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Stakeholder Pressure, Eco-Control Systems, and Firms' Performance:

Empirical Evidence from UK Manufacturers

Abstract

This study investigates whether stakeholder pressure directly intensifies the extent of eco-control systems' use, and thus indirectly affects economic and environmental performance. Cross-sectional data was collected from 93 UK manufacturers belonging to industries of high pollution propensity, and analysed using structural equation modelling. This study provides a broader understanding of environmental management control systems (EMCS) development, responds to calls in the literature for extending prior empirical research to both the antecedents and consequences of EMCS, and offers further evidence from the UK context (one of the leading countries in tackling environmental-related issues). Our findings reveal that the pressure from organisational stakeholders is significantly and positively associated with all eco-control systems' constructs. Interestingly, our findings indicate a lack of significant indirect relations between stakeholder pressure groups and firms' performance (economic or environmental), and only eco-control incentives influence UK firms' environmental performance.

Keywords:
Eco-control systems, economic performance, environmental performance, manufacturing firms, stakeholder pressure, UK.

1. Introduction

Environmental management control systems (EMCS) have gained momentum in the literature in the last decade (Henri and Journeault, 2010; Pondeville et al., 2013; Guenther et al., 2016). Their use can improve firms' ability to translate their environmental motivations into enhanced performance (Henri and Journeault, 2010; Guenther et al., 2016). One example of EMCS developed to guide environmental strategies within organisations is eco-control systems (Journeault, 2016). They are defined as the formal systems "that use financial and ecological information to maintain or alter firms' patterns in environmental activities" (Henri and Journeault, 2010, p. 64).

However, the EMCS field is said to be in its infancy; "overall, our understanding of how companies design and use management control systems (MCS) to drive sustainability strategy remains limited (Crutzen and Herzig, 2013)" (Bui and De Villiers, 2017, p. 121). Furthermore, empirical studies investigating EMCS antecedents and consequences are not only scarce (Guenther et al., 2016; Henri et al., 2017), but also arguably offer fragmented and disparate empirical findings due to the lack of consensus on the conceptualisation and operationalisation of EMCS (Guenther et al., 2016).

Several frameworks of MCS/EMCS have been developed in the literature[1] (e.g. Simons, 2000; Malmi and Brown, 2008; Merchant and Van der Stede, 2011). This development coincided with a growing pressure on firms, particularly from stakeholders (Brammer and Millington, 2003; Vogel, 2005), to have environmental strategies and objectives, implement EMCS, and improve environmental communications with stakeholders (Simons, 2000; Perego and Hartman, 2009; Rodrigue et al., 2013). In the MCS literature, it is argued that stakeholder pressure is expected to

[1] For brevity, the discussion of these frameworks is summarised in Appendix A (A.1).

motivate the implementation, design and use of EMCS, i.e. eco-control systems (Porter and Van der Linde, 1995; Henriques and Sadorsky, 1999; Schaltegger and Burritt, 2000; Pondeville et al., 2013; Gomez-Conde et al., 2019; Bui et al., 2020). As such, it is crucial to investigate the relative effect of different stakeholders on managers' decisions in relation to the corporate eco-control systems, in order to better understand the relationship between stakeholders and eco-control systems usage. There have been recent calls in the literature to research the specific influence of stakeholder groups and their interactions on eco-control systems (i.e. antecedents of EMCS), as well as their effect on environmental and financial performance (i.e. consequences of EMCS) (Pondeville et al., 2013; Guenther et al., 2016; Bstieler et al., 2018). Accordingly, this study investigates whether stakeholder pressure influences the extent of eco-control systems' use, as an application of EMCS (i.e. Study Objective One). We also delve deeper to investigate whether stakeholder pressure indirectly influences economic and environmental performance by intensifying the extent of eco-control systems' use (i.e. Study Objective Two).

In our study, we build on the stakeholder salience theory. This theory assumes that managers aiming to achieve particular ends pay particular attention to specific stakeholder classes, and their perceptions dictate stakeholder salience (Mitchell et al., 1997). We argue that this theory can provide a useful theoretical lens for our study considering that our key focus is whether stakeholder pressure influences the extent of eco-control systems' use. The application of the salience concept to the eco-control systems context can assist us in exploring the processes of prioritisation in this important context. EMCS can provide assurance to stakeholders because it is used to monitor firms' compliance with environmental policies and regulations (Henri and Journeault 2010). Thus, stakeholders may exert pressure on the extent of their usage.

Cross-sectional data was collected using an online questionnaire from 93 UK manufacturers belonging to industries of high pollution propensity in 2014, and analysed using structural equation modelling. The UK represents an interesting context for this study because the UK government has been committed to sustainability being the key characteristic of economic growth (UK Government, 2015). It has persistently advocated the adoption of environmentally friendly strategies through the development of different schemes and acts (Giannarakis et al., 2017), such as the Climate Change Programme, the Climate Change Act, the UK Emissions Trading Scheme, and the Carbon Disclosure Project (CDP) (see Appendix A (A.2) for further information). Furthermore, a growing number of FTSE100 companies were found to engage in actions to reduce greenhouse gas (GHG) emissions (Okereke, 2007, p. 484). The UK's Accounts Modernisation Directive requires public limited and large private companies to report to investors on how their profitability is affected by environmental issues (defra, 2006). The European G250 companies were shown to reach the highest average quality score for their corporate responsibility reports, where UK companies achieved third place (KPMG, 2013). In 2014, 201 UK companies fulfilled the Global Reporting Initiative (GRI) requirements (Giannarakis et al., 2017).

Our findings reveal that the pressure from organisational stakeholders is significantly and positively associated with all eco-control systems' constructs. They also indicate a lack of significant indirect relationships between stakeholder pressure groups and firms' performance (economic or environmental). Only eco-control incentives influence UK firms' environmental performance.

This study's contribution to the EMCS literature is fourfold. First, it builds on stakeholders' salience theory to enhance our understanding of eco-control systems, and hence, it illustrates that stakeholders' effects are significant, next to the company characteristics effects. This contributes to EMCS literature as most of the previous scarce studies were found to not directly refer to a theoretical framework (Guenther et al., 2016). Second, our study provides empirical evidence on both the antecedents and consequences of EMCS, which contributes to providing a better understanding of the development of an EMCS framework and the influence stakeholders have on them (Pondeville et al., 2013; Guenther et al., 2016). In doing so, we extend the existing literature by viewing stakeholder pressure as an independent variable and not as a control variable like in prior studies, and considering both operational and non-operational dimensions in operationalising environmental performance (see, Henri et al., 2017). Third, it provides empirical evidence on how some stakeholder groups are better able to influence the managerial decisions related to EMCS usage compared to other groups. Fourth, although prior studies looked at the manufacturing industry, to our knowledge, no prior studies on eco-control used the UK as a context. The UK is considered as one of the leading countries in tackling environmental-related issues. As such, using the UK as a context can provide further evidence on the impact of stakeholder pressure on eco-control systems.

For the remainder of this paper, a literature review and hypotheses are discussed in Section 2, followed by the research method in Section 3. Section 4 presents data analysis and results. A discussion of the findings and conclusions are provided in Sections 5 and 6.

2. Literature Review and Hypotheses Development

2.1 Stakeholder Pressure and Eco-control Systems

Stakeholder pressure depicts the interest and impact of groups/individuals (Henriques and Sadorsky, 1999). Organisations' decisions affect, and are affected by, various stakeholders. Considering that they tend to have different and often conflicting interests, it is crucial that managers identify who their stakeholders are and appropriately respond to their demands (Gago and Antolin, 2004). It is thus argued that the environmental strategy and practices of a company could be viewed as a response to various pressures and demands from stakeholders (Henriques and Sadorsky, 1999). In the same line of argument, the literature on MCS argues that stakeholder pressure is expected to motivate the implementation of EMCS, i.e. eco-control systems (Porter and Van der Linde, 1995; Henriques and Sadorsky, 1999; Schaltegger and Burritt, 2000; Pondeville et al., 2013). This stems from managers' tendencies to implement managerial changes, and communicate them, to satisfy influential stakeholders (Deegan et al., 2002; Islam and Deegan, 2010). Nevertheless, few insights were provided by the management control research on this key role of stakeholders in corporate social responsibility and environmental management (Pondeville, 2013).

A stakeholder can be defined as "any group or individual who can affect or is affected by the achievement of the organisation's objectives" (Freeman, 1984, p. 46). According to stakeholder salience theory, managers perceive stakeholders as salient if they accumulate any combination of three attributes, namely: power, legitimacy and urgency[2] (Mitchell et al., 1997). Those attributes provide the basis of managerial prioritisation of stakeholder relationships. Thus, managers' perspectives are crucial considering their ability to affect reconciliations among stakeholders, and to determine which stakeholders to pay more attention to (Mitchell et al., 1997). As such, managers' perceptions of stakeholder pressure determines stakeholders' roles in the development of environmental strategy and practices. This relationship has not been widely investigated in the literature, with the exception of Pondeville (2013). The contingency literature supports the view that firms encountering significant pressure tend to strengthen their MCS and

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[2] For more details, please refer to Appendix A (A.3).

thus adopt organic ones (Chenhall, 2003). In this regard, the use of EMCS increases when stakeholder pressure intensify (Henri and Journeault, 2010).

The environmental disclosure literature also supports the argument that environmental actions are considered by managers as a reaction to stakeholder pressure (e.g., investors, customers, shareholders, etc.). For example, Moneva and Llena (2000) argued that firms try to affect stakeholders' perceptions through disclosing more environmental information (financial and non-financial), highlighting their efforts towards protecting the environment. Simultaneously, stakeholders have increasingly required access to companies’ environmental information (Bouma and Kamp-Roelands, 2000). As such, they can influence the decision to use EMCS, and the extent of their usage (Cespedes-Lorente et al., 2003). This will allow them to affect the environmental information collected by firms, which should cover the ecological issues at stake.

The EMCS literature conceptualises eco-control systems through three main aspects: the use of environmental performance indicators, incentives, and budget planning (Ittner and Larcker, 2001; Luft and Shields, 2007; Henri and Journeault, 2010)[3]. We argue that these are aligned with elements of the EMCS framework – in particular, cybernetic and reward and compensation controls. However, prior literature is scarce on studies investigating the influence of stakeholder pressure on the use of EMCS, i.e. eco-control systems. In recent investigations of the effect of eco-control practices on environmental/operational performance, stakeholder pressure was treated as a control variable with no detailed view of the types of stakeholders involved (see, Henri et al., 2017; Gomez-Conde et al., 2019). In our study, we argue that it is crucial to understand the pressures exerted by specific stakeholders on firms. Bui et al. (2020), who focus on carbon budgetary control, recently concluded that stakeholder pressure does not necessarily determine the emphasis or

[3] For more details, see Section (3).

intensity of MCS usage. However, a few previous empirical studies reported a significant positive association between pressures from stakeholders and the use of MCS/EMCS (Pondeville and De Rongé, 2005; Pondeville et al., 2013; Gomez-Conde et al., 2019). Accordingly, the following hypothesis is presumed:

H1: *A positive association exists between stakeholder pressure and the extent of using eco-control systems in the surveyed firms.*

2.2 Eco-Control Systems and Economic Performance

The relationship between the use of environmental initiatives and shareholder evaluations could indicate that managers are dealing with stakeholders in an effective way (Peloza and Papania, 2008). The claims of different stakeholders are continuously balanced by managers, particularly with those of shareholders (Berman et al., 1999). The correct identification and prioritisation of corporate stakeholders can thus result in successful management of organisations. This is because a company's actions have implications recognised by shareholders and other stakeholders directly affected by those actions (Jawahar and McLaughlin, 2001). In this regard, the managers' responses to salient stakeholders' demands – "those stakeholders who possess the ability to impact the reputation and operations of the firm" – has the potential to harm (or improve) the financial performance (Peloza and Papania, 2008, p. 170; Neville et al., 2011).

Based on stakeholder salience theory, managers have the ability and motivation to focus their environmental-related initiatives, such as eco-control systems, on stakeholders with power, legitimacy and urgency (Peloza and Papania, 2008). Those stakeholders have the ability to reward or punish the company based on their assessment of the company's activities and eco-control here. Therefore, companies may tend to enhance the extent of use of eco-control systems (as an example of those initiatives) as a response to those stakeholders and hence maintain or enhance its financial performance. This is crucial because "stakeholders' evaluations of the firm and its activities can impact (among other things) the firm's share price, its consumer support, the loyalty of its employees and the amount of attention directed at (or against) it by the media" (Peloza and Papania, 2008, p. 169). As such, the same contingent relationship between eco-control systems and financial performance can exist if stakeholders perceive a company as environmentally responsible or not. There is evidence that the firm's stock price fell after announcements of fraud, criminal activity and socially irresponsible behaviour (Frooman, 1997), which has long-term financial implications. Clarifying this relationship is important because managers try to balance stakeholders' expectations of the company's social/environmental responsibility against demands for its financial performance (Bertels and Peloza, 2008).

Positive relationships are reported in literature between the use of MCS and a firm's economic performance (e.g., Bonner et al., 2000; Baines and Langfield-Smith, 2003; Ittner et al., 2003; Luft and Shields, 2007). Eco-control systems, as an EMCS application, are said to be used to quantify the environmental actions and integrate the environmental concerns into the organisational routines, which are expected to improve business strategy alignment and underlying value drivers (Ittner et al., 2003). A few previous empirical studies have supported that the use of eco-control systems contribute to economic performance. Judge and Douglas (1998) and Wisner et al. (2006) reported that firms' economic performance is enhanced when they integrate environmental concerns within strategic planning. Melnyk et al. (2003) found that companies implementing formal EMCS experience greater impact on economic performance. Eco-control systems are said to support the development and maintenance of organisational abilities, which helps in sustaining firms' competitive advantage and leads to a better performance (e.g., Henri and Journeault, 2010).

As eco-control systems bring together the goals of individuals and organisations, manage and communicate strategic priorities, highlight main areas of concern to managers, and improve resources allocation and priorities formation in relation to organisational goals (Flamholtz et al., 1985), they can foster economic performance (Baines and Langfield-Smith, 2003). Considering that integrating various environmental issues within the organisational practices is voluntary, it can represent the management's commitment to improving environmental and economic performance (Henri and Journeault, 2010). Our second hypothesis is as follows:

H2: *A direct positive association exists between the extent of using eco-control systems and the surveyed firm's economic performance.*

2.3 Eco-Control Systems and Environmental Performance

Society has increasingly valued the environmental components implemented by organisations into their processes, products and services (Owen and Scherer, 1993). It is argued that stakeholders try to impact management strategies to attain their goals (Frooman, 1999). Those stakeholders also evaluate the extent to which their expectations have been met by the firm's environmental performance (Wood and Jones, 1995). Knowing that, companies will continuously attempt to enhance their environmental performance. One way of responding to stakeholders' expectations is by complying with them through implementing/intensifying the use of environmental initiatives, e.g. installing equipment to reduce emissions, or redesigning the production processes (Russo and Fouts, 1997). Proactive companies are viewed as more socially responsible by stakeholders interested in the environment (Russo and Fouts, 1997).

In prior studies, it is argued that eco-control systems could be used to gain benefits related to environmental performance (Schaltegger and Burritt, 2000), and empirical evidence reported in previous studies supports this argument (Henri and Journeault, 2010; Henri et al., 2017). This was ascribed to the provision of relevant financial/ecological information for decision-making (Henri and Journeault, 2010) and external reporting (e.g., Chenhall, 2005; Dixon et al., 2005). However, the effect of eco-control systems on environmental performance was not thoroughly addressed, particularly in relation to the operational and non-operational components of environmental performance. Prior studies focused only on the operational dimension of environmental performance when exploring eco-controls (Henri et al., 2017). However, our study extends the existing research by considering both operational and non-operational dimensions in operationalising environmental performance. This can contribute to the current EMCS literature by offering a deeper insight into the effects of eco-control systems and stakeholder pressure.

Eco-control systems promote environmental goal congruence between individuals and the organisation through guiding actions (Flamholtz et al., 1985). They align staff behaviour with the organisational environmental goals, and encourage them to put in additional efforts. This is expected to improve environmental performance (Epstein, 1996; Bonner et al., 2000). They reveal causal relationships among environmental operations, strategy and goals (Atkinson et al., 1997; Chenhall, 2005). They further support achieving the environmental goals through directing managers' focus towards profit-related and environmental performance activities (Lothe et al., 1999), and thus respond to stakeholders' interests.

When there is inconsistency between the managers' and stakeholders' views, financial and/or environmental performance may decline as a result of contesting managerial decisions (Tashman and Raelin, 2013). Therefore, the positive relationship between the use of environmental initiatives and environmental performance could indicate that managers are dealing with stakeholders' demands in an effective way. Also, eco-control systems provide data for external reporting, where disclosure of financial/ecological information can influence the public's perception of the company's operations, and provide information to stakeholders on the extent to which their demands are met. This, in turn, influences reputation (Dixon et al., 2005) and stakeholders' interpretations of the environmental actions undertaken by the company. Accordingly, the following hypothesis is presumed:

H3: A direct positive association exists between the extent of eco-control systems' use and the surveyed firm's environmental performance.

2.4 Stakeholder Pressure and Economic and Environmental Performance (indirect relationship)

Prior research has not thoroughly addressed the effect of stakeholder pressure on organisational and environmental performance, particularly through the use of eco-control systems. In the ongoing debate about the relationship between EMCS applications and corporate financial performance, there has been limited consideration of the potential for different stakeholder demands to attract the company's attention and the consequent responses made, which can affect a firm's performance. Based on our arguments in Section 2, stakeholder pressure can motivate firms to perform well both environmentally and economically to ensure firms' operations are not conveying environmental risk (Al-Tuwaijri et al., 2004). We follow the arguments in H1 (the pressures exerted by stakeholders to deploy environmental management practices could increase the extent of using eco-control systems), and the literature supporting a relationship between the extent of eco-control systems' use and a firm's organisational and environmental performance (H2 and H3). Thus, we predict that stakeholder pressure is indirectly associated with a firm's performance (economic and environmental) through the extent of using eco-control systems. Thus, the fourth hypothesis is stated as follows:

H4a: An indirect relationship exists between stakeholder pressure and the surveyed firms' economic performance through the extent of using eco-control systems.

H4b: An indirect relationship exists between stakeholder pressure and the surveyed firms' environmental performance through the extent of using eco-control systems.

Figure (1), depicts the study's framework.

FIGURE 1

3. Research Method

3.1 Sample and Data Collection

The UK is one of the largest GHG emitters in the world, with the manufacturing sector being one of the main polluters in Europe (Agnolucci and Arvanitopoulos, 2019; EEA, 2019). The manufacturing industry is further "exposed to a particularly wide range of green issues and experiences relatively high visibility in its environmental issues". It is also "based on non-renewable inputs and under considerable pressure from external stakeholders to change its environmental practices" (Pondeville et al., 2013, p. 321). The magnitude of environmental spending in industries of high pollution propensity in order to comply with the environmental regulations, and the impact of their operations on the natural environment are argued to be of crucial concern to stakeholder groups (e.g., primary, secondary and regulatory stakeholders) (Clarkson et al., 2008). As such, our study sample frame was confined to UK manufacturing firms belonging to industries of high pollution propensity. The manufacturing sector is said to have a high environmental impact, which advocates its relevance for research on EMCS (Pondeville et al., 2013). The selected sample firms are medium- and large-sized, with a minimum of 100 staff, to ensure that the surveyed firms are large enough for their MCS to be sufficiently developed (Abdel-Kader and Luther, 2008; Abdel-Maksoud et al., 2016; Journeault, 2016).

Data was collected using Qualtrics Online Survey Software[4], from cross-sectional UK firms, in 2014, in which a structured questionnaire was used. Initially, 860 invitations were sent via e-mail to managers of the surveyed firms, resulting in 839 e-mails being successfully delivered. The initial mail-out was followed by three reminders and then a telephone follow-up to all non-respondents. Of the 839 delivered emails, only 93 respondents were used in the analysis; accordingly, the usable response (completion) rate was 11.1% (93 usable responses/839 successfully delivered emails). This response rate complies with those reported in online studies using similar methods (e.g., FluidSurveys, 2014; Pollanen et al., 2017).

Various questionnaire pre-testing stages were performed on the questionnaire form itself before data collection. To ensure the validity of our research, we made sure that the respondents had knowledge about environmental issues and were involved in the related process. In addition, the survey provided specific technical terms definitions/explanations. For more details about data collection, kindly refer to Appendix B (B.1).

Two types of non-response bias were considered: questionnaire non-response and item non-response (Van der Stede et al., 2005). To test for the former, comparisons between early and late respondents were performed (Wallace and Mellor, 1988; Hall, 2008; Pollanen and Abdel-Maksoud, 2010). We compared early respondents (first 24%) to late respondents (last 24%) for salient environmental performance items[5] and all four control variables in the model. Unreported, results indicate that there are no significant differences for any of the variables tested; hence, the existence of non-respondents bias does not impose a threat to our findings. For the item non-

[4] www.qualtrics.com

[5] These are: reduction in costs of regulatory compliance (EnvP3); filters and controls on emissions and discharges (EnvP14); and residue recycling (EnvP15); see, environmental performance items, Appendix B (B.3).

response, the questionnaires used in analysis were complete (as indicated above). The measurement of variables is discussed next.

3.2 Measurement of Variables

Multi-item constructs were used in variables measurement. Further details on variables, control variables and measures for constructs are presented in Appendix B (B.2 and B.3).

3.2.1 Stakeholder Pressure (SP)

In this study, we adopt a 14-items scale, derived from the environmental management accounting literature, in measuring stakeholder pressure (Buysse and Verbeke, 2003; Henri and Journeault, 2010). The 14 items include various stakeholder's influence items; the importance attached to them was measured by asking respondents to rate stakeholder pressure impact on decisions related to environmental management, where higher scores indicate more pressure.

In our study, we adopt an empirical grouping of stakeholders' items. In doing so, we build on Pondeville et al. (2013), and perform exploratory factor analysis on the designated 14 items in order to group stakeholder pressure on an empirical basis. The results of exploratory factor analysis – on the 14 items – revealed four factors: (1) secondary stakeholders; (2) primary stakeholders; (3) organisational stakeholders; and (4) regulatory stakeholders.

3.2.2 Eco-Control Systems

We build on the EMCS framework, recalled from Section (1), and adopt multi-constructs consisting of two elements, namely: cybernetics, and reward and compensation. In doing so, we build on the work of Henri and Journeault (2010) who suggested a composite of three practices of eco-control system, these are: uses of performance measures, budgeting, and incentives (Ittner and Larcker, 2001; Luft and Shields, 2007; Henri and Journeault, 2010). In our study, we use a similar variable construct, where a ten-item scale was used, to ask respondents questions related to the extent to which their organisations use environmental aspects/criteria in relevance to their performance measurements, budgets, and incentive systems (i.e. Eco-Control Environmental Performance Indicators (EC-EPIs); Eco-Control Budgeting (EC-Budgeting); and Eco-Control Incentives (EC-Incentives)).

3.2.3 Economic Performance

We adopted a three-item scale to measure economic performance (Clarkson et al., 2008; Henri and Journeault, 2010). Respondents were asked to indicate the degree of importance/rate performance of their units, in the past 12 months, compared to leading competitors of these items. In our study, we adopt a weighted score in data analysis (i.e. rate by importance).

3.2.4 Environmental Performance (EnvP)

We adopted a 15-item scale, following Henri and Journeault (2010) and Sharma and Vredenburg (1998); as a proxy for environmental performance. Respondents were asked to indicate the extent to which their environmental practices have led to 15 items of benefits. The empirical grouping of the 15 items, using exploratory factor analysis, resulted in two factors. The first factor is labelled 'operational environmental performance'; while the second factor is labelled 'non-operational environmental performance'.

Self-reporting measures were adopted for our performance variables. We understand that, in the environmental management context, self-reporting might be an issue when using a survey. Therefore, we performed common method bias analysis and analysed objectivity/subjectivity of respondents' judgments, as reported in the next section. The results eradicate any concern of bias or subjectivity in respondents' judgments.

3.3 Descriptive Statistics and Control Variables

Four main control variables are incorporated. These are: industry type (Perego and Hartmann, 2009); firm size (Perego and Hartmann, 2009; Henri et al., 2014; Windolph et al., 2014); ownership type as a proxy of public visibility (Henri and Journeault, 2010; Journeault, 2016); and stock exchange listing (Ermenc et al, 2017). These control variables are advocated in EMCS literature, as mostly common used controls in previous survey-based studies related to EMCS (Guenther et al., 2016) (see Appendix B (B.2) for further explanation for the choice of control variables). Seven industry sectors were included in the questionnaire to capture the industry type the respondents' firms belonged to. Firm size was measured using the natural log of the number of employees (Journeault, 2016). Public visibility was measured using a dichotomous variable, where respondents were asked in the questionnaire form to identify the ownership type of their firms. The stock exchange was measured using a dichotomous variable. Stock listing data was collected from respondents, who were asked to indicate whether their firms are listed or non-listed.

TABLE 1

Most of the surveyed organisations (50.5%) are large-sized, i.e. workforce is more than 500 employees, while 49.5% are medium-sized (size of workforce is 100 – 500). Respondents' firms belonged to food, beverage and tobacco (16.2%); chemicals, plastic, mining, oil and gas (18.9%); and metal, machinery and transport equipment (13.5%). The vast majority of the surveyed firms (91.3%) were private; and most of them (76.1%) were not listed in stock exchange markets (see Table 1). Data analysis is presented next.

4. Results

Two different software were used in data analysis. We used the partial least square (PLS) approach to structural equation modelling (SEM), using SmartPLS software. Our sample size is considered adequate in compliance with the requirement of PLS[6]. We also used WarpPLS software to execute the final model and to ensure diminishing the effect of possible endogeneity. WarpPLS's main algorithms are based on PLS, with bootstrapping resampling method, and have no requirements for sample size (Kock, 2019, 2020).

4.1 The Measurement Model

The measurement model estimates relationships between scale measures and constructs. The PLS measurement model was used to assess both reliability (i.e. individual item and composite reliability) and validity (i.e. convergent and discriminant validity). Overall, the results indicate that factor loadings for all items are acceptable, composite reliability (CR) measures for all constructs exceed 0.7 (except for 0.6912 in organisational stakeholders) indicating good CR (Hair et al., 2010), and the square roots of constructs average variances extracted (AVEs) are greater than correlation coefficients indicating adequate discriminant validity. The PLS measurement model statistics are summarised and further analysed in Appendix B (B.4).

4.2 Common Method Bias and Objectivity of Respondents' Judgments

We tested whether common method variance (CMV) was a threat and performed Harman's single-factor test (Podsakoff et al., 2003). Results indicated a multiple factor solution, with the first factor explaining 25.0% of the total variance. Hence, the threat of CMV was eliminated. To avoid any potential bias from using self-reported measures from single respondents, we further

[6] Ten times the number of independent variables in regression in the model is set to be the minimum sample size for PLS analysis (Chin and Newsted, 1999). In our model, the largest multiple regression incorporates five independent variables; hence a minimum of sample size of 50 is implied.

tested for the degree of objectivity/subjectivity in the respondents' judgments (Guilford, 1954; Abdel-Maksoud et al., 2016). Results indicate that the vast majority, 92 per cent, of the values of the factor analysis communalities ranged from 0.90 – 0.99 for the surveyed respondents, which indicates a high degree of objectivity in the respondents' judgments.

4.3 The Structural Model

The hypothesised relationships in this study were tested using PLS-SEM. At first, we used SmartPLS software to test for the hypothesised relations. However, as PLS-SEM is regression-based, commentators recommend testing the robustness of PLS-SEM model parameters, particularly assessing endogeneity (Kock, 2019). Endogeneity occurs when "the structural error term for an endogenous variable is correlated with any of the variable's predictors" (Kock, 2019, p. 9). Some recent efforts are evident – in business literature – on testing the robustness of PLS-SEM models through complementary methods and the use of various software (Sarstedt and Mooi, 2019). Our study contributes to the MCS literature through extending our analysis further to check for the robustness of the original model and test/control for any potential endogeneity problems (for full details and statistics, please refer to Appendix B (B.5)). We adopted Hult et al.'s (2018) systematic procedures in assessing, and controlling for, endogeneity problem. The final model results are presented in Table (2) and Figure (2).

TABLE 2

To ensure goodness of fit of the final model, six model fit indices are tested, using WarpPLS, as follows (Kock, 2019): Average path coefficient (APC) = 0.128, P = 0.051; Average R-squared (ARS) = 0.310, P<0.001[7]; Average adjusted R-squared (AARS) = 0.245, P<0.001;

[7] For the first two indices, the null hypotheses are APC = 0, ARS = 0; against the alternative hypotheses that they are ≠ 0.

Average block VIF (AVIF) = 1.382 [acceptable if <= 5, ideally <= 3.3]; Average full collinearity VIF (AFVIF) = Inf [acceptable if <= 5, ideally <= 3.3][8]; and Tenenhaus GoF (GoF) = 0.499 [small >= 0.1, medium >= 0.25, large >= 0.36. The GoF index depicts a model explanatory power; results indicate a large explanatory power. Furthermore, the validation of latent variables of the final model indicates that the Cronbach's alpha and composite reliability results are above 0.7 in all latent variables, indicating good composite reliability (Hair et al., 2010). AVE values are above 0.5, concluding adequate convergent validity for the latent variables (Hair et al., 2010). Full collinearity VIF values are lower than 3.3, concluding no collinearity problems (Hair et al., 2010).

The final model results indicate significant associations between industry and operational environmental performance (0.168, $p = 0.047$). Also, size is found to have a significant association with Eco-Control budgeting (0.188, $p = 0.030$). No other significant associations were found between the control variables and any of the dependent variables. The validation of the study hypotheses is presented next.

FIGURE 2

4.4 Direct Effects (H1-H3)

The direct hypotheses between the latent variables were tested using direct effect. Results are presented in Table (3).

TABLE 3

H1 investigates the direct relationship between stakeholder pressure and the extent of eco-control systems' use in the surveyed firms. Table (3) shows that EC-Environmental Performance Indicators (EC-EPIs) are found to have significant direct relations with primary stakeholders and

[8] For AVIF and AFVIF results, values equal to or lower than 3.3 are accepted as threshold for models with constructs consisting of two or more indicators (Kock, 2019).

organisational stakeholders. Eco-Control-Budgeting (EC-Budgeting) has significant direct relation with organisational stakeholders, while Eco-Control-Incentives (EC-Incentives) have a significant direct relations with primary stakeholders, organisational stakeholders, and regulatory stakeholders. These results therefore indicate that H1 is accepted for these six direct relations (i.e. partially accepted).

H2 investigates the direct relationship between the extent of using eco-control systems and a firm's organisational performance. The results in Table (3) show no significant direct relations between any of the eco-control variables and economic performance – which indicates rejection of H2. H3 investigates the direct relationship between the extent of using eco-control systems and firms' environmental performance (operational and non-operational). The results in Table (3) indicate that eco-control incentives have significant direct relations with both operational and non-operational environmental performance. This implicates that H3 is accepted for Eco-control incentives.

4.5 Indirect Effects (H4)

The study hypothesises indirect relations between the stakeholders' latent variables and the organisational economic/environmental performance. These indirect effects are presumed through the eco-control latent variables. The results of indirect effect are presented in Table (4).

TABLE 4

Table (4) indicates that no significant indirect relation is reported between any of the stakeholders' latent variables and the organisational economic/environmental performance latent variables. So far, we reported results of both direct and indirect effects. However, given that no significant direct effects were reported from the stakeholders' latent variables to the organisational economic/environmental performance, then the total effects equal the direct effects.

5. Discussion

Despite the importance of stakeholder theory in relation to firms and environmental issues, it is interesting that stakeholder pressure has rarely been demonstrated empirically in relation to eco-control systems, i.e. EMCS (see, Pondeville et al., 2013; Gomeze-Conde, 2019). Interestingly, our findings provide empirical evidence that the pressure organisational stakeholders exert is central to eco-control systems usage in UK manufacturing firms and affects the extent of their use. Our findings are consistent with Bui et al. (2020) who conclude that stakeholder pressure may drive the implementation of MCS. However, they argue that such pressures do not necessarily determine the extent of MCS usage; yet, our findings provide empirical evidence that stakeholder pressure affects the extent of eco-control systems use. We further identified variations in the pressures exerted by different stakeholders which can be explained in relation to their different and often conflicting interests (Gago and Antolin, 2004). A discussion of those results will be provided in this section.

Primary stakeholders are argued to be of high importance for companies' survival, and attention should be always paid to their needs (Thijssens et al., 2015). However, our findings reveal that only organisational stakeholder pressure is significantly positively associated with the three eco-control constructs. Thus, organisational stakeholders, as an antecedent, are perceived by managers to be fully influential in shaping eco-control systems of the surveyed UK manufacturing firms. Organisational stakeholders' construct includes shareholders, financial institutions, and environmental and non-governmental organisations. This result provides empirical evidence supporting the argument that environmental impacts matter to financial stakeholders when it interferes with their firm's contractual relations (Cormier et al., 2004; Rodrigue et al., 2013). Research on managers' attention to stakeholders also implicitly indicates that salient stakeholders are more interested in the company's operations compared to the less salient ones because they have greater contact and higher degrees of interdependence with the company (Peloza and Papania, 2008), which could explain organisational stakeholders' salience (applying greater scrutiny on all aspects of the company's actions). This result is also consistent with the growing evidence highlighting that environmental and non-governmental organisations (classified as secondary stakeholders in Thijssens et al. (2015)) prompt companies to respond to their needs because of their legitimacy (Thijssens et al., 2015).

Our findings also confirm the results reported in the literature suggesting that firms perceiving intensified stakeholder pressure would strengthen their EMCS (Chenhall, 2003; Pondeville et al., 2013). Previous studies showed that stakeholders and organisations interacted with each other on environmental matters, particularly when the demands and interests of stakeholders were incorporated in the design of organisations EMCS (Henriques and Sadorsky, 1996; Harvey and Schaefer, 2001; Rodrigue et al., 2013). Considering that only a limited amount of resources are available to companies, they may be encouraged to prioritise stakeholder demands based on cost-benefit assessments. In our context, organisational stakeholders were shown to be able to affect the companies' management, and thus they are more likely to be given priority by their management (Thijssens et al., 2015).

There is no association between secondary stakeholders and any of the three eco-control constructs. Those stakeholders encompass international rivals and agreements, and the media. Therefore, stakeholder management, in our context, ignored the narrower interests of possibly legitimate stakeholders. It is argued that the rapid improvements in environmental information in comparison to rivals, and the development of a path-dependent process based on specific interactions and activities, provide organisations with a sustainable competitive advantage

(Sharma and Vredenburg, 1998; Henri, 2006). In this sense, the firm's reputation is not only shaped by the company's actions to protect the environment, but also by its actions compared to its competitors (Peloza and Papania, 2008). Furthermore, it is argued that the environmental performance of organisations can become a concern for a specific community because of media reporting (Islam and Deegan, 2010). Thus, organisations face specific external media pressure that drives them to enhance their environmental information. Our results, however, did not support the above arguments. This may be explained due to that a different salience level could be assigned to a particular stakeholder over time. The company's environmental stand – defensive, reactive, accommodative or proactive – can further affect the importance placed on different stakeholder groups (Henriques and Sadorsky, 1999). Companies that follow a reactive approach to environmental practices could be more concerned about reputation through the media rather than employees or customers.

Primary stakeholders are significantly associated with EC-EPIs and EC-Incentives. The primary stakeholder construct includes domestic customers, domestic and international suppliers, and employees. This can result from the specific interests of primary stakeholders in the intensity of the use of EC-EPIs for purposes of monitoring, decision-making and external reporting, as well as the integration of environmental criteria in the performance evaluation and incentive process to direct those efforts towards environmental activities. This is because they have greater contact (customers) and higher degrees of interdependence (employees and suppliers). For example, employees rely on the firm for their livelihood, and thus improved decisions that can enhance the company's competitive advantage and incentives could be critical to them, particularly if those relate to their personal values. A reward and incentive system ensures the congruence of managerial and employee behaviour with sustainability goals (Tang and Luo, 2014). It is reported that specifying and rewarding environmental objectives on a par with financial objectives is sufficient to engage employees (Merriman et al., 2016). Furthermore, it is rare that most customers and employees (and other stakeholders for that matter) will be familiar or can understand the budgeting processes, which may explain their insignificant pressure on EC-Budgeting. Managers' responses to those demands show a tendency towards developing enhanced environmental decisions and practices by integrating the perspectives of customers, suppliers, and employees (Clarkson, 1995). This can lead to environmental improvements and a sustainable competitive advantage (Sharma and Vredenburg, 1998; Aragon-Correa et al., 2008; Journeault, 2016). Our results thus show that the importance of traditional stakeholders (i.e., shareholders, employees and customers) is more significant than other stakeholders. This implies that the 'traditional production view' is still dominant in large companies (Agle et al., 1999).

Regulatory stakeholders are significantly associated with EC-Incentives. The regulatory stakeholders' construct includes national/regional government and local public agencies. Rewards and incentive systems usage can be linked to the management's interest in pursuing sustainability objectives that may contradict financial objectives (Crutzen et al., 2017). As regulations aim to change environmental behaviour towards achieving an improved environmental performance (Rademaekers et al., 2012), it makes sense that regulatory stakeholders are perceived to be mainly interested in EC-Incentives. This is because incentive schemes could influence the design of MCS and enhance employees' engagement (Merriman et al., 2016; Bui et al., 2020). In this regard, the effectiveness of regulations could be enhanced with incentives, which will support a behaviour change towards the wider interest of regulators and possibly lead to continuous improvements.

Regulatory stakeholders are found to have no significant associations with any other eco-control constructs, which is not consistent with prior studies. Thus, our findings - though cautiously read in terms of generalisation - indicate that managers of UK manufacturing firms do not perceive the influence exerted by these stakeholders as salient when it comes to environmental issues. Harvey and Schaefer (2001) reported that stakeholders with institutional power, e.g. the Environmental Protection Agency or other environmental regulators, are the only stakeholders perceived as significantly salient. Furthermore, Gago and Antolin (2004) reported a hierarchy among stakeholders in the context of the natural environment, with the government occupying first place in importance. This was found logical considering that the government has power and should play a key role in ensuring the appropriate use of the environment, considering that the environment is viewed as a public asset (Gago and Antolin, 2004). On the contrary, in our case, it is shown that the government failed to add power by passing compulsory laws. This could be attributed to the non-compulsory/minimal compulsory requirements for environmental disclosure in the UK.

Overall, our results indicate that both power and legitimacy play more significant roles in determining stakeholders' salience. Stakeholders with economic power seem to be perceived as salient by managers (shareholders, financial institutions and customers) (Harvey and Schaefer, 2001; Gago and Antolin, 2004). Stakeholders with institutionalised powers (regulatory stakeholders) seem to be perceived as far less salient than stakeholders with economic powers. Both stakeholders with institutionalised or economic power are considered to be legitimate (Harvey and Schaefer, 2001). Environmental and non-governmental organisations, international suppliers and employees are viewed as possessing high legitimacy (e.g., Harvey and Schaefer, 2001; Gago and Antolin, 2004; Thijssens et al., 2015).

Furthermore, our findings support the impact of organisational size as a control variable, on the extent of EC-Budgeting. This complies with prior literature. For instance, it is suggested that given the availability of resources in large firms, EMCS are sufficiently developed compared to smaller ones (Ittner et al., 2003; Abdel-Kader and Luther, 2008; Journeault et al., 2016).

The support of important stakeholders manifested in the environmental initiatives implemented is argued to result in an improved financial performance (Peloza and Papania, 2008). This can be attributed to the potential change in stakeholders' behaviour, e.g. increased customer loyalty, and increased employee productivity. However, this relationship is argued to be dependent on the stakeholder possessing power, urgency and legitimacy (Peloza and Papania, 2008). Significant associations between the use of eco-control systems and economic performance were reported in previous empirical studies on firms operating in Northern America (e.g., Al-Tuwaijri et al., 2004; Henri and Journeault, 2010) and Europe (e.g., Pondeville et al., 2013). However, no significant association is reported in our study between any of the eco-control constructs and economic performance. This is not consistent with the argument that the economic information offered by MCS can influence the association between economic performance and the use of eco-control systems (Feltham and Xie, 1994; Hemmer, 1996; Said et al., 2003). One explanation could be that managers may focus on specific stakeholders who may lack a combination of power, urgency and legitimacy. Stakeholders possessing those characteristics are more likely to influence the company's financial performance compared to those without (Peloza and Papania, 2008). Another explanation is that stakeholders are indifferent toward the firms' actions, and make no change in behaviour (Peloza and Papania, 2008).

Eco-Control systems offer relevant information for external reporting (Lothe et al., 1999). Companies use environmental reporting as a way of responding to different pressures from stakeholders through disclosing financial and non-financial impacts of environmental matters (Henri and Journeault, 2010). Stakeholders can use such information to evaluate the extent to which the company met their demands and therefore enhanced its environmental performance. Such practices can influence the organisation's image, reputation, and marketing benefits via impacting the various stakeholders' perceptions of the company's operations (Dixon et al., 2005). Our findings support prior research (Henri and Journeault, 2010; Henri et al., 2017), to an extent, as they report significant positive associations between eco-control and environmental performance, but only via one element – that is EC-Incentives, and both OEnvP and NOEnvP. Eco-Control systems draw managers' focus to environmental performance activities, and hence facilitate the achievement of environmental objectives. One way to promote such objectives is by offering incentives to their employees that are geared towards better environmental behaviour (Merriman et al., 2016). In this regard, managers encourage and support a behaviour change that can lead to continuous improvements in environmental performance (Bui et al., 2017). It is further argued that rewarding employees only based on profit or revenue contributions makes them realise that trade-offs on the environment are accepted (Epstein, 1996), which will negatively affect the environmental performance.

Our findings show that EC-EPIs had no effect on environmental performance. This may be related to the type of performance indicators developed and the frequency of their use to monitor compliance, to support decision-making, to motivate continuous improvement and for external reporting. Those are essential for integrating environmental issues into the control systems (Henri and Journeault, 2010). This indicates that further enhancement of the performance indicators for eco-control better facilitates the decision-making process and contributes to environmental performance (Henri and Journeault, 2010). Furthermore, EC-Budgeting had no effect on environmental performance. It is argued that “without a sustainability budget, managers and employees lack sufficient resources and motivation to undertake sustainability initiatives, especially when those initiatives are beyond the traditional responsibilities of their core roles” (Bui et al., 2017, p 130). Our results thus imply that participation/communication between managers and employees about environmental matters and the level of detail and clarity of the goals for environmental expenses may need improvement. Offering clear goals can affect job-related and budget-related attitudes, and improve environmental performance (Kenis, 1979) via “clarifying expectations, reducing ambiguity associated with tasks related to achieving environmental strategies, and providing a coherent reflection of environmental priorities (Chenhall, 2005)” (Henri and Journeault, 2010, p. 67). This can encourage employees to align their behaviour with the company’s environmental goals, and to give extra effort, which can enhance environmental performance (Epstein, 1996; Bonner et al., 2000). Furthermore, our findings support the impact of industry type as a control variable on OEnvP.

Interestingly, no significant indirect relation is reported between any of the stakeholders’ latent variables and the organisational economic/environmental performance. This provides empirical evidence that UK managers do not perceive their salient stakeholders to be influential with regards to their firm’s performance. This might result from the ambiguous relationship between stakeholder pressure and corporate financial performance (Peloza and Papania, 2008). One possible explanation for the lack of an indirect relationship between stakeholder pressure and environmental performance could be that stakeholder pressure may influence strategy and practices (e.g., Henriques and Sadorsky, 1999; Pondeville et al., 2013), which in turn affects performance (not via eco-controls) (Solovida and Latan, 2017). As such, eco-controls may not play such an important role in enhancing environmental performance unless improvements are made to the practices of eco-control systems. This observation links to our discussion above, illustrating the lack of a direct relationship between performance indicators for eco-control and budgeting and environmental performance.

6. Conclusions

Our study investigated the stakeholders' effect on the usage of EMCS, i.e. eco-control systems, in UK manufacturing firms. It further examined the indirect influence of stakeholder pressure on firms' economic and environmental performance via escalating the extent of eco-control systems usage. Structural equation modelling was used to analyse the cross-sectional data collected from 93 UK manufacturers. Our results contribute to the literature by providing empirical evidence on how organisations' decisions are affected by various stakeholders, in an eco-control context, and managers' perceptions of the importance of those stakeholders in the UK context. They indicate that power and legitimacy play more significant roles in determining stakeholders' salience. We consider antecedents and consequences of EMCS - not only bilateral relations -, which provides a broader understanding of EMCS development, and hence responds to calls from researchers to extend prior empirical research on EMCS (see, Pondeville et al., 2013; Henri et al., 2017).

Our findings indicate that secondary stakeholders are not associated with any Eco-Control systems; primary stakeholders are significantly associated with EC-Environmental Performance Indicators and EC-Incentives; and regulatory stakeholders are associated with EC-Incentives. Organisational stakeholders are shown to be perceived as being more influential than the other stakeholders by managers of the surveyed UK firms in relation to eco-control systems usage. Furthermore, our findings indicate that the stakeholders' influence is limited to implementing eco-control systems, and does not extend further to firms' performance. Only EC-Incentives were found to influence firms' environmental performance.

Our results provide practical implications to managers and stakeholders. For management, the results provide insights into the key stakeholders influencing the decisions to implement/enhance environmental-related practices. This can provide the basis for developing their environmental-related and stakeholder management strategies. For stakeholders, the results allow them to know 'where they stand' with the company in relation to their environmental demands. Accordingly, various individuals or groups may adopt specific courses of action.

In addition, the effectiveness of the existing incentives scheme should be carefully considered in the design of eco-control systems considering its significant effect on environmental performance. Another implication is that UK managers seem to be acquainted with the importance of embedding environmental aspects into their firms' MCS, i.e. EMCS. This can take the form of extending environmental performance indicators to include aspects related to budget and incentives, which can support the existing EMCS framework in manufacturing firms. Overall, our findings represent empirical evidence in the emergent quest for stronger EMCS and offer lessons that may support UK firms implementing, or planning to implement, EMCS. Furthermore, they highlight the perceived role of environmental regulatory bodies in the UK and in firms' environmental performance, which can contribute to the development of future relevant regulations.

This study has its limitations. First, this study adopted a contingency approach, which, though advocated, was criticised in particular in the cross-sectional survey method (e.g., Abdel-Maksoud et al., 2016). Second, our study was conducted in the manufacturing sector without any differentiating sectors being taken into account. Any generalisation to a different sector should be made with caution. Third, our study is limited by the variable and sample selection processes. Thus, further research using different research design, e.g. longitudinal design, multi-informant design, would be beneficial. Fourth, we collected data using self-reported measures from single respondents. Considering the contradicting arguments about using direct measures versus self-reported measures[9]; however, results of the common method bias and objectivity/subjectivity analyses we performed indicate no threat from such. The use of objective secondary data, in particular for firms' performance, would extend the findings to objective measures of economic and environmental performance, e.g. level of emissions, or actual return on investment. Fifth, our survey was directed to managers with relevant knowledge of EMCS. However, inclusion of other stakeholders' perspectives in the research design would benefit the study (Hall, 2008) because it will broaden our understanding. Sixth, this study was confined to high pollution propensity firms, where managers possibly perceive stronger environmental stakeholder pressure compared to those from low pollution propensity industries (e.g., Pondeville et al., 2013). Additional studies could extend our findings to various levels of pollution propensity industries.

Future studies may also consider investigating the effect of management's tendency to implement managerial changes to satisfy specific stakeholder groups which could influence the configuration of EMCS elements, in particular administrative and cultural controls, which, in turn, impact firms' performance (e.g., Guenther at al., 2016). We recommend the use of objective data for firms' economic and environmental performance. Given the ongoing, changing, global political settings (e.g., BREXIT, UK/European Union regulatory strategy on plastic waste disposal, etc.), interdisciplinary research (socio-political-managerial) could further enrich EMCS literature – particularly, the inclusion of broader political/strategic contextual factors (de Villiers and van

[9] See, Meier et al. (2015).

Staden, 2010; Pondeville et al., 2013; Lehman and Kuruppu, 2017). Moreover, investigating reciprocal associations between firms' performance (economic and environmental) and stakeholder pressure is recommended for future studies. This is expected to enrich the EMCS literature since EMCS communicate information about firms' objectives to stakeholders, which implies behavioural consequences of EMCS (Hall 2008).

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Tables

Table 1: Respondents' Demographics

Variable	Percentage
Industry type	
Pulp, paper, wood and furniture	2.7%
Food, beverage and tobacco	16.2
Textile, wearing apparel and leather	5.4
Chemicals, plastic, mining, oil and gas	18.9
Metal, machinery and transport equipment	13.5
Computer and electrical equipment	4.1
Printing or record of media	5.4
Other manufacturing (i.e. other than the above sectors)	33.8
	100%
Workforce Size	
Less than 100	0%
100 - 500	49.5
More than 500	50.5
	100%
Min.	125
Max.	26,761
Mean	1,310.65
Std. Deviation	3,336.8
Ownership Type	
Private (1)	91.3%

Public (2)	8.7
	100%
Min.	1
Max.	2
Mean	1.09
Std. Deviation	0.283
Stock Exchange Listing	
Listed (1)	23.9%
Not Listed (2)	76.1
	100%
Min.	1
Max.	2
Mean	1.76
Std. Deviation	0.429

Table 2: Final Model Latent Variables Coefficients - WarpPLS Results

Latent Variable Coefficients	Primary Stakeholders	Secondary Stakeholders	Organisational Stakeholders	Regulatory Stakeholders	Eco-Control Env. Perf Indicators (EC-EPIS)	Eco-Control Budgeting (EC-Budgeting)	Eco-Control Incentives (EC-Incentives)	Economic Performance	Operating Env. Performance	Non Operating Env. Performance
R-Squared					0.268	0.246	0.312	0.060	0.461	0.514
Composite Reliability	0.846	0.839	0.830	0.876	0.886	0.866	0.917	0.873	0.927	0.867
Cronbach's alpha	0.754	0.703	0.691	0.716	0.826	0.762	0.864	0.781	0.910	0.808
AVE	0.585	0.628	0.622	0.779	0.663	0.687	0.787	0.696	0.614	0.568
Full collinearity VIF	Inf	Inf	Inf	Inf	2.139	2.146	2.203	1.134	1.796	1.994

Table 3: Direct effects and hypotheses validation

Hypothesis	Independent Variable	Dependent Variable	β	*p*-value	Decision
H1	Primary Stakeholders	Eco-Control Environmental Performance Indicators (EC-EPIs)	0.217	0.014	**Accepted**
	Secondary Stakeholders		0.125	0.107	Rejected*
	Organisational Stakeholders		0.191	0.027	**Accepted**
	Regulatory Stakeholders		0.091	0.186	Rejected
	Primary Stakeholders	Eco-Control Budgeting (EC-Budgeting)	0.030	0.387	Rejected
	Secondary Stakeholders		0.048	0.321	Rejected
	Organisational Stakeholders		0.314	< 0.001	**Accepted**
	Regulatory Stakeholders		0.144	0.075	Rejected
	Primary Stakeholders	Eco-Control Incentives (EC-Incentives)	0.253	0.005	**Accepted**
	Secondary Stakeholders		0.047	0.322	Rejected
	Organisational Stakeholders		0.203	0.020	**Accepted**
	Regulatory Stakeholders		0.189	0.029	**Accepted**

H2	Eco-Control EPIs	Economic Performance	0.050	0.314	Rejected
	Eco-Control Budgeting		0.141	0.080	Rejected
	Eco-Control Incentives		-0.123	0.112	Rejected
H3	Eco-Control EPIs	Operational environmental performance	0.095	0.174	Rejected
	Eco-Control Budgeting		0.091	0.186	Rejected
	Eco-Control Incentives		0.305	< 0.001	**Accepted**
	Eco-Control EPIs	Non-operational environmental performance	0.102	0.157	Rejected
	Eco-Control Budgeting		0.040	0.350	Rejected
	Eco-Control Incentives		0.199	0.023	**Accepted**

*Rejected under 95% level of confidence. This applies throughout rejected hypotheses in this table.

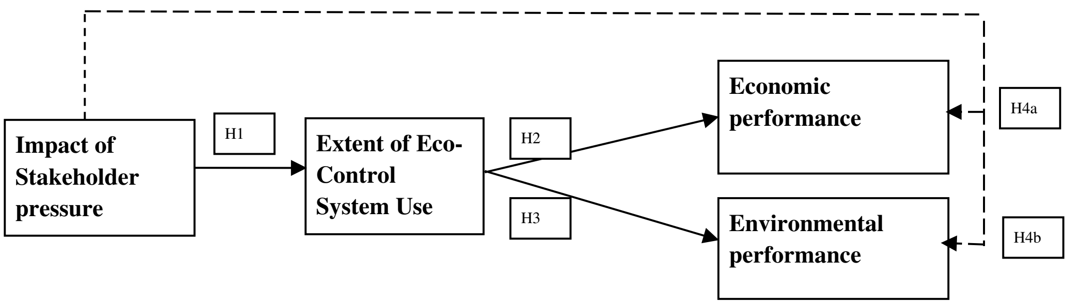
Table 4: Sum of indirect effects

Hypothesis	To:	From*:			
		Primary Stakeholders	**Secondary Stakeholders**	**Organisational Stakeholders**	**Regulatory Stakeholders**
H4a	**Economic Performance**	-0.016 (*p* =0.438) ES=0.001	0.007 (*p* =0.473) ES=0.001	0.029 (*p* =0.390) ES=0.007	0.002 (*p* =0.494) ES=0.000
H4b	**Operational environmental performance**	0.101 (*p* =0.160) ES=0.042	0.031 (*p* =0.383) ES=0.013	0.109 (*p* =0.141) ES=0.049	0.079 (*p* =0.218) ES=0.015
	Non-operational environmental performance	0.074 (*p* =0.235) ES=0.102	0.024 (*p* =0.408) ES=0.010	0.072 (*p* =0.239) ES=0.034	0.053 (*p* =0.304) ES=0.016

* Number of paths for indirect effects = 3 (i.e. through Eco-Control EPIs, Eco-Control Budgeting, and Eco-Control Incentives).

ES= Effect sizes for sums of indirect effects.

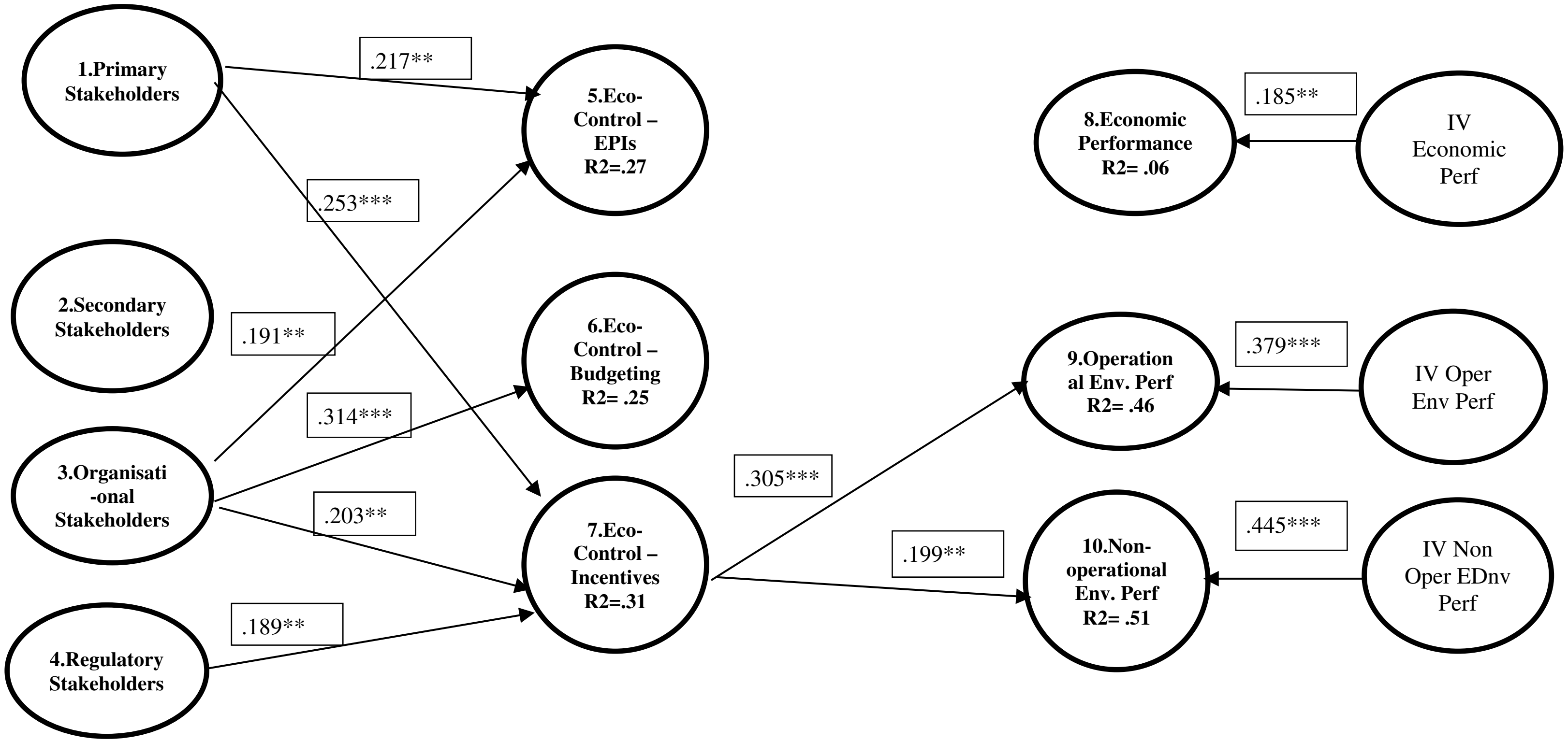
Figure 1: The proposed framework



Direct relationship →

Indirect relationship - - - →

Figure 2: Final PLS Structural Model with Path Coefficients



*= p ‹ 0.10, **=p ‹ 0.05,***= p ‹ 0.01; N= 93

Notes:

- For ease of reading, only significant relationships are reported. No arrows between the constructs depict insignificant relationships.

- In our study, we further examined, in two different models, possible indirect influence of the extent of eco-control systems on: a) economic performance through environmental performances; or b) environmental performances through economic performance. However, no significant associations were found. In doing so, we considered any possible impact firm environmental performance could have on economic performance or vice versus (see, Gray, 2006).

Appendix A

A.1: Summary of the MCS frameworks developed in the MCS literature

Several frameworks of MCS/EMCS are identified in the MCS literature (e.g. Levers of Control (Simons, 2000); Object of Control (Merchant and Van der Stede, 2011), MCS package (Malmi and Brown, 2008), etc.). In an endeavour to address the issue of lack of conceptualisation of EMCS, Guenther et al. (2016), recently, have conducted a study to propose a framework of EMCS. They identify a framework for EMCS that builds on Malmi and Brown's MCS package, which includes five main controls: cybernetics (budgets, financial and non-financial measurement systems), planning (long range and action planning), reward and compensation, administrative (governance and organisation structure, and policies and procedures) and cultural (clans, values, symbols) controls. Notably, Guenther et al. emphasise that these different types of controls can be used either in parallel or complementarily. Taking into account the several elements of EMCS framework, the lack of a consensual approach in operationalising EMCS is notable in previous survey-based studies (Guenther et al., 2016). Different approaches were used in operationalising EMCS, ranging from using different items separately, multi-item construct, and using multiple-constructs (Guenther et al., 2016).

A.2: A background on the UK context and its regulations

Our study focuses on the UK as a context. The UK government has been committed to sustainability being the key characteristic of economic growth (UK Government, 2015). It has persistently advocated the adoption of environmentally friendly strategies through the development of different schemes and acts (Giannarakis et al., 2017). In response to climate change, the UK set up the Climate Change Programme, which constituted the target for the UK to reduce emissions as set by the Kyoto Protocol (HM Government, 2006). Consequently, a growing number of FTSE100 companies were found to engage in actions to reduce GHG emissions. Those actions encompassed basic technological change, behavioural change, product and process-based innovations, emissions trading and public education (Okereke, 2007, p. 484). In 2008, the Climate Change Act was passed, which illustrated a financially possible way to reduce emissions. It sets a target of reducing the net UK emissions by a minimum of 80% in 2050 below the 1990 baseline. Furthermore, the Department for Environment, Food and Rural

Affairs (Defra) implemented the UK Emissions Trading Scheme as a novel policy tool, which offers economic incentives from a £215 million ‘incentive fund’ to companies to promote emission reduction (Giannarakis et al., 2017). Furthermore, the UK’s Accounts Modernisation Directive requires public limited and large private companies to report to investors on how their profitability is affected by environmental issues (defra, 2006). The European G250 companies were shown to reach the highest average quality score for their corporate responsibility reports, where UK companies achieved third place (KPMG, 2013). In 2014, 201 UK companies fulfilled the Global Reporting Initiative (GRI) requirements (Giannarakis et al., 2017). Since 2013, there has been an increasing level of CSR reports implementation, which reflects the fact that companies listed on LSE are obliged to report their emissions (KPMG, 2013). Moreover, the Carbon Disclosure Project (CDP) in the UK works with investors and corporations on issues of GHG emissions disclosure. Each year, the CDP surveys the world’s largest companies, which voluntarily report their carbon emissions to the CDP, to evaluate the opportunities and risks concerned with climate change. Similar initiative programmes have been developed for water, supply chains, forests, and cities (Giannarakis et al., 2017, p. 1079).

A.3 Stakeholder salience theory - power, legitimacy and urgency

In stakeholder salience theory, stakeholder power is defined as “the ability of those who possess power to bring about the outcomes they desire" (Salancik and Pfeffer, 1977, p. 3). Stakeholder legitimacy is “a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions” (Suchman, 1995, p. 574). Urgency is based on time sensitivity (the degree to which managerial delay in attending to the claim or relationship is unacceptable to the stakeholder), and criticality (the importance of the claim or the relationship to the stakeholder) (Mitchell et al., 1997, p. 867).

Appendix B

B.1: Notes on Data Collection

1. Age of data: It is argued that "… in studies where cross-sectional models are appropriate and adequately specified, the age of data should have little effect on the generality of research findings" (Robins, 2004, p. 253). To respond, effectively, to concerns about age of data, it is recommended that researchers need do a careful assessment of models and adopt an appropriate research design (Robins, 2004). "… the use of recent data cannot resolve underlying problems that might make findings specific to a point in time, and any arbitrary standard for the selection of data has the potential to diminish the quality of research. Careful assessment of the temporal implications of specific models and the adoption of appropriate research design is the only effective response to concerns about the point in time when data were collected" (Robins, p. 269). Accordingly, the age of data in this study does not impose concerns; and data inferences are concluded to be appropriate.

2. Missing data: Out of the 93 usable responses, few cases contained some missing items. We performed Little's MCAR test (missing are completely at random) and results (X^2 = 396.877; degrees of freedom = 354; Sig. = 0.058) indicated that missing data were MCAR ($p > 0.05$); hence, any imputation method could be used (Hall, 2008; Hair, Anderson, Tatham, & Black, 1998). We used the expectation–maximisation (EM) method (see, Hair et al., 1998) as an imputation method, which resulted in a complete data set of 93 responses.

3. Respondents' knowledge about environmental issues: We first phoned up the companies, and specifically asked for people who were from the environmental department. If the company did not have an environmental department, we asked for the senior person who was involved in environmental issues. When speaking to the relevant people, an explanation/definition of eco-control systems and the project was provided. Then they were asked whether they could help in this regard. In some cases, people stated that they were not the best to respond to the questionnaire, and hence they were not included. In some other cases, we were provided with contact details of who was involved in environmental issues, who was, then, contacted via email including all the details and/or by phone.

B.2 Measurement of Variables

Stakeholder Pressure (SP)

In the literature, three main research streams are evident in operationalising stakeholder pressure groups. The first research stream identifies two main groups: primary stakeholders (including items such as: customers, suppliers) and secondary stakeholders (e.g. pressure groups, competitors, non-governmental organisations) (see, for instance, Clarkson, 1995; Mensah, 2014). This categorisation associates with the existence of a formal contractual relationship with an organisation. The second research stream identifies four groups, these are: internal primary stakeholders (e.g. employees, shareholders, financial institutions), external primary stakeholders (e.g. customers, suppliers), secondary stakeholders (e.g. environmental organisations, rivals), and regulatory stakeholders (e.g. governments and local public agencies) (see, for instance, Buysse and Verbeke, 2003). Last, the third research stream tends to group stakeholders using empirical basis (i.e. empirical groupings) of the literature-based items. For instance, Pondevellie et al. (2013) factorised the stakeholder pressure items and suggested names for the four groups, these are: regulatory stakeholders (i.e. impose laws on firm), community stakeholders (local community, press, etc.), market actors (e.g. buyers, competitors, etc.), and organisational stakeholders (i.e. linked to managing the firm).

In our study, we build on the third research stream, and adopt an empirical grouping of stakeholders' items. In doing so, we build on Pondeville et al. (2013), and perform exploratory factor analysis on the designated 14 items in order to group stakeholder pressure on an empirical basis. The results of exploratory factor analysis – on the 14 items – revealed four factors[1]. The first factor, secondary stakeholders, includes SP 9, 10 and 12 (Cronbach Alpha = 0.655; factor loadings range 0.613 – 0.813; total variance explained = 18.13%). The second factor, primary stakeholders, includes SP 1, 3, 4 and 5 (Cronbach Alpha = 0.745; factor loadings range 0.600 – 0.823; total variance explained = 18.05%). The third factor, organisational

[1] Principal component analysis Extraction Method; Eigenvalues greater than 1; Varimax Rotation; Kaiser normalisation and maximum iteration for convergence of 25.

stakeholders, includes SP 6, 7 and 11 (Cronbach Alpha = 0.701; factor loadings range 0.624 – 0.843; total variance explained = 16.50%). The fourth factor, regulatory stakeholders, includes SP13 and 14 (Cronbach Alpha = 0.716; factor loadings range 0.788 – 0.836; total variance explained = 12.76%). Most of the Cronbach's alphas exceeded 0.7[2] in support of internal reliability of measures (Cramer, 1994; Nunnally, 1978). In addition, Barlett's test of sphericity was significant for all factors, and Kaiser-Meyer-Olkin measures of sampling adequacy were greater than 0.7; which support factorability of the items.

Environmental Performance (EnvP)

We adopted a 15-item scale, following Henri and Journeault (2010) and Sharma and Vredenburg (1998); as a proxy for environmental performance. Respondents were asked to indicate the extent to which their environmental practices have led to 15 items of benefits. The empirical grouping of the 15 items, using exploratory factor analysis, resulted in two factors. The first factor, labelled 'operational environmental performance', includes: EnvP 1, 2, 4, 5,6,7,8 and 9 (Cronbach Alpha = 0.909; factor loadings range 0.605 – 0.817; total variance explained = 34.15%); while the second factor, labelled 'non-operational environmental performance', includes EnvP 11, 12, 13, 14, and 15 (Cronbach Alpha = 0.808; factor loadings range 0.628 – 0.806; total variance explained = 22.96%). All Cronbach's alphas exceeded 0.7 in support of internal reliability of measures. Results were significant for all factors for Barlett's test of sphericity, and greater than 0.7 for Kaiser-Meyer-Olkin measures of sampling adequacy.

Control Variables

We control for industry type based on the idea that companies from industries with higher social and environmental impacts are expected to engage more in social/environmental activities/practices in order to respond to stakeholder pressure (see, Hahn and Kuhnen, 2013). They may vary in their perception of, and response to, stakeholder pressure based on the industry inherited stakeholder management. "Industries also differ in the perceived importance of and approach to environmental management" (Buysse and Verbeke,

[2] For secondary stakeholders, Cronbach's alpha is .655, which remains acceptable (Nunnally, 1978; Peter, 1979).

2003, p. 463). Seven industry sectors were included in the questionnaire form to capture the industry type the respondents' firms belonged to.

We also control for the firm size based on the argument that larger companies have a greater effect on society and are more visible compared to smaller companies. Thus, they are subject to higher/intense scrutiny from stakeholders (Thijssens et al., 2015). Moreover, smaller companies may attach less importance to international customers, suppliers, and rivals than large firms (Buysse and Verbeke, 2003). Firm size was measured using the natural log of the number of employees, which is considered as an appropriate measure in prior management control studies (Journeault, 2016).

We also control for public visibility because companies are argued to enjoy better (more improved) credibility and performance due to their visibility, which is valued by customers, suppliers, employees, and the financial community (Xie, 2010). Low visibility is argued to associate more with private firms, while high visibility associates more with public firms (Journeault, 2016). Public visibility was measured using a dichotomous variable, as company ownership data was collected by asking respondents, in the questionnaire form, to identify the ownership type of their firms.

Eco-control systems are influenced by stock exchange listings, so we control for it. Companies listed on a stock exchange have a public company status and have to pay attention to larger stakeholder groups compared to non-listed companies (Ermenc et al, 2017). This could also be reflected in the perceived importance of shareholder pressure (Buysse and Verbeke, 2003). The stock exchange was measured using a dichotomous variable. Stock listing data was collected from respondents, who were asked to indicate whether their firms are listed or non-listed.

B.3: Measurement of Constructs

Stakeholder Pressure (SP): Respondents were asked to rate; on a scale from 1 (no influence) to 7 (very strong influence); the impact of the following pressures from various stakeholders on decisions related to environmental management. 14 items were included (see, Abdel-Maksoud et al., 2016; Buysse and Verbeke, 2003; Henri and Journeault, 2010): domestic customers (SP1); international customers (SP2); domestic suppliers (SP3); international suppliers (SP4); employees (SP5); shareholders (SP6); financial institutions (SP7); domestic rivals (SP8); international rivals (SP9); international agreements (SP10); environmental, nongovernmental organisations (ENGOs) (SP11); media (SP12); national and regional governments (SP13); and local public agencies (SP14).

Eco-Control (EC)[3]: Consists of three aspects (Henri and Journeault, 2010): Eco-Control Environmental Performance Indicators (EC-EPIs); Eco-Control Budgeting (EC-Budgeting); and Eco-Control Incentives (EC-Incentives).

EC-EPIs: Respondents were asked to indicate; on a scale from 1 (not used at all) to 7 (used extensively); to what extent do their organisation use environmental performance indicators to: monitor internal compliance with environmental policies and regulations (ECP1); provide data for internal decision making (ECP2); motivate continuous improvement (ECP3); and provide data for external reporting (ECP4).

EC-Budgeting: Respondents were asked to rate; on a scale from 1 (not detailed at all) to 7 (very detailed); the extent to which the following items are detailed in the budget of their organisation: environmental expenses (ECB1); environmental investment (ECB2); and incomes from material scrap or recycled waste (ECB3).

[3] Respondents were provided with a definition of 'Eco-Control' and explanation of 'Environmental Performance Indicators'.

EC-Incentives: Respondents were asked to indicate; on a scale from 1 (not at all) to 7 (very great extent); the extent to which environmental performance indicators/objectives are in their organisation: the extent to which environmental performance indicators are important in reward systems (ECR1); the extent to which environmental performance objectives are included in the planning systems (ECR2); and the extent to which environmental performance indicators are weighted on par with economic performance indicators (ECR3).

Economic Performance (EP): Respondents were asked to rate; on a scale from 1 (significantly below average) to 7 (significantly above average); their Business Unit's performance - in the past 12 months- compared to leading competitors - and the degree of importance **-** in the following dimensions (Clarkson et al., 2008; Henri and Journeault, 2010): return on investment (EP1); operating profit (EP2); and cash flow from operations (EP3).

Environmental Performance (EnvP): Respondents were asked to indicate, on a scale from 1 (no contribution) to 7 (very strong contribution) the extent to which their organisation's environmental practices have led to any of the following 15 competitive benefits? (Henri and Journeault, 2010; Sharma and Vredenburg, 1998): reduction in material costs (EnvP1); reduction in process/production costs (EnvP2); reduction in costs of regulatory compliance (EnvP3); increased process/production efficiency (EnvP4); increased in productivity (EnvP5); increased knowledge about effective ways of managing operations (EnvP6); improved process innovation (EnvP7); improved product quality (EnvP8); improved product innovation (EnvP9); organisational-wide learning among employees (EnvP10); better relationships with stakeholders such as local communities, regulators, and environmental groups (EnvP11); improved employee morale (EnvP12); overall improved company reputation or goodwill (EnvP13); filters and controls on emissions and discharges (EnvP14); and residue recycling (EnvP15).

B.4: PLS Measurement Model Statistics

TABLE B.4

Results in Table B.4 indicate factor loadings greater than 0.70 for all items, except three items with factor loadings of a minimum of 0.6342 (in Primary Stakeholders); 0.6698 (in Eco-Control–Environmental Performance Indicators); and 0.6823 (in Economics Performance); which are acceptable (Hair et al., 2010). Factor loadings, of each scale item, were used to assess individual item reliability, while a composite reliability measure (CR) was used to assess the composite reliability of the measurement model. Construct's average variance extracted (AVE) was used to assess the validity of the measurement model. Results in Table (B.3) indicate that CR measures for all constructs range exceed 0.7 – except for 0.6912 in organisational stakeholders – indicating good composite reliability (Hair et al., 2010).

Results in Table (B.3) indicate that AVEs for all constructs are greater than 0.5, which indicates adequate convergent validity (Ibid). We checked that the AVE for each construct is greater than the squares of its correlation with other constructs for assessing discriminant validity (Hair et al., 2010Ibid). Results also indicate that for all our constructs, the square roots of AVEs are greater than correlation coefficients, which, in turn, indicates adequate discriminant validity.

Table B.4: Reliability and Convergent Validity (AVE)

Latent Variable	Min	Max	Mean	Standard Deviation	Factor Loadings	t-statistics*
Primary Stakeholders (CR = 0.7538; AVE = 0.5768)						
SP1 (domestic customers)	1	7	4.06	1.904	0.6342	6.4757
SP3 (domestic suppliers)	1	7	3.16	1.663	0.8390	14.2589

SP4 (international suppliers)	1	7	3.17	1.711	0.74296	7.4207
SP5 (employees)	1	7	3.66	1.550	0.80556	13.1433
Secondary Stakeholders (CR = 0.7027; AVE = 0.6141)						
SP9 (international rivals)	1	7	3.43	1.940	0.7410	7.02022
SP10 (international agreements)	1	7	3.97	1.793	0.7478	7.0748
SP12 (media)	1	7	3.64	1.742	0.8567	16.7662
Organisational Stakeholders (CR = 0.6912; AVE = 0.6167)						
SP6 (shareholders)	1	7	4.10	1.925	0.7853	16.7912
SP7 (financial institutions)	1	7	3.17	1.870	0.8210	14.1902
SP11 (environmental, nongovernmental organisations (ENGOs))	1	7	3.67	1.788	0.7479	11.6735
Regulatory Stakeholders (CR = 0.7161; AVE = 0.7732)						
SP13 (national and regional governments)	1	7	4.69	1.688	0.8390	6.8126

SP14 (local public agencies)	1	7	4.43	1.882	0.7429	26.8574
Eco-Control - Environmental Performance Indicators (EC-EPIs) (CR = 0.8258; AVE = 0.6622)						
ECP1 (monitor internal compliance with environmental policies and regulations)	1	7	5.66	1.522	0.7926	11.7839
ECP2 (provide data for internal decision making)	1	7	5.33	1.563	0.8983	35.4451
ECP3 (motivate continuous improvement)	1	7	5.35	1.479	0.8746	20.1438
ECP4 (provide data for external reporting)	1	7	5.26	1.876	0.6698	8.7906
Eco-Control – Budgeting (EC-Budgeting) (CR = .7622; AVE = 0.6729)						
ECB1 (the extent to which environmental expenses are detailed in the	1	7	4.48	1.791	0.8041	10.7077

budget of their organisation)						
ECB2 (the extent to which environmental investments are detailed in the budget of their organisation)	1	7	4.41	1.650	0.8868	30.4462
ECB3 (the extent to which incomes from material scrap or recycled waste are detailed in the budget of their organisation)	1	7	4.77	1.946	0.7652	11.0784
Eco-Control - Incentives (EC-Incentives) (CR = 0.8640; AVE = 0.7862)						
ECR1 (the extent to which environmental performance indicators are important in reward systems)	1	7	3.28	1.867	0.8729	43.949

ECR2 (the extent to which environmental performance objectives are included in the planning systems)	1	7	4.84	1.555	0.8834	34.0758
ECR3 (the extent to which environmental performance indicators are weighted on par with economic performance indicators)	1	7	4.00	1.751	0.9035	44.7740
Economics Performance (EP) (CR = 0.7813 ; AVE = 0.6424)						
EP1 (return on investment)	1	7	3.95	1.554	0.9463	4.9652
EP2 (operating profit)	1	7	4.29	1.633	0.6823	4.7477
EP3 (cash flow from operations)	1	7	3.98	1.411	0.7525	4.9017

Operational Environmental Performance (OEnvP) (CR = 0.9095; AVE = 0.6103)						
EnvP1 (reduction in material costs)	1	7	4.11	1.986	0.7705	14.8268
EnvP2 (reduction in process/production costs)	1	7	4.73	1.649	0.7651	15.1298
EnvP4 (increased process/production efficiency)	1	7	4.18	1.622	0.8378	18.0806
EnvP5 (increased in productivity)	1	7	3.90	1.662	0.8431	18.3447
EnvP6 (increased knowledge about effective ways of managing operations)	1	7	4.42	1.583	0.7006	9.9600
EnvP7 (improved process innovation)	1	7	3.90	1.682	0.7932	13.7126
EnvP8 (improved product quality)	1	7	3.37	1.756	0.7698	14.5747

EnvP9 (improved product innovation)	1	7	3.71	1.779	0.7601	13.7244
Non-Operational Environmental Performance (NOEnvP) (CR = 0.8078; AVE = 0.5635)						
EnvP11 (better relationships with stakeholders such as local communities, regulators, and environmental groups)	1	7	4.77	1.533	0.8327	19.7196
EnvP12 (improved employee morale)	1	7	3.89	1.463	0.6694	7.5855
EnvP13 (overall improved company reputation or goodwill)	1	7	4.78	1.552	0.7808	13.4536
EnvP14 (filters and controls on emissions and discharges)	1	7	5.19	1.513	0.7427	10.2004
EnvP15 (residue recycling)	1	7	5.29	1.536	0.7173	8.2704

***All item loadings on their respective constructs are statistically significant (p ‹ 0.01, one tailed).**

B.5: Tests of Endogeneity

We adopted Hult et al.'s (2018) systematic procedures in assessing, and controlling for, endogeneity problem. We started by applying a Gaussian copula approach using latent scores of the original model estimation as input. In verifying whether variables with potential endogeneity are normally distributed, we ran a Kolmogorov-Smirnov test with Lilliefors corrections (Sarstedt and Mooi, 2019) on latent variables scores serving as independent variables in the PLS path model's partial regression[4]. Results, in Table (B.5.1), indicate that some of the constructs (i.e. secondary stakeholders (X2); organisational stakeholders (X3); and EC-Incentives (X7)) have normal distribution scores, which do not fulfil requirements to proceed with the Gaussian copula approach (see, Hult et al., 2018).

TABLE B.5.1

Subsequently, we adopted the control variable approach (Ibid). Four control variables were included in the PLS model, these are: industry type; firm size measured using the natural log of the number of employees; ownership type as a proxy of public visibility; and stock exchange listing. These control variables are, recalled from Section 3, grounded in existing EMCS literature, and have been used in previous studies. To test for potential endogeneity, these control variables were linked to the latent variables (i.e. X5-X7) in which predictor constructs are assumed to exhibit possible endogeneity in the original PLS model. Results are presented in Table (B.5.2).

TABLE B.5.2

The results in the table above indicate that most of the f^2 values are below 0.02, indicating a small effect of endogeneity; while only few are greater than 0.02 but less than 0.15, indicating a moderate effect of endogeneity in the original PLS model[5]. To ensure controlling for any potential effect of endogeneity in the original PLS model, we further adopted the instrumental variable (IV) approach (Ibid); in doing so, we used

[4] These are: X1: Primary Stakeholders; X2: Secondary Stakeholders; X3: Organisational Stakeholders, X4: Regulatory Stakeholders; X5: Eco-Control – EPIs; X6: Eco-Control – Budgeting; and X7: Eco-Control – Incentives.

[5] Hult et al. (2018) argue that "assessment of significant control variables should use f^2 effect size to also consider their relevance. According to Chin (1998) f^2 values of 0.02, 0.15, 0.35 suggest small, moderate and substantial effects" (pp. 17-18).

WarpPLS software[6]. Using WarpPLS, an instrumental variable (iDependent variable) is created incorporating only the variation of independent variable(s) that ends up in the dependent variable (Ibid). In our model, four independent variables are identified (i.e. X1-X4 – in Figure 2) to have potential indirect links (through X5-X7 – in Figure 2) with the three dependent variables (Y1-Y3 – in Figure 2). Accordingly, we created three instrumental variables (IVs), these are: IV Economic performance; IV Operating environmental performance; and IV Non-operating environmental performance. These IVs were incorporated in the model with direct links to the designated dependent variables (see Figure 2). These links were used to test for, and control for, endogeneity. In accordance with Kock (2019), endogeneity exists if the *p* value – of the direct link between the created IV and the designated dependent variable – is significant.

The final model indicates significant *p* values of the direct links: IV Economic performance > Economic performance (0.185, p=0.031); IV Operating environmental performance > Operational environmental performance (0.379, p <0.001); and IV Non-operating environmental performance > Non-operational environmental performance (0.445, p <0.001). This indicates that the four independent variables (i.e. primary, secondary, organisational, and regulatory stakeholders) exhibit endogeneity in the context of the significant relationships between EC-Incentives and both operational environmental performance and non-operational environmental performance. Yet, the inclusion of the IVs in the final model has controlled for this endogeneity problem (Kock, 2019). To elaborate, the instrumental variable IV Operating environmental

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[6] WarpPLS software identifies nonlinear relationships, and estimates path coefficients accordingly. It models linear relationships, using classic and factor-based PLS algorithms. The software calculates full collinearity coefficients; it also calculates effect sizes, indirect effects, as well as total effect, for paths with various segments (WarpPLS, 2020). It implements composite-based as well as factor-based PLS algorithms (Ibid). In assessing and controlling for endogeneity in WarpPLS instrumental variables are used to test and control for endogeneity (Kock, 2019). Kock illustrates: "for example, let us consider a simple population model with the following links A > B and B > C. This model presents endogeneity with respect to C, because variation flows from A to C via B, leading to a biased estimation of the path for the link B > C via ordinary least squares regression. Adding a link from A to C could be argued as "solving the problem", but in fact it creates the possibility of a type I error, since the link A > C does not exist at the population level. A more desirable solution to this problem is to create an instrumental variable iC, incorporating only the variation of A that ends up in C and nothing else, and revise the model so that it has the following links: A > B, B > C and iC > C. The link iC > C can be used to test for endogeneity, via its P value and effect size. This link (i.e., iC > C) can also be used to control for endogeneity, thus removing the bias in the path coefficient for the link B > C" (p.9).

performance incorporates the variation of the four independent variables – through EC-Incentives – that end up in the dependent variable 'operational environmental performance'. Since the direct link IV Operating environmental performance > Operational environmental performance shows both significant *p* value (i.e. $p < 0.001$), the four independent variables do indicate endogeneity in the model. Yet, the inclusion of the direct link IV Operating environmental performance > Operational environmental performance in the model controls for such endogeneity as it removes any bias in the path coefficient for the link EC-Incentives > Operational environmental performance. The same applies to the IV Non-operating environmental performance > Non-operational environmental performance (0.445, $p < 0.001$).

Table B.5.1: Kolmogorov-Smirnov Results

Variables	**Stat (sig.)**
Primary SH (X1)	0.111 (0.006)
Secondary SH (X2)	0.083 (0.118)
Organisational SH (X3)	0.057 (0.200)
Regulatory SH (X4)	0.103 (0.017)
Eco-Control – Environmental Performance Indicators (EC – EPIs) (X5)	0.149 (0.000)
Eco-Control – Budgeting (EC – Budgeting) (X6)	0.093 (0.046)
Eco-Control – Incentives (EC – Incentives) (X7)	0.089 (0.067)

d.f. = 93 in all variables

Table B.5.2: Endogeneity Test - Control Variables Approach Results*

Control Variables	Endogenous Variables		
	Eco-Control Environmental Performance Indicators (EC-EPIs) (X5)	**Eco-Control Budgeting (EC-Budgeting) (X6)**	**Eco-Control Incentives (EC-Incentives) (X7)**
Industry type	0.077 (0.008)	0.159 (0.034)	0.066 (0.006)
size	0.053 (0.004)	0.180 (0.043)	0.091 (0.011)
ownership	0.002 (0.000)	0.189 (0.042)	0.003 (0.000)
Stock listing	-0.067 (0.005)	0.071 (0.006)	-0.080 (0.007)

*Path coefficient and f^2 (in parentheses).