Institutional pressures, environmental management practices, firm characteristics and environmental performance

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Abstract

Purpose – The purpose of this paper is twofold: to establish the contribution of institutional pressures, environmental management practices and firm characteristics to environmental performance; and to establish whether environmental management practices mediate the relationship between institutional pressures and environmental performance.

Design/methodology/approach – Using a cross-sectional design, data were collected through a questionnaire survey of 303 manufacturing firms in Uganda. Data were analyzed using Statistical Package for Social Sciences and MedGraph program (Excel version).

Findings – Both environmental management practices and institutional pressures are significant predictors of environmental performance. Results further suggest that environmental management practices partially mediate the relationship between institutional pressures and environmental performance. Variables that represent firm characteristics are not significantly associated with environmental performance.

Originality/value – This study provides an initial empirical evidence on the mediating role of environmental management practices in the relationship between institutional pressures and environmental performance. It also enhances our understanding of the contribution of individual dimensions of environmental management practices and institutional pressures to environmental performance using evidence from an emerging economy setting.

Keywords Environmental performance, Institutional pressures, Environmental Management Practices, Manufacturing firms, Institutional theory, Stakeholder theory

Paper type Research paper

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1. Introduction

Globally, organizations are faced with pressures from various stakeholders to improve on their environmental performance. Stakeholders demand that organizations aim at reducing their carbon footprint and mitigate their impact on land degradation (Wijethilake *et al.*, 2017). As a result, firms are increasingly adopting those practices that are directed toward the achievement of environmental performance. Such practices are biased towards promotion of environmental conservation efforts by employees, integration of environmental considerations into new product development, maximizing reuse and recycling of materials and undertaking collaborative research projects (Yu and Ramanathan, 2016). Organizations that have such practices in place are expected to see the amount of resources used reduce drastically over the years, issues of non - compliance with environmental laws and regulations diminish, production costs are expected to shrink and stakeholder interaction to improve. Some studies indicate that environmental management practices are significantly associated with environmental performance. For example, Famiyeh *et al.* (2018) conducted a study on medium-sized and large firms in Ghana and found that environmental management practices and environmental performance are significantly and positively associated. Similarly, Yu and Ramanathan (2016) found that environmental management practices are positively and significantly associated with environmental performance. Other studies have focused on environmental disclosures (Mathuva *et al.*, 2019) and whether such disclosures can improve stock liquidity.

Studies on environmental performance capture a large audience largely because of increasing environmental disasters such as pollution and climate change effects such as unexpected heavy rains and droughts, reduction of water levels and drying of wetlands in most parts of the world. At a local level (Uganda), the second National Development Plan 2015/2016–2019/2020 (Mugerwa, 2015) indicates that because of rapid industrialization, pollution levels are on the increase. This is further emphasized in the National Environmental Management Authority (NEMA) annual report of 2017/2018, where it was indicated that inadequate waste management practices, emissions to air, construction/expansion and operation of facilities without approvals from NEMA, inadequate housekeeping, illegal discharges and discharges that do not meet the standards, limited use of personal protective equipment (PPE) and noise, among others, are the major areas of noncompliance (Annual corporate report, 2018). All the above issues highlighted are, by nature, associated largely with manufacturing firms.

Given the prevalent environmental disasters across the globe amid several efforts by international and national bodies, one wonders whether there exists a clear mechanism through which environmental performance can be achieved for all manufacturing firms, especially in developing countries such as Uganda. Literature on environmental performance is still minimal in developing countries. Further, existing literature on environmental management practices has not explored the effect of individual environmental management practices such as promotion of environmental conservation efforts by employees, integration of environmental considerations into new product development, maximizing reuse and recycling of materials and undertaking collaborative research projects on environmental performance. Similarly, studies that test the individual contribution of each institutional pressure as identified by DiMaggio and Powell (1983) are minimal in developing countries. Yet, previous studies such as Lin and Ho (2016) document that institutional pressures are significantly associated with environmental performance whereas other studies such as Barla (2007) found that firms that adopt ISO 14001 EMS only improve their environmental performance immediately after adoption of ISO EMS and, thereafter, worsen in environmental performance. This means that previous study results

are mixed. Moreover, existing studies have not tested whether environmental management practices can mediate the link between institutional pressures and environmental performance.

Given the existing research gaps, we build on previous studies (see, Yu and Ramanathan, 2016; Lin and Ho, 2016) and partially respond to previous studies' calls (Mensah, 2014) for further studies in other contexts using other variables by testing the individual contribution of the identified environmental management practices, institutional pressures and firm characteristics to environmental performance. We also test whether environmental management practices mediate the relationship between institutional pressures and environmental performance. We achieve our purpose through a questionnaire survey of 303 manufacturing firms in Uganda where Chief Finance Officers were our respondents. Results suggest that environmental management practices and institutional pressures are significant predictors of environmental performance while firm characteristics variables are not significant. Results further suggest that environmental management practices partially mediate the relationship between institutional pressures and environmental performance. In terms of policymaking, the results are important for policy development especially in ensuring that the Uganda Manufacturers Association (UMA) has an enforcement mechanism on implementing the NEMA laws among her members. UMA may also organize awards for companies that have fully complied with environmental laws (this can be done in consultation with NEMA).

The remainder of the paper proceeds as follows. Literature review is provided next, followed by the methodology, results and discussion of study results. The last section provides a summary and conclusion.

2. Literature review

2.1 Study setting

This study was undertaken in Uganda with a focus on manufacturing firms. Uganda's population has continued to grow over time. In 2014, Uganda's population stood at 34.6 million with an average annual growth rate of 3% (UBOS, 2016). This means that manufacturing firms in Uganda are faced with a task of producing more tangible products for consumption and this has adverse effects on the environment. Government through NEMA has amended and enacted several laws to mitigate adverse environmental effects caused by manufacturing firms. For example, the National Environment (Audit) regulation of 2020; National Environment (Management of Ozone Depleting Substances and Products) regulations of 2020; National Environment (Waste Management) regulations of 2020; and Petroleum (Waste Management) regulations of 2019, among others. All the above regulations are aimed at improving environmental management practices among individuals and firms.

Because of the worsening situation of Uganda's natural environment, Uganda has revised its National Environmental Act (NEA) of 1995 to include more robust environmental management practices and pressures. As a result, a new NEA of 2019 was released. The Act has a number of provisions regarding environmental management. For example, no body corporate is expected to pollute the environment (see Section 163), no body corporate is expected to mismanage its waste (see Section 162 of the Act) and no body corporate is expected to be involved in unlawful dealings in hazardous chemicals (see Section 161 of the Act). The NEA of 2019 further indicates that whoever contravenes any section of the Act is liable to a fine not exceeding 50 currency points (US$271,000) or the individual involved is subjected to a maximum of 15 years imprisonment. We therefore undertake this study to test whether institutional pressures such as those enshrined in the Ugandan laws and those

environmental management practices such as those described in the NEA of 2019 are perceived to have an effect on environmental performance.

2.2 Theoretical foundation

The institutional theory (Meyer and Rowan, 1977; DiMaggio and Powell, 1983) is widely known for explaining institutional pressures. According to Mizruchi and Fein (1999), firms constantly aim at maintaining and increasing legitimacy through agreeing with pressures that arise from their institutional environment. Institutional pressures are known to have an upper hand in shaping environmental management practices of an organization (Famiyeh and Kwarteng, 2018). Further, Berthod (2016) argues that institutional theory of organizations puts institutions at the forefront of analysis of organization's design and conduct. This means that organizational attributes such as age, type of auditors and market are under scrutiny. The activities of a firm may be compared with its age. If a firm has been in existence for say 10 years, it may be expected to have better environmental performance compared with newly established firms. In terms of market nature, firms that are known to be exporters to countries such as the European Union are expected to improve their environmental performance because such markets require environmentally friendly products unlike those firms whose markets are local. Auditors all over the world are under immense pressure over the quality of their audit opinions. In certain cases, big audit firms have been critiqued over what some people have called audit failures. The level of audit risk is continuing to emerge but there are also pressures from various stakeholders to minimize such audit risks. Given that institutional theory asserts that a firm is under scrutiny without exploring in detail those who scrutinize it, then this study explores another theory – stakeholder theory – to provide a much more understanding of the environmental performance problem.

The stakeholder theory assumes that doing business requires value which needs to be shared among the various business stakeholders. The theory is premised on the notion that there should be a balance between value creation and trade (Freeman *et al.*, 2010). In trying to balance between value creation and trade, managers must then change their mindset on how to put business and ethics together to come up with valid decisions (Freeman *et al.*, 2010) that are appropriate for the turbulent business environment. Freeman *et al.* (2010) note that there are primary stakeholders (suppliers, employees, financiers, communities and customers) and secondary stakeholders (media, government, competitors, consumer advocate groups and special interest groups) and all these have concerns over the natural environment. However, if the primary stakeholders are more interested in the environmental performance metrics, it is more likely that such a firm will be mindful about the effects of its activities on the environment compared with secondary stakeholders.

In the current business environment, it is apparent that all stakeholders of a company are catered for through provision of environmentally friendly products, undertaking collaborative research on environmental matters, minimizing resource usage and improving stakeholder interactions. Because stakeholders such as shareholders put focus on wealth maximization (capitalism) at the expense of society, Freeman and Philip (2002) assert that stakeholders should jointly satisfy each other's needs through voluntary agreements; parties to such agreements should take responsibility for their actions; people should have a crowd of motivations and values; people should use organizations as vehicles for searching for new opportunities of creating value; and competition should have a secondary effect on their operations. These suggestions have been known as the core principles of stakeholder capitalism. Freeman *et al.* (2010) argue that stakeholder capitalism provides a better remedy to easing tensions within capitalism and thus the balance between value creation and trade.

Therefore, it is no longer an issue of wealth maximization for a few stakeholders but rather ensuring welfare for all.

2.3 Institutional pressures and environmental performance

Institutional pressures are commonly known to be coercive pressures, mimetic pressures and normative pressures (DiMaggio and Powell, 1983). Coercive pressures refer to pressures faced by one organization by other organizations on which they depend (DiMaggio and Powell, 1983). However, this definition ignores the fact that customers can coerce an organization to conform to practices that are generally acceptable by the community in which such a firm operates. Thus, coercive pressures may be defined as the pressure faced by an organization by other organizations on which they depend and pressures from organizations' customers. Regulatory pressures may, for example, require manufacturing firms to monitor hazardous wastes and submit environmental impact assessment reports for any new projects or new plants to the regulators. For example, Section 163 of the Uganda's Environmental Act of 2019 stipulates that any person/body corporate who discharges or emits any pollutant into the environment contrary to approved standards is liable to imprisonment not exceeding 15 years or a fine not exceeding 50,000 currency points (US$271,000). Mimetic pressures are those pressures where an organization imitates competitors or other successful organizations when it is uncertain on what to do so as to improve its operations (DiMaggio and Powell, 1983). Normative isomorphism refers to following professional standards and practices established by education and training methods, professional networks and movement of employees among firms (DiMaggio and Powell, 1983).

Institutional pressures and environmental performance are significantly associated (see for example, Lin and Ho, 2015). Lin and Ho (2015) found that institutional pressures are significantly associated with environmental performance. However, Lin and Ho (2015) conceptualized institutional pressures as Environmental Regulatory Regime Index developed by Esty and Porter (2005) and falls short of examining the contribution of the various institutional pressures to environmental performance. Further, Mensah (2014) found that stakeholder pressures and environmental performance are significantly and positively associated. Mensah (2014) study focuses on the various stakeholder pressures in terms of primary and secondary stakeholders and how these various stakeholders' pressures impact on environmental performance of hotels in Ghana. Yang (2017) documents that institutional pressures improve green performance of firms in Taiwan. Further, Ahmed *et al.* (2019) found that institutional pressures are critical for improving environmental performance of ISO 14001 certified firms in Pakistan. Barla (2007) found that firms that adopt ISO 14001 EMS only improve their environmental performance immediately after adoption of ISO EMS and, thereafter, worsen in environmental performance. However, this study differs from previous studies because it goes an extra mile to test whether the various institutional pressures as identified by DiMaggio and Powell (1983) shape environmental performance. Based on the foregoing discussion, the following hypotheses are stated:

H1. Institutional pressures are significantly associated with environmental performance.

H1(a). Coercive institutional pressures are significantly associated with environmental performance.

H1(b). Mimetic institutional pressures are significantly associated with environmental performance.

H1(c). Normative institutional pressures are significantly associated with environmental performance.

2.4 Environmental management practices and environmental performance

Few studies have linked environmental management practices to environmental performance (see, for example, Yu and Ramanathan, 2016; Famiyeh *et al.*, 2018). In their study of environmental management practices and environmental performance using evidence from a developed country – United Kingdom, Yu and Ramanathan (2016) found that the adoption of environmental management practices improves environmental performance. In Yu and Ramanathan (2016) study, environmental management practices were operationalized in terms of promotion of environmental conservation efforts by employees, integration of environmental considerations into new product development process, maximizing reuse and recycling of materials when developing products/processes and undertaking collaborative research projects with universities on environmental management. Their argument is that when such practices are adopted by an organization, the resultant benefit is improved environmental performance. Similarly, Famiyeh *et al.* (2018) found that environmental management practices are positively associated with environmental performance using evidence from Ghana. Famiyeh *et al.* (2018) study did not establish the significance of individual environmental management practices on environmental performance.

In their study of 76 United Kingdom manufacturing firms, Nath and Ramanathan (2016) found that once firms improve their level of environmental commitment, their involvement in long-term pollution prevention activities also improves. However, Nath and Ramanathan (2016) used a content analysis of those environmental management practices at the operational, tactical and operational levels as earlier used by Montabon *et al.* (2007). Content analysis studies have often been criticized for non-interactivity with the respondents, which limits reasoning on the side of respondents compared with perception-based studies. Some studies document that environmental management systems and environmental management accounting are critical for improving environmental performance in an organization (de beer and Friend, 2006; Campos *et al.*, 2015; Comoglio and Botta, 2012). Comoglio and Botta (2012) found that environmental management system is a gateway for increasing a company's commitment towards environmental performance improvements through monitoring environmental aspects such as waste management, use of resources, emissions to air and local issues. Relatedly, Melnyk *et al.* (2003) document that firms with an environmental management system register greater overall performance than those without.

Environmental management practices need not to be downplayed as Schaltegger and Synnestvedt (2002) argue that environmental issues influence both costs and income of the company, implying that poor environmental management practices have a negative effect on the economic performance. In another study, Al-Sheyadi *et al.* (2019) document that complementarities between green supply chain management practices lead to better environmental performance of Omani manufacturing firms. In this study, the argument is that the overall environmental management practices and the specific environmental management practices as adopted from Montabon *et al.* (2007) and Yu and Ramanathan (2016) have a significant effect on environmental performance. Based on the foregoing discussion, the following hypotheses are stated:

H2. Environmental Management Practices and environmental performance are positively related.

H2(a). Promotion of environmental conservation efforts by employees and environmental performance are positively related.

H2(b). Integration of environmental considerations into new product development processes and environmental performance are positively related.

H2(c). Maximizing reuse and recycling of materials and environmental performance are positively related.

H2(d). Undertaking collaborative research projects with various universities on environmental management and environmental performance are positively related.

Following a review of literature and in our reasoning, we test whether institutional pressures are significantly associated with environmental management practices and whether the latter mediate the relationship between the former and environmental performance. Gunaranthne and Lee (2019) document that institutional pressures are positively associated with environmental management maturity/practices. Also, Famiyeh and Kwarteng (2018) found that regulatory and mimetic pressures have an effect on implementation of environmental management practices in Ghana. Sánchez-Medina *et al.* (2016) found stakeholder pressures to have a direct positive relationship between the hoteliers' perceptions of stakeholders' interests and the implementation of environmental management practices. Using evidence from Chinese firms, Wang *et al.* (2018) found that regulatory and normative pressures are positively and significantly related to the firms' motivation to implement environmental management practices.

In other studies, green operational practices as measured by setting annual targets for energy conservation; recycling and waste reductions; environmental mission statement; environmental management system; a separate environmental department/team and training programmes for employees; and environmental considerations in designing new products were found to mediate the relationship between stakeholder pressures and environmental performance (Yu and Ramanathan, 2015). Also, Yang (2018) found that green supply chain management mediates the relationship between institutional pressures and green performance. The evidence that green supply chain management and generally green practices are documented in literature to mediate the relationship between institutional pressures and environmental or green performance leads us to believe that environmental management practices can mediate the relationship between institutional pressures and environmental performance.

We then hypothesize that:

H3. Institutional pressures and environmental management practices are positively related.

H4. Environmental management practices mediate the relationship between institutional pressures and environmental performance.

2.5 Firm characteristics and environmental performance

In some studies, several firm-specific characteristics have been known to be controlled for, while in other instances, firm characteristics have been conceptualized as organizational

identity. This study's scope of firm characteristics only include firm age, auditor type and nature of the market. Several studies have documented non-significant associations between firm age and environmental performance (see Lin and Ho, 2015; Ru and Ramanathan, 2016). Firm age has also been linked to disclosure of managers' identity (Asien, 2014) although no significant associations are documented. Firm age has also been found not to be significant with firm risk (Wang and Oliver, 2009). However, Orazalin and Mahmood (2015) document that firm age is significantly associated with sustainability disclosures.

Auditor type is significantly associated with sustainability disclosures (Orazalin and Mahmood, 2015). The Big 4 audit firms are known for ensuring compliance with laws and regulations compared with small and medium-sized practices (Kaawaase *et al.*, 2016). This means that the Big 4 audit firms ensure that firms comply with environmental laws by issuing an appropriate opinion depending on whether a given firm complies with laws or not. In a study by Du *et al.* (2018), it was found that environmental performance is negatively and significantly associated with modified audit opinions, which means that environmentally responsible firms are more likely to receive standard unmodified opinions because they will be complying with environmental laws.

For market nature, it is expected that if firms are selling their products largely to foreign markets, say European Union, it is likely that it will perform better in terms of environmental performance, especially if the majority of firms in such markets and the customers are biased toward environmental concerns. However, firms that operate within their local markets are likely not perform better in environmental aspects, especially if the norms of such markets have nothing to do with the environment. Based on the foregoing discussion, the following hypotheses are stated:

H5. Firm age is significantly associated with environmental performance.

H6. Auditor type is significantly associated with environmental performance.

H7. Market nature is significantly associated with environmental performance.

3. Methodology

3.1 Research design, population and sample

Using a cross-sectional and correlational research design, Uganda Manufacturers Association's (UMA) 1,039 members as of December, 2019 were considered for this study. We distributed questionnaires to all members of UMA whose addresses were provided and these were 1,000. The data collection exercise started in October 2018 and ended in April 2019. Usable questionnaires were received from 303 firms resulting into a response rate of 30%. The low response rate was a result of ignoring those responses from service firms given that the members of UMA also include service firms such as banks. Also, because questionnaires had been hand delivered to the respondents, 100 questionnaires were found incomplete and these were not considered for final analysis. Also, 30 questionnaires with outliers were eliminated during data cleaning. The respondents were given three months to complete the questionnaire. This time was considered sufficient enough for one to complete the questionnaire. The sample characteristics are presented in Table 1.

3.2 Validity and reliability of the questionnaire

Data were collected from the respondents using a self-administered questionnaire with closed-ended questions. The questionnaire had two parts. Part A contained general information regarding respondents and information regarding the firm (firm-specific

Category	Scale	$n = 303$ (100%)
Gender	Male	188 (62%)
	Female	115 (38%)
Age of the respondent	Less than 36 years	81 (27%)
	36 years and above	222 (73%)
Experience	Less than 5 years	109 (36%)
	5–10 years	124 (41%)
	11–15 years	43 (14%)
	16 years and above	27 (9%)
Professional qualification	CPA	132 (44%)
	ACCA	54 (18%)
	CIA	10 (3%)
	Others	107 (36%)
Education	Diploma	43 (14%)
	Bachelor's degree	168 (55%)
	Master's degree	73 (24%)
	PhD	19 (6%)

Source: Primary data

Table 1. Demographic profile of the respondents

characteristics). Part B contained questions on the study variables designed on a six-point Likert scale ranging from completely disagree to completely agree. Because we intended to compute the mean rating of respondents' responses, we opted for a closed-ended questionnaire. Also because of the large population, the questionnaire was more appropriate than an interview guide in collecting self-reported information. We opted for self-reported data because it is an opportunity to test the perceptions of respondents on the problem at hand. We tested for reliability of the questionnaire using Cronbach's α coefficient. The Cronbach's α values for environmental management practices, institutional pressures and environmental performance are 0.953, 0.961 and 0.904, respectively. Cronbach (1951) requires a Cronbach's α coefficient of at least 0.7 and above. We also tested for validity where our questionnaire was given to practitioners and academicians. The suggestions of these academicians and practitioners were incorporated in the final questionnaire.

3.3 Measurement of variables

3.3.1 Environmental performance scale. Environmental performance was operationalized in terms of resource usage, regulatory compliance, productivity and stakeholder interaction and this was according to the works of Phan *et al.* (2018). We used several item scales (questions) to measure the various environmental performance dimensions. For example, under resource usage, questions such as "We have registered reductions in energy consumption" were asked. For regulatory compliance, questions such as "We have a mechanism for monitoring internal compliance with environmental policies and regulations" were asked. We also asked questions such as "We have registered significant reduction in consumption of hazardous materials" to measure productivity. Stakeholder interaction was measured using questions such as "There are better relationships with stakeholders such as local communities, regulators, and environmental groups as compared to the previous periods." More measurement items for the constituents of environmental performance are indicated in Appendix 3.

3.3.2 Institutional pressures scale. We follow previous scholars to operationalize institutional pressures in terms of coercive, mimetic and normative pressures (see DiMaggio

and Powel, 1983). We asked questions such as "We comply to the Environmental Act because our regulator requires us to do so" to measure the coercive pressures. For mimetic pressures, we asked questions such as "Our competitors who planned and implemented comprehensive environmental management practices are favorably perceived by others in the same industry." We also asked questions such as "Our firm adopts environmental management practices due to the extent to which the government of Uganda promotes such practices to measure normative pressures."

3.3.3 Environmental management practices scale. The measures for EMP were mainly adapted from Yu and Ramanathan (2016) and Montabon *et al.* (2007) and included promoting environmental conservation efforts by employees; integrating environmental considerations into new product development process; maximizing reuse and recycling of materials when developing products/processes; and undertaking collaborative research projects with universities on environmental management. We used several item scales for each EMP dimension. For example, we asked questions such as "Our firm considers environmental matters while developing new products" to operationalize integration of environmental considerations into new product development. For undertaking collaborative research projects dimension, we asked questions such as "Our firm collaborates with international bodies dealing with research on environmental management." We asked questions such as "In this firm, we aim at ensuring that no bi-product or any material goes to the dustbin" to operationalize the maximizing reuse and recycling of materials dimension. Finally, we ask our respondents questions such as "Our firm has consistently sensitized employees on the need to minimize on water consumption" to measure the promotion of environmental conservation efforts by employees. More measurement items for each dimension of EMP are provided in Appendix 2.

Firm characteristics considered in this study include firm age, auditor type and market nature. These variables take on different codes as shown in Table 2.

3.4 Common method variance

We used several methods to control for Common Methods Variance (CMV) in this study. First, multiple scales were used for perceptive independent constructs. Second, the respondent's anonymity was protected so that their responses are more aligned to the research goal. Also, the respondents were expressly assured that there are no right or wrong answers as long as the responses are honest. The objective was to reduce the respondent's apprehension over their responses, hence reducing the chance that they can edit their answers to give what they perceive as the best answers. Third, we limited reverse scoring and avoided "double-barrelled" questions so as to reduce the risk of reducing scale reliability. Finally, the survey tool was pre-tested by a representative group of respondents (academics and practitioners) to support the instrument's content validity. In the process of pretesting, the academicians and practitioners comments were incorporated into the final questionnaire before going for the final data collection exercise. Further, we performed exploratory factor analysis since according to Podsakoff, Mackenzie and Lee (2003), factor analysis is used to address the issue of CMV. Podsakoff *et al.* (2003) indicate that, all factors under study are loaded into factor analysis and if a substantial amount of CMV is present, either a single factor will emerge from the factor analysis or one general factor will account for the majority of the covariance among the measures, which was not the case for this study (see Appendices 1–3). We considered factors that were retained during factor analysis for our final analysis.

Variable		Measurement	Definition	Sample item scales
Global variable	*Dimensions*			
Environmental performance	Resource usage	Respondents' mean rank of the two items of information included in the questionnaire on a six-point Likert scale	Environmental performance is "an overview of the use of operational performance indicators that evaluate the use of resources, waste disposal, emissions or water consumption" (Nawrocka and Parker, 2009).	We have registered reductions in energy consumption
	Environmental regulatory compliance	Respondents' mean rank of the four items of information included in the questionnaire on a six-point Likert scale		We have a mechanism for monitoring internal compliance with environmental policies and regulations
	Productivity	Respondents' mean rank of the four items of information included in the questionnaire on a six-point Likert scale		Our firm has consistently registered reductions in process/production costs
	Stakeholder interaction	Respondents' mean rank of the four items of information included in the questionnaire on a six-point Likert scale		We provide data to other departments and sections for external reporting
Environmental management practices	Promotion of environmental conservation efforts by employees	Respondents' mean rank of the seven items of information included in the questionnaire on a six-point Likert scale	Environmental management practices are techniques, policies and procedures a firm uses to monitor and control the impact of its activities on the natural environment to reduce the environmental harm as a result of such firm activities (Ru and Ramanathan, 2016; Montabon *et al.*, 2007; Grolleau *et al.*, 2007)	Our firm has consistently sensitized employees on the need to minimize on water consumption
	Integration of environmental considerations into new product development	Respondents' mean rank of the nine items of information included in the questionnaire on a six-point Likert scale		We have always disclosed environmental information through displaying on our notice boards and various publications of the entity
	Maximizing reuse and recycling of materials	Respondents' mean rank of the four items of information included in the questionnaire on a six-point Likert scale		Our firm considers opportunities for reuse/recycling/ recovery of material when designing products/processes
	Undertaking collaborative research projects	Respondents' mean rank of the ten items of information included in the questionnaire on a six-point Likert scale		Our firm collaborates with international bodies dealing with research on environmental management
Institutional pressures	Coercive pressures	Respondents' mean rank of the 11 items of information included in	These are pressures exerted on to an organization resulting	Our regulators requires our firm to plan and implement

(*continued*)

Table 2. Variable definitions and their measurements

Variable		Measurement	Definition	Sample item scales
		the questionnaire on a six-point Likert scale	from existing laws and focused customers,	environmental management practices
	Mimetic pressures	Respondents' mean rank of the six items of information included in the questionnaire on a six-point Likert scale	organizations' peers and professional norms and practices	Our practices of environmental management are shaped by peers in the industry
	Normative pressures	Respondents' mean rank of the six items of information included in the questionnaire on a six-point Likert scale		Our firm adopts environmental management practices because of the extent to which the government of Uganda promotes environmental management practices
Firm characteristics	Auditor type	A dummy variable coded as 0 if the firm is audited by Big 4 audit firms, 1 if the firm is audited by a small and medium audit practices and 2 if the firm is audited by the Auditor General	These are specific attributes to an organization	This firm is audited by. . .
	Firm age	A dummy variable coded as 0 if the firm has been in existence for not more than 5 years, 1 if the firm has been in existence for 5 and 10 years, 2 if the firm has been in existence for 11 years and 20 years and 3 if the firm has been in existence for more than 20 years		How long has this firm been in existence?
	Market nature	A dummy variable coded as 0 if the firm largest market share is in Uganda, 1 if the firm's largest market share is within East Africa and 2 if the firm's largest market share is outside East Africa		This firm's products are largely sold to. . .

Table 2.

3.5 Model

This study uses the hierarchical regression model in establishing the contribution of independent variables to the dependent variable. The hierarchical regression analysis is powerful in testing which independent variable contributes more to the variances in the dependent variable and also indicates the incremental power of an additional independent variable to the already existing variable(s) in explaining the dependent variable (Sekaran, 2003; Field, 2009). Specifically, the models below were tested.

Panel A: Hierarchical multiple regression models:

$$EV = \beta_0 + \beta_1 AUD + \beta_2 AGE + \beta_3 MKT + \varepsilon j \quad \text{Model 1}$$

$$EV = \beta_0 + \beta_1 COE + \beta_2 MIM + \beta_3 NOM + \varepsilon j \quad \text{Model 2}$$

$$EV = \beta_0 + \beta_1 ECE + \beta_2 ECP + \beta_3 MAX + \beta_4 COL + \varepsilon j \quad \text{Model 3}$$

$$EV = \beta_0 + \beta_1 AUD + \beta_2 AGE + \beta_3 MKT + \beta_4 EMP + \varepsilon j \quad \text{Model 4}$$

$$EV = \beta_0 + \beta_1 AUD + \beta_2 AGE + \beta_3 MKT + \beta_4 EMP + \beta_5 IPS + \varepsilon j \quad \text{Model 5}$$

Panel B: Regression models to test for mediation:

$$\text{EMP} = \beta_0 + \beta_1 \text{IPS} + \varepsilon_j \quad \text{Model 6}$$

$$\text{EV} = \beta_0 + \beta_1 \text{IPS} + \varepsilon_j \quad \text{Model 7}$$

$$\text{EV} = \beta_0 + \beta_1 \text{EMP} + \varepsilon_j \quad \text{Model 8}$$

$$\text{EV} = \beta_0 + \beta_1 \text{IPS} + \beta_2 \text{EMP} + \varepsilon_j \quad \text{Model 9}$$

where EV is environmental performance; IPS is institutional pressures; EMP is environmental management practices; ECE is promotion of environmental conservation efforts by employees; ECP is integration of environmental considerations into new product development processes; MAX is maximizing reuse and recycling of materials; COL is undertaking collaborative research projects with institutions that support environmental management; COE is coercive pressures; MIM is mimetic pressures; NOM is normative pressures; AGE is firm age; AUD is auditor type; $OWNP$ is ownership; β_0 is a constant; εj is the error term.

4. Results

4.1 Descriptive statistics

The means and standard deviations for environmental performance, institutional pressures and environmental management practices are 5.43 and 0.63; 5.23 and 0.77; and 4.85 and 1.04, respectively (see Table 3). Results suggest that on average, manufacturing firms in Uganda are doing well in terms of environmental performance but the presence of minimum values of 3.07 is an indicator of poor environmental performance for some firms. We also report means and standard deviations because according to Field (2009), small standard deviations

Variable	*N* Statistic	Min Statistic	Max Statistic	Mean Statistic	SD Statistic
Environmental performance	303	3.07	6	5.43	0.63
Resource usage	303	1.75	6	5.15	1.07
Regulatory compliance	303	2.5	6	5.33	0.99
Productivity	303	3.5	6	5.54	0.61
Stakeholder interaction	303	4	6	5.66	0.45
Institutional pressures	303	2.71	6	5.23	0.77
Coercive pressures	303	2.5	6	5.19	0.85
Mimetic pressures	303	2.75	6	5.19	0.95
Normative pressures	303	2.88	6	5.32	0.78
Environmental management practices	303	1.88	6	4.85	1.04
Promotion of environmental conservation efforts	303	3	6	5.35	0.70
Integration of environmental conservations	303	1.22	6	4.44	1.53
Maximizing reuse and recycling materials	303	1	6	4.8	1.39
Undertaking collaborative research projects	303	2.57	6	5.22	0.91
Auditor type	303	0	2	0.82	0.48
Firm age	303	0	3	2.26	1.01
Market	303	0	2	0.63	0.76

Table 3.
Descriptive statistics

Source: Primary data

relative to the mean values themselves indicate that the data points are close to the mean and thus the means are an accurate representation of the data. A large standard deviation relative to the mean s indicates that the data points are distant from the mean and thus the mean is not an accurate representation of the data.

4.2 Correlation analysis results

Table 4 shows correlation analysis results. The correlation analysis results reveal that environmental management practices have a significant positive relationship with environmental performance ($r = 0.681^{**}$, $p < 0.01$). This finding means that a positive change in environmental management practices will lead to a positive change in environmental performance. In terms of environmental management practices constructs, both of them are positively associated with environmental performance. It should be noted that undertaking research in collaborative projects as a construct of environmental management practices is highly associated with environmental performance whereas integration of environmental considerations in new product development as a construct for environmental management practices is least associated with environmental performance. Further, correlation analysis results reveal that institutional pressures are positively and significantly associated with environmental performance ($r = 0.495^{**}$, $p < 0.01$). All institutional pressures dimensions of mimetic pressures, coercive pressures and normative pressures are positively and significantly associated with environmental performance. Coercive pressures are more associated with environmental performance compared with normative and mimetic pressures. Mimetic pressures are the least significant in terms of association with environmental performance. Results also indicate that institutional pressures are significantly and positively associated with environmental management practices ($r = 0.523^{**}$, $p < 0.01$). In terms of firm characteristics, there is a weak negative relationship between firm age ($r = -0.004$, $p > 0.05$), auditor type ($r = 0.005$, $p > 0.05$) and environmental performance. Market nature is positively and significantly associated with

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Environmental performance (1)	1																
Resource usage (2)	0.905**	1															
Regulatory compliance (3)	0.836**	0.674**	1														
Productivity (4)	0.899**	0.728**	0.700**	1													
Stakeholder interaction (5)	0.628**	0.345**	0.459**	0.563**	1												
Institutional pressures (6)	0.495**	0.453**	0.443**	0.498**	0.198**	1											
Coercive pressures (7)	0.528**	0.501**	0.451**	0.521**	0.202**	0.916**	1										
Mimetic pressures (8)	0.397**	0.353**	0.340**	0.416**	0.173**	0.881**	0.677**	1									
Normative pressures (9)	0.358**	0.308**	0.371**	0.355**	0.139*	0.868**	0.690**	0.702**	1								
Environmental management practices (10)	0.681**	0.667**	0.534**	0.613**	0.345**	0.523**	0.502**	0.403**	0.487**	1							
Environmental conservation efforts (11)	0.540**	0.513**	0.378**	0.454**	0.405**	0.310**	0.361**	0.215**	0.213**	0.565**	1						
Environmental considerations (12)	0.417**	0.404**	0.319**	0.398**	0.201**	0.392**	0.354**	0.293**	0.411**	0.893**	0.382**	1					
Maximizing reuse (13)	0.672**	0.669**	0.536**	0.608**	0.305**	0.498**	0.469**	0.408**	0.447**	0.896**	0.466**	0.669**	1				
Research projects (14)	0.793**	0.778**	0.642**	0.671**	0.436**	0.518**	0.536**	0.388**	0.431**	0.770**	0.538**	0.486**	0.686**	1			
Auditor (15)	0.005	0.003	0.009	−0.019	0.031	−0.107	−0.101	−0.083	−0.102	−0.102	−0.016	−0.122*	−0.099	−0.013	1		
Firm age (16)	−0.004	0.042	−0.089	−0.009	−0.010	−0.076	−0.097	−0.079	−0.006	0.131*	−0.051	0.210**	0.045	0.051	0.084	1	
Market (17)	0.116*	0.097	0.113*	0.113	0.064	0.109	0.137*	0.041	0.100	0.180**	0.023	0.182**	0.123*	0.177**	0.104	0.111	1

Notes: **Correlation is significant at the 0.01 level (two-tailed); *correlation is significant at the 0.05 level (two-tailed)
Source: Primary data

Table 4.
Correlations of independent and dependent variables

Table 5.
Hierarchical regression analysis

Item	Model 1	Model 2	Model 3	Model 4	Model 5	VIF	Tolerance
Constant	5.398	3.403	2.233	3.422	2.894	na	na
Auditor type	−0.006			0.086	0.094	1.016	0.984
Firm age	−0.017			−0.103	−0.076	1.018	0.982
Market nature	0.119**			−0.008	−0.015	1.022	0.979
Coercive pressures		0.500**				2.219	0.451
Mimetic pressures		0.096				2.293	0.436
Normative pressures		−0.055				2.369	0.422
Promotion of environmental conservation efforts			0.140**			1.456	0.687
Environmental considerations in product development			0.105**			1.833	0.546
Maximizing reuse and recycling materials			0.283**			2.640	0.379
Undertaking collaborative research projects			0.575**			2.135	0.468
Environmental management practices				0.705**	0.607**	1.066	0.938
Institutional pressures					0.184**	1.034	0.968
Model F	1.396	39.257**	156.831**	68.821**	60.318**	na	na
R-square	0.014	0.283	0.678	0.480	0.504	na	na
Adjusted *R* square	0.004	0.275	0.674	0.473	0.495	na	na
F change	1.396	39.257**	156.831**	267.363**	146.661**	na	na
R-square change	0.014	0.283	0.678	0.466	0.490	na	na

Note: **Significant at the 0.01 level
Source: Primary data

environmental performance ($r = 0.116$*, $p < 0.05$). This means that manufacturing firms that sell their products in international markets have better environmental performance compared to those firms with local markets. The international markets are categorized into two for purposes of this study. These include the markets within East African countries excluding Uganda and those markets outside East Africa such as European Union and Economic Community of West African States (ECOWAS), among others.

4.3 Regression analysis results

After obtaining preliminary results from the bivariate correlations between the independent and the dependent variable, a regression analysis was run to further substantiate the study hypotheses. We present regression analysis results in Table 5. Given that we used a hierarchical regression, we entered firm characteristics first and these are constituted in Model 1. Model 1 results indicate that only market nature is a significant contributor to environmental performance (standardized $\beta = 0.119$) whereas firm age and auditor type are not. Model 1 explains 0.4% of the variance in environmental performance. Based on Model 1, *H5* and *H6* are not supported while *H7* is supported. The standardized β values were used in this study and not the unstandardized β. Next, we test the contribution of specific institutional pressures (coercive, mimetic and normative pressures) to environmental performance in Model 2. We find that only coercive pressures significantly contribute to environmental performance (standardized $\beta = 0.500$) whereas mimetic pressures and normative pressures are not. Model 2 predicts 27.5% of the variance in environmental performance. Based on Model 2, *H1(a)* is supported while *H1(b)* and *H1(c)* are not supported.

We enter only environmental management practices constructs in Model 3. Results indicate that promotion of environmental conservation efforts by employees significantly contributes to environmental performance (standardized $\beta = 0.140$), thus providing support for *H2(a)*. Also, integration of environmental considerations into new product development processes significantly contributes to environmental performance (standardized $\beta = 0.105$), thus providing support for *H2(b)*. Maximizing reuse and recycling of materials significantly contributes to environmental performance (standardized $\beta = 0.283$), thus providing support for *H2(c)*. Finally, undertaking collaborative research projects is also a significant contributor (standardized $\beta = 0.575$) and therefore *H2(d)* is supported. Model 4, environmental management practices, was entered together with firm characteristics and found significant (standardized $\beta = 0.701$) whereas all firm characteristics variables became insignificant. In Model 5, which is our final model for Panel A regressions, institutional pressures was added to environmental management practices and firm characteristics where both environmental management practices and institutional pressures were found significant, and thus providing support for *H1* and *H2*. However, institutional pressures were found to have a lower standardized beta (standardized $\beta = 0.279$) than environmental management practices (standardized $\beta = 0.627$). Overall, the final model predicts 49.5% of the variance in environmental performance.

4.4 Mediation test results

The second objective of this study was to establish the mediation effect of environmental management practices on the relationship between institutional pressures and environmental performance. There are two statistical strategies for testing mediated effects: multiple regression (as reviewed by Baron and Kenny, 1986) and structural equation modeling. This study adopts the regression strategy. Mediation tests were thus conducted to be sure that the conditions suggested by Baron and Kenny (1986) are met. According to

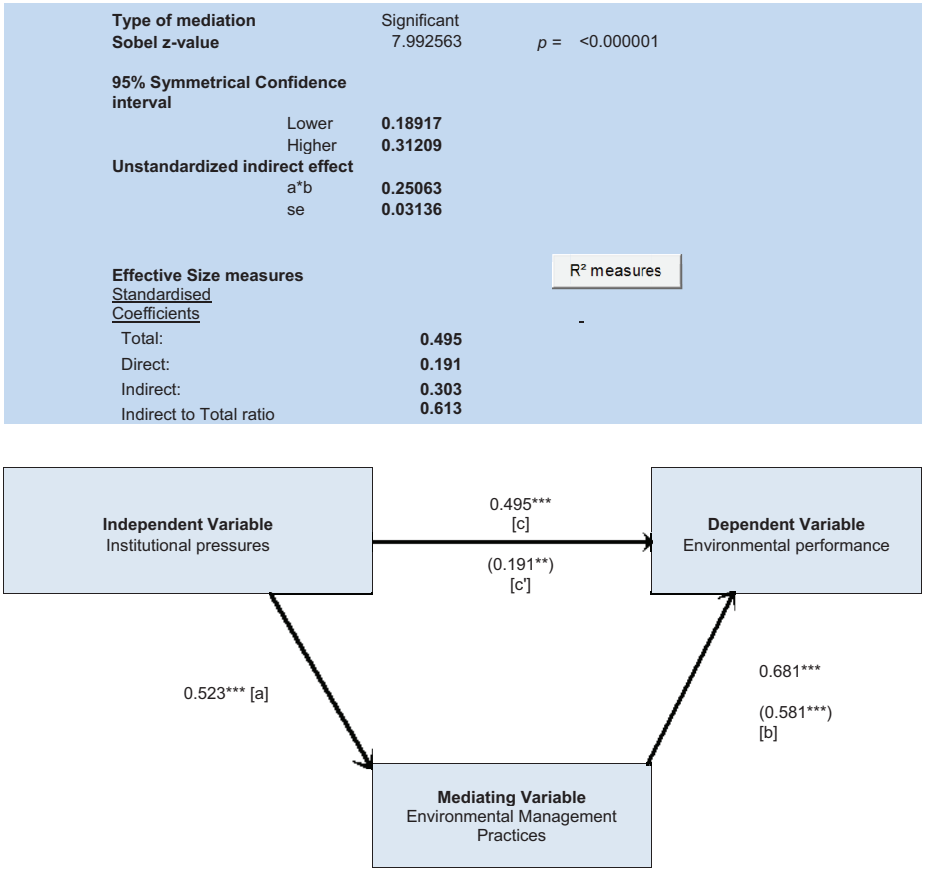

Figure 1.
MedGraph – PC: mediation effect of environmental management practices on the link between institutional pressures and environmental performance

Note: The numerical values in parentheses are beta weights taken from the second regression and other values are zero-order correlations

Baron and Kenny (1986) and Kenny *et al.* (1998), mediation occurs if the following conditions are met. First, variations in the independent variable significantly account for variance in the presumed mediator. Second, variations in the independent variable significantly account for variance in the dependent variable. Third, variations in the mediator significantly account for variance in the dependent variable. Finally, the effect of the independent variable on the dependent variable significantly reduces when the mediator is included in the equation.

Baron and Kenny's (1986) mediation path analysis, as shown in Figure 1 and Table 6 regression analysis, revealed the following. First, there was a significant direct effect of institutional pressures on environmental management practices, thus providing support for *H3* (standardized beta = 0.523), and this is Model 6. Second, a significant direct effect of institutional pressures on environmental performance exists (standardized beta = 0.495) and this is Model 7. Third, a significant direct effect of environmental management practices on environmental performance exists (standardized beta = 0.681) and this is Model 8. Finally,

Predictor	Dependent variables											
	Model 6: Environmental management practices			Model 7: Environmental performance			Model 8: Environmental performance			Model 9 Environmental performance		
	B	SE	Beta	*β*	SE	Beta	*β*	SE	Beta	*β*	SE	Beta
Intercept (constant)	1.141	0.352		3.296	0.218		3.422	0.127		2.894	0.182	
Institutional pressures	0.710	0.067	0.523**	0.408	0.041	0.495**				0.158	0.040	0.191**
Environmental management practices							0.414	0.026	0.681**	0.353	0.029	0.581**

Notes: **Significant at the 0.01 level; *β* = unstandardized beta coefficients; SE = standard error; Beta = standardized beta coefficients
Source: Primary data

Table 6.
Testing for mediation

when controlling for environmental management practices, the direct effect of institutional pressures on environmental performance reduced from Beta = 0.495–0.191 but remained significant. This is an indication that the relationship between institutional pressures and environmental performance is partially mediated by environmental management practices. In Model 9, we enter both institutional pressures and environmental management practices and they all turn out to be significant.

The significance of the mediation effect and nature or type of mediation were also tested by calculating Sobel's *z*-value and ratio index using the Jose's Medigraph program. From Figure 1, a Sobel *z*-value of 7.99 with *p*-value of 0.00001 was obtained. These results indicate that because the Sobel *z*-value is large with a *p*-value less than 0.05, it means that a significant mediation of environmental management practices in the relationship between institutional pressures and environmental performance exists. The Sobel test is a specialized *t* test that is used to determine whether the reduction on the effect of the independent variable after including the mediator in the model is a significant reduction and therefore whether the mediation effect is statistically significant (Sobel, 1982). Also, based on the results of the Medigraph (see Figure 1), the indirect effect of institutional pressures on environmental performance is 0.303 and the direct effect is 0.191. The total effect coefficient was 0.495. This means that 61.2% [(0.303/0.495) × 100%] of the effect of institutional pressures on environmental performance was mediated through environmental management practices. Therefore, 38.8% was the direct effect of institutional pressures on environmental performance while controlling for environmental management practices. So, *H4*, which states that environmental management practices mediate the relationship between institutional pressures and environmental performance, is supported.

5. Discussion

According to this study results, firm characteristics, environmental management practices and institutional pressures contribute to positive variances in environmental performance of manufacturing firms. For firm characteristics variables, none of them is significant and this contradicts institutional theory. It means that whether a firm is old or not, audited by the Big 4 audit firms or the Small & Medium Audit Practices firms, sells its products in international markets or local markets, all these have little to do with environmental performance, especially if the firm has enough institutional pressures and better environmental management practices. It is only market nature that makes considerable contribution but this is only when there are minimal institutional pressures and poor environmental management practices. Our study finding that environmental management practices significantly contribute to environmental performance are in line with the stakeholder theory and institutional theory. The adoption of environmental management practices is important in ensuring that there is positive environmental performance results. Manufacturing firms that promote environmental conservation efforts, integrate environmental considerations into new product development, maximize reuse and recycle raw materials and undertake collaborative research projects will register significant strides in environmental performance, and this is in line with Yu and Ramanathan (2016) and Famiyeh *et al.* (2018) whose studies found that the adoption of environmental management practices improves environmental performance.

The finding that institutional pressures are significantly associated with environmental performance is consistent with the results of Lin and Ho (2015) who found that institutional pressures are significantly associated with environmental performance. Further, Yang (2017) also documents that institutional pressures improve green performance of firms in Taiwan. This study only confirms coercive pressures to be significantly associated with

environmental performance. Regarding the study finding that institutional pressures are significantly associated with environmental management practices, it means that institutional pressures shape environmental management practices which in turn improve environmental performance. However, in situations where there are no strong consumer movements, customer-related pressures are likely to be weak. Instead, coercive pressures such as regulatory pressures like enforcement of the provisions of the NEA can exert much pressure on manufacturing firms. The NEA punishments for non-compliance with environmental laws such as coercive punishments and penalties that go as far as imprisonment for not exceeding a maximum of 15 years or a fine of not exceeding an equivalent US$271,000 if made strict would make companies fear to contravene the requirements of NEA. This study finding is in line with the findings of previous scholars. For example, Wang, Li and Zhao (2017) found that regulatory pressures are positively and significantly related to the firms' motivation to implement environmental management practices. For the mediation test results where we report that environmental management practices partially mediate the relationship between institutional pressures and environmental performance is an initial result in literature.

To improve environmental performance of manufacturing firms, there is need to promote environmental conservation through introduction of reward schemes for employees involved in environmental conservation, sensitization of employees on the need to minimize water consumption, appealing to employees to work towards energy saving, defining environmental policy and establishing a department in charge of environmental conservation, integrate environmental considerations while designing new products and having a policy on waste management, develop a policy on disposal of waste and this policy need to emphasize on recycling or reuse of materials and collaborate with various researchers aimed at managing the environment because this can lead to environmental performance. Also, NEMA has to increase on its enforcement mechanisms to ensure that the provisions NEA of 2019 such as ensuring that those who contravene the provisions of NEA are awarded heavy sentences or penalties and fines. Also, NEMA may have to ensure that the various regulations such as National Environment (Waste management) regulations of 2020 and Petroleum (Waste management) regulations of 2019 are complied with. Once there is improved environmental performance among manufacturing firms, issues of climate change such as global warming, ozone layer depletion, increasing waste and high pollution levels will be minimized.

For firm characteristics variables, the study results contradict the findings for Orazalin and Mahmood (2018) who found that, in Russian firms, the auditor type has a significant influence on sustainability disclosures because in this study, auditor type is reported to be non-significant with environmental performance. This study results indicate that firm age is not significantly associated with environmental performance and this is consistent with the works of Yu and Ramanathan (2016) who found that firm age is not a significant predictor of environmental performance but contradicts findings by Orazalin and Mahmood (2018) who found that firm age and sustainability disclosures of firms in Russia are significantly associated. The reason for non-significance of firm-level characteristics considered in this study may follow the argument that whether old or young, all firms' activities have an impact on the environment and therefore there are no significant variations. Further, for auditor type, auditors whether small or big, they are not mandated by any standard to audit environmental issues. For Uganda, it is only NEMA that extensively audits environmental issues. Otherwise, auditors will only relay on correspondences from NEMA as to whether the company being audited complies with NEA and this will satisfy the requirements for International Standards on Auditing Number 250: Laws and Regulations. Empirically,

Kaawaase *et al.* (2016) documented that there are no significant differences between the Big 4 audit firms and the small and medium audit practices.

6. Summary and conclusion

In this study, we aimed to establish the contribution of firm characteristics, environmental management practices and institutional pressures to environmental performance. This study also aimed to test whether environmental management practices mediate the link between institutional pressures and environmental performance. This study's aim was achieved through a questionnaire survey of 303 manufacturing firms that are members of Uganda Manufacturers Association. Results suggest that both environmental management practices and institutional pressures are significant predictors of environmental performance whereas variables that represent firm characteristics are not. Results further indicate that there is a partial mediation of environmental management practices in the relationship between institutional pressures and environmental performance.

Results of this study have important implications for academics and policymakers regarding environmental performance. For academics, results suggest that both environmental management practices and institutional pressures are significant predictors of environmental performance while firm characteristics variables are not. This implies that, only environmental management practices and institutional pressures are critical for improving environmental performance. The academic community should also note that all the components of environmental management practices identified by Yu and Ramanathan (2016) are critical for improving environmental performance in Uganda. For institutional pressures, only coercive pressures can improve environmental performance. This study also provides a mechanism through which institutional pressures improve environmental performance. We document that institutional pressures improve environmental performance largely through environmental management practices. For policymakers, the results are important for policy development, especially in ensuring that the members of UMA encourage their members to adopt those environmental management practices that are found in the NEA of 2019. UMA can, for example, put in place awards for best environmental performing companies and possibly have some incentives for such firms. For example, UMA reduces annual membership fees for those companies that have been rated by NEMA as compliant to the environmental laws. UMA may also be permitted to enforce NEA among her members. NEMA has to think about being strict in the enforcement of its regulations on to manufacturing firms. The punishments included in the NEA of 2019 need to be enforced on all those manufacturing firms whose activities contravene the requirements of NEA.

Finally, we discuss the study limitations alongside the directions for further research. This study only focused on manufacturing firms in Uganda and it is highly possible that the results may be generalized to the Ugandan manufacturing firms. Future studies may be extended to other national settings or even in other firms other than those of manufacturing setting. This study only considers firm age, auditor type and nature of market as the only firm characteristics. Future studies may use other firm characteristics variables such as profitability and legal status, among others, to predict environmental performance. This study enlists responses from CFOs and it is possible that their views may be different from those of the production managers. It would be a worthwhile endeavor to undertake a study of similar nature that aggregates responses of both the CFOs and Production managers. In the presence of the above limitations, this study results remain useful to both academicians and policymakers in Uganda's manufacturing firms and other environments with a similar setting.

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Appendix 1

Table A1. Rotated component matrix for institutional pressures

Statement	Component: Coercive pressures	Mimetic pressures	Normative pressures
Our regulators require our firm to plan and implement environmental management practices	0.811		
We comply to the Environmental Act because our regulator requires us to do so	0.743		
The international environmental regulation requires that our firm to plan and implement environmental management practices	0.738		
The competitive conditions of our firm require our firm to plan and implement environmental management practices	0.735		
We adhere to guidelines provided by the Environmental Management Authority (NEMA)	0.735		
Our firm receives requirements from consumer associations to be more environmentally conscious firm	0.723		
The industry associations such as Uganda manufacturers Association in Uganda require our firm to plan and implement environmental management practices	0.668		
There are frequent government inspections or audits on our firm to ensure that the firm is in compliance with environmental laws and regulations	0.656		
We adhere to guidelines provided by our influential lenders	0.655		
There are a large number of environmental regulations or restrictions imposed by the government on our firm's industry	0.647		
Our firm's parent company sets strict environmental standards for our firm to comply with	0.543		
Our competitors who planned and implemented comprehensive environmental management practices are favorably perceived by others in the same industry		0.821	
Our practices of environmental management are shaped by peers in the industry		0.817	
Our competitors who planned and implemented comprehensive environmental management practices are favorably perceived by their customers in the same industry		0.801	
Our competitors who planned and implemented comprehensive environmental management practices are favorably perceived by their suppliers in the same industry		0.797	
Our competitors who planned and implemented comprehensive environmental management practices have benefited		0.795	
We benchmark our competitors when coping up with environmental management issues		0.780	
We copy industrial peers in coping up with environmental matters in our organizational practices		0.773	
We follow industry leaders when dealing with environmental matters		0.559	
Our firm's major customers would withhold their contracts if our firm did not meet their environmental performance requirements		0.539	
Our firm adopts environmental management practices because of the extent of environmental management practices adopted by customers			0.780

(*continued*)

Statement	Component Coercive pressures	Mimetic pressures	Normative pressures
Our firm adopts environmental management practices because of the extent to which the government of Uganda promotes such practices			0.758
Our staff believe in independence of decision-making when it comes to environmental management issues			0.753
Our firm adopts environmental management practices because of the extent of environmental management practices adopted by suppliers			0.737
Our organization considers sometimes environmental training certificates in their recruitment policy on top of other qualifications			0.658
Employees in this organization believe in public interest			0.595
Our staff are encouraged to adhere to environmental policies			0.556
Our industrial association emphasizes adherence to environmental laws			0.553
Eigen values	14.359	2.363	1.723
Percentage of variance	24.689	23.357	17.828
Cumulative percentage	24.689	48.046	65.874

Notes: KMO = 0.944; Approx. Chi square = 7,414.515; df = 378; Sig = 0.000; extraction method: principal component analysis; rotation method: varimax with Kaiser normalization
Source: Primary data

Table A1.

Appendix 2

Statement	Component 1	2	3	4
We have always disclosed environmental information through displaying on our notice boards, especially those at or adjacent to the production unit	0.876			
We disclose environmental indicators in most of our reports, especially those from production department	0.870			
We have elaborated environmental indicators in our policies and reports regarding new product development	0.837			
We always elaborate the environmental report so that it be easily understood by staff involved in the production process	0.817			
We always provide our environmental report to those interested in it at section level in the production department	0.812			
Our firm considers environmental matters while developing new products	0.807			
Our firm includes in its annual budget, environmental issues related to production and the entire company	0.796			
Our organization has ISO 14001 Certification	0.715			
We ensure that the elaboration of environmental information of general scope is disclosed through the media, brochures, the internet, etc.	0.679			
Our firm collaborates with international bodies dealing with research on environmental management		0.757		
Our firm has had or is considering a knowledge transfer partnership with a university or college to improve our environmental performance		0.755		
Our firm has participated in seminars and workshops regarding environmental management		0.748		
Our firm has an environmental management research project running		0.739		
Our firm collaborates with universities and other institutions of higher learning in conducting research related to environmental management		0.729		
Our firm has improvised new technologies on environmental management		0.727		
Our firm supports students undertaking research on environmental management		0.705		
Our organization has a cross-functional cooperation for environmental improvements		0.702		
Our firm has a policy on disposal of hazardous materials		0.679		
Our organization is committed to environmental compliance and auditing programs		0.606		
In this firm, we recycle our bi-products/residues			0.861	
In this firm, we aim at ensuring that no bi-product or any material goes to the dustbin			0.808	
Our firm considers opportunities for reuse/recycling/recovery of material when designing products/processes			0.803	
In this firm, we have initiated processes and procedures for improving reuse of various materials			0.721	
Our firm has consistently sensitized employees on the need to minimize on water consumption				0.832
Our firm has consistently appealed to employees to work towards energy saving				0.704
Our firm encourages new ideas for conserving the environment by instituting reward schemes for employees				0.553
Eigen values	12.392	3.192	1.733	1.283
Percentage of variance	27.699	22.974	13.052	7.810
Cumulative percentage	27.699	50.673	63.725	71.535

Table A2. Rotated component matrix for adoption of environmental management practices

Notes: KMO = 0.944; Approx. Chi square = 7,414.515; df = 378; Sig = 0.000; Extraction method: principal component analysis; rotation method: varimax with Kaiser normalization; 1 = integration of environmental considerations into new product development; 2 = undertaking collaborative research projects; 3 = maximizing reuse and recycling of materials; 4 = promotion of environmental conservation efforts by employees

Source: Primary data

Appendix 3

Statement	Component			
	Regulatory compliance	Productivity	Stakeholder interactions	Resource usage
We have a mechanism for monitoring internal compliance with environmental policies and regulations	0.812			
We have increased residue recycling over the years and this is in line with our policy	0.792			
Our firm has consistently registered reductions in the costs of regulatory compliance	0.737			
Our firm has consistently registered increased filters and controls on emissions and discharges	0.697			
Our firm has consistently registered reductions in process/production costs		0.754		
We have registered significant reduction in consumption of hazardous materials		0.745		
Our firm has consistently registered reductions in levels of emissions		0.739		
Our firm has consistently registered increased process/production efficiency		0.711		
We provide data to other departments and sections for external reporting			0.783	
There are better relationships with stakeholders such as local communities, regulators and environmental groups compared with the previous periods			0.766	
Our firm has consistently registered increased organization-wide learning among employees			0.738	
We design mechanisms that motivate our employees and other stakeholders for continuous improvement in the area of environmental performance			0.730	
We have registered reductions in energy consumption				0.861
We have registered reductions in water usage				0.841
Eigen values	6.613	1.825	1.083	1.000
Percentage of variance	20.836	20.052	19.723	13.352
Cumulative percentage	20.836	40.888	60.611	73.963

Notes: KMO = 0.858; Approx. Chi square = 2,676.874; df = 91; Sig = 0.000; extraction method: principal component analysis; rotation method: varimax with Kaiser normalization
Source: Primary data

Table A3. Rotated component matrix for environmental performance

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