increasing stakeholder pressures), the better the firm's performance (Edelman et al., 2005). The strategic responses such as implementing environmental innovation strategies to the increasingly dynamic market characterized by government regulation and stakeholder pressures lead to superior environmental and financial performance.

Another important contribution of our study is the confirmation of the moderating role of marketing capability. Our results indicate that marketing capability significantly moderates the relationship between environmental regulation and environmental innovation strategy. This finding is consistent with the DCV. The RBV suggests that marketing capability is an inimitable resource (Day, 1994; Ortega and Villaverde, 2008) and the DCV highlights that this capability provides firms superior competitive advantage (Eisenhardt and Martin, 2000; Teece et al., 1997). Our finding shows that firms having higher marketing capability can develop better environmental innovation strategy, in order to respond to the increasing government regulation. This is an important finding since it reinforces the theoretical arguments (e.g. Hart, 1995; Rugman and Verbeke, 1998) that it is important to recognize the role of a firm's key capabilities in implementing environmental management initiatives and improving green success. However, our results indicate that marketing capability is not a moderator of the relationship between stakeholder pressures and environmental innovation strategy. A possible explanation for this result is that environmental regulation represents a main determinant of managerial action to deal with environmental concerns (Rugman and Verbeke, 1998). Environmental regulation is viewed as complementary to the firm's overall objectives, because it facilitates the development of green capabilities and reduces environmental risk (Crotty and Smith, 2006). Henriques and Sadorsky (1996) find that other environmental pressures (e.g. customer pressure, shareholder pressure, and community pressure) may play a significant role in the development of an environmental plan at the firm level. However, their study also identified that government regulation does represent the single most important source of pressure on firms to implement environmental management initiatives.

5.2. Implications and contributions to practitioners and policy makers

This study has several implications for the practitioners and policy makers as well. Firstly, the findings suggest that environmental innovation strategy mediates the relationship between environmental pressures (such as government regulation and stakeholder pressures) and environmental and financial performance of the firm. This result indicates that it is crucial for firms to develop the necessary organizational structure such as having a separate environmental management department with clear long-term environmental missions, offering employees with continuous training facilities to tackle environmental issues, and allocating resources to implement a formal environmental management system. Therefore, taking leadership in actively pursuing environmental innovativeness is likely to lead to superior environmental and financial performance rather than taking up a follower role with a sole objective of environmental compliance.

Secondly, our results suggest that marketing capability moderates the relationship between environmental pressures and innovation. Hence, it is crucial for a firm to engage in marketing campaigns to highlight the environmental initiatives such as energy conservation and waste reduction, and communicate such initiatives to their stakeholders. In addition, it is worthwhile for firms to invest additional resources in developing and maintaining relationships with stakeholders so that they accept any such marketing communication positively and do not treat it as mere window dressing.

Thirdly, given that many firms often miss win-win opportunities to improve performance, our results provide practical and valuable guidance to managers for opening up the win-win opportunities by developing environmental innovation strategies. To find the win-win solutions to their environmental problems, managers should not ignore environmental regulations or environmental demands of stakeholders. They must innovate, which leads to firms' competitive advantage.

Finally, our results also generate several policy implications. The findings of the win-win situation in the UK manufacturing industry provide policy makers with a comprehensive understanding of the relationship between environmental regulation, the implementation of environmental initiatives, and green success. It would be fruitful to introduce correctly formulated environmental regulation that can offer a firm with great green benefits through developing environmental innovation strategies.

6. Conclusions and limitations

In spite of the significant theoretical and practical contributions of the results, the study has certain limitations as well. First, this study focuses on exploring the moderating role of marketing capability. However, according to the RBV, each organization has a distinctive set of capabilities, such as operations capability, IT capability, supply chain capability, and financial capability (Day, 1994; Song et al., 2007; Teece et al., 1997). Future research should identify more relevant dynamic capabilities and investigate their impacts on developing environmental innovation strategy. Second, although our sample size and response rate is similar to previous studies that surveyed management executives (e.g. Chiou et al., 2011; Green et al., 2012; Hsu et al., 2016; Tachizawa et al., 2015), such size may limit the generalizability of the research findings. Future research should collect data from other countries with larger sample size to confirm the results obtained in our study. Third, this study measures environmental and financial performance using subjective survey based data instead of objective measures drawn from databases such as Toxic Release Inventory (TRI). Future research can validate the subjective scores obtained from the environmental managers of firms with their objective environmental emissions records and also include more determinants of environmental disclosure such as firm performances and governance variables (Zhao et al., 2016).

To summarize, from the CT and DCV perspectives, this study extends the environmental management literature by empirically evaluating the mediating effect of environmental innovation strategy and the moderating effect of marketing capability. Our results support the moderation and mediation hypotheses using a combination of both primary and secondary data. This is an important finding, since research studying the mediating role of environmental innovation strategy has been limited (Eiadat et al., 2008), and no study to date has examined the moderating role of marketing capabilities. From a practical perspective, by testing the mediation and moderation effects, the results of this study provide managers with valuable guidance for developing environmental innovation strategy.

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