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Adoption of green inbound logistics practices: the role of internal environmental communication and organizational environmental governance

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Abstract

Purpose – The study focused on the influence of internal environmental communication on organizational environmental governance and the adoption of green inbound logistics practices and the mediating role of organizational environmental governance on the relationship between internal environmental communication and the adoption of green inbound logistics practices.

Design/methodology/approach – A cross-sectional quantitative survey design was used. The population used consisted of the central procuring and disposing entities. An actual sample size of 105 public sector firms in the central procuring and disposing entities category was used. The data were analyzed using the Statistical Package for the Social Sciences (SPSS), SMART PLS version 4.0.1.8 and AMOS SPSS v26.

Findings – The findings show the relevancy of internal environmental communication in the achievement of organizational environmental governance and adoption of green inbound logistics practices. Further, organizational environmental governance mediates the link between internal environmental communication and the adoption of green inbound logistics practices. However, a partial mediation effect is observed, implying that both internal environmental communication and organizational environmental governance play significant roles in enhancing the adoption of green inbound logistics practices.

Research limitations/implications – The study examined internal environmental communication, organizational environmental governance and the adoption of green inbound logistics practices in a public sector procurement setting. The role of proactive internal environmental communication, proactive external environmental communication, organizational environmental governance and the adoption of green inbound logistics practices in both the public and private sector procurement settings needs to be examined.

Originality/value – Further, the study examines internal environmental communication, organizational environmental governance and the adoption of green inbound logistics practices in a public sector procurement context. Green logistics research is much more pronounced in the third-party logistics firm context. Further, existing research takes a holistic approach when examining the green logistics concept. Whereas the green inbound logistics and green outbound logistics form the green logistics concept, the green inbound logistics concept is much more common in the public procurement settings although no significant attention has been given to it in the existing research.

Keywords Internal environmental communication, Organizational environmental governance, Adoption of green inbound logistics practices, Procuring and disposing entities/public sector firms, Public procurement

Paper type Research paper

Ethical statement: The research involved human participants and was cleared by the faculty of procurement and logistics management research committee for Makerere University Business School. Ethics clearance involving human participants is only required when collecting data from vulnerable people such as the patients in hospitals and the refugees (persons of concern).

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1. Introduction

Green logistics involves reducing the negative environmental impact of logistics activities when being undertaken (Blanco and Sheffi, 2024; Kamewor *et al*., 2024). The negative environmental impact may be in the form of environmental pollution, noise pollution and packaging waste. The green logistics concept can be explained using green inbound logistics and green outbound logistics. Inbound logistics focuses on supplier management, inventory management, green transportation, green packaging and disposal (Rahman *et al*., 2023). Earlier research shows that green inbound logistics involves reducing the purchase of hazardous materials, purchasing recyclable, recycled, reused or reusable products, reducing the purchase of items that are hard to be disposed of obtaining environmentally friendly purchases, minimizing packaging unless unavoidable, encouraging suppliers to use biodegradable and returnable packaging, contracting suppliers that have incorporated environmental initiatives in their processes, providing awareness seminars to suppliers and engaging in green supplier development (Rao, 2014). Rao (2019) further categorizes green inbound logistics into green sourcing and green process. According to him, green sourcing involves looking for environmentally friendly procurements, substituting environmentally questioned items, limiting the purchase of hard-to-dispose items and limiting the use of virgin materials through purchasing recycled, reuseable or recyclable items. The green process entails integrating the environmental criteria when selecting suppliers, integrating environmental attributes in product specifications, requesting suppliers to produce environmental reports concerning their operations and also requesting suppliers to provide the environmental impact of their product content. Nevertheless, Hernandez *et al.* (2022) define green inbound logistics in terms of green sourcing only. Whereas Rao (2014, 2019) and Hernandez *et al.* (2022) provide an exhaustive definition for green inbound logistics, Bhatti *et al.* (2023) take green inbound logistics to be synonymous with sustainable procurement.

Existing research majorly focuses on green logistics (Kamewor *et al*., 2024; Panghal *et al*., 2024; Yadav *et al.*, 2021) and sustainable logistics (Creazza *et al*., 2024; Nikseresht *et al*., 2024), with most of the studies conducted in China (Kamewor *et al*., 2024). In addition, much of the research is conducted on logistics, shipping and manufacturing firms, small and medium-sized enterprises (SMEs), and public sector firms (Afum *et al*., 2024; Panghal *et al*., 2024; Agyabeng-Mensah and Tang, 2021; Ashfaq *et al*., 2020; Hernandez *et al*., 2022) with a few focusing on green outbound logistics and inbound logistics (Afum *et al*., 2022; Afum *et al*., 2024) although the focus was placed on their effect on community-based performance. Whereas logistics is examined in some research on green inbound, the research is silent on the definition and operationalization of the concept (Ong *et al*., 2024).

Research on inbound logistics and green inbound logistics in the public sector procurement literature is nonexistent (Rześny-Cieplińska *et al*., 2023; Kamewor *et al*., 2024). Nonetheless, the urge for green inbound logistics is heightened by emerging trends arising from the 2015 Sustainability Development Goals and the increased procurement orders placed by firms in the public sector (Quak *et al.*, 2019). Green inbound logistics may make a great contribution in promoting sustainable public sector procurement and achieving Sustainable Development Goal 11 on sustainable cities and communities, Goal 12 on sustainable production and consumption and Goal 13 on climate action.

Globally, demand for green logistics is estimated to increase significantly from 1.5 trillion US dollars in 2024 to 3.11 trillion US dollars by 2034 (Globe Newswire, 2024). Although important, the majority of the research focuses on sustainable or environmentally friendly transport, eliminating other elements of green logistics that include warehousing, packaging, disposal and the type of product being purchased (whether the product purchased is environmentally friendly) and green procurement. Whereas the existing studies are concentrated in the private sector, public sector firms contribute greatly to most suppliers' businesses worldwide and are crucial in the endeavors for attaining a green world. This is because public sector firms initiate inbound logistics flows that greatly contribute to environmental damage. Besides, several factors have been identified as precursors for

greening inbound logistics, although not empirically examined (Panghal *et al*., 2024). Factors brought forth include organizational factors, technological factors and regulator factors (Panghal *et al*., 2024).This research focused on organizational factors where attention was placed on organizational environmental governance and internal environmental communication in the public sector firms. Further, existing research focuses more on government-to-public environmental communication and external environmental communication by firms (Zikargae, 2018). Environmental governance, whether at the organizational level or government level, is essential in driving sustainability (Jacobi and Peres, 2016; Corrêa de Faria *et al*., 2009; Thiers *et al*., 2018; Kigochi, 2024); organizational environmental governance concerns the development of policies or regulations, programmes, initiatives or visions that promote environmental protection (Sadiq *et al*., 2023), and internal environmental communication involves communication of environmental management policies to employees and sending messages that provide a clear picture on how environmental aspects can be integrated in the day-to-day activities of employees in a firm (Uusi-Rauva and Nurkka, 2010).

Besides the estimated increase in the global demand for green inbound logistics, the demand for inbound logistics is expected to rise within low- and middle-income countries (LMICs) for several more years (Bullock *et al*., 2023). Thus, LMICs will have to include decarbonizing inbound logistics activities in the economic and transport planning and policymaking, given that the rise in the demand is expected to result in increased environmental emissions. For instance, Moody *et al*. (2023) advance that emissions from logistics activities are set to rise, with much of the new emissions emanating from road transport in developing nations and international maritime shipping. Among the developing countries and countries in the East African community, more deaths are expected to occur in Uganda due to environmental emissions compared to Tanzania, Rwanda and Kenya. The air quality in Kampala, Uganda's capital, has a PM2.5 concentration that is 4.6 times the World Health Organization's annual air quality guideline (IQAir, 2024). In Nairobi, Kenya, the PM2.5 concentration is 2.6 times and 3.6 times in Addis Ababa (IQAir, 2024). Other than air quality, public procurement is also vulnerable to waste. Uganda experiences a high percentage of supplier-generated waste. Whereas environmental emissions and damage from other inbound logistics activities such as packaging are recognized and despite the formulation of the 2021 National Climate Change Act, the 2024 National Strategy for Management of Plastic Pollution, the 2021 Solid Waste Management Ordinance, the 2015 National Climate Change Policy and the National Green Growth Strategy, efforts to curb them are still minimal (Mugume, 2023), and the role of public procurement in promoting green inbound logistics practices is still given less attention.

To address the research problem and achieve the intended objectives, three research questions are established that include:

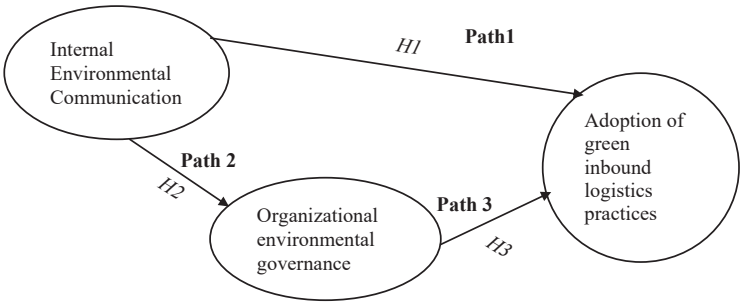
RQ1. Does internal environmental communication promote the adoption of green inbound logistics practices?

RQ2. Does internal environmental communication enhance organizational environmental governance?

RQ3. Does organizational environmental governance mediate the relationship between internal environmental communication and the adoption of green inbound logistics practices?

2. Literature review

This sub-section contains the literature review results conducted based on three established research hypotheses. The direction of the arrows as presented in Figure 1 below further shows the findings from the literature review activity.



Source(s): Jayarathna *et al*. (2023), Rahman *et al*. (2020), Dong *et al.* (2024), Sibeko (2022)

Figure 1. Conceptual framework

2.1 Theoretical perspective

Previous research examining green logistics uses the signaling theory (Karaman *et al.*, 2020), stakeholder theory, natural resource-based view and resource advantage theory (Afum *et al*., 2022) and institutional theory (Touboulic and Walker, 2015). However, the signaling theory is much more pronounced in research relating to environmental or sustainability reporting (Karaman *et al.*, 2020; Mehdikhani and Valmohammadi, 2022); the stakeholder theory has been employed by researchers who want to understand the role of each stakeholder in a firm's adoption of green logistics practices and research examining the effect of a firm's externalities on stakeholders (Huge-Brodin *et al.*, 2020; Bouzon *et al.*, 2018), while the resource advantage theory is applied more in the reverse logistics field (Khan *et al*., 2024). Among the theories, the institutional theory is more frequently used in green logistics research although much of the focus is on explaining institutional pressures and not organizations as institutions (Sharma *et al.*, 2023). Nonetheless, there are other theories such as the upper echelon theory that have been identified as relevant in explaining engagement in sustainability practices despite their scarcity in green logistics studies (Fritz and Ruel, 2024; Li *et al*., 2019; Wei *et al*., 2024). This study employs the upper echelon theory. First coined by Hambrick and Mason (1984), the upper echelons theory is premised on two perspectives: why firms behave the way they behave and why they perform the way they perform. Earlier researchers attach firm strategic decisions and behavior to management action (Evert *et al*., 2018), with these actions being determined by management attributes and characteristics. More to that, firms are reflections of management (McCants, 2024). Whereas the effect of management on firm behavior varies across firm types, the upper echelon theory cannot only apply to private sector firms but also the public sector firms (Kim, 2022). Besides, the upper echelon theory is applied in research examining corporate communication although emphasis is placed on external corporate communications (Alazzani *et al*., 2019). Nevertheless, management determines the communication mode, strategy and mechanisms through which environmental information should be shared among employees in the firm. Also, management determines a firm's behavior or practices (Zheng *et al*., 2024) through its governance elements. According to Sancha *et al.* (2023), governance elements or mechanisms affect a firm's behavior. Further, the upper echelon theory is used by earlier researchers when examining social and environmental governance and social and environmental operational management practices (Sancha *et al*., 2023) as well as corporate governance in general.

According to the upper echelon theory, management determines the level of internal firm communication effectiveness and effective governance mechanisms that can result in the adoption of green logistics practices.

2.2 Internal environmental communication and the adoption of green inbound logistics practices

Much of the research examines internal communication. Internal communication relates to the flow of information together with its purpose and direction (Lindstam, 2016) and is a multi-disciplinary concept. In the environmental management discipline, the concept of internal environmental communication is still under development and variably defined. In some research, internal environmental communication refers to the communication that occurs between management of the firm and its employees or they may occur among employees, while other research on internal environmental communications refers to the communication that considers environmental issues of management in a firm (Zikargae, 2018). The link between internal environmental communication and green inbound logistics practices is underresearched. Earlier research examines green logistic practices in general (Panghal *et al.*, 2024; Creazza *et al*., 2024) and external environmental communication (Maas *et al.*, 2014; Aslam *et al.*, 2019). Despite that, earlier researchers argue that communication is crucial for effective implementation of green logistics and motivation of employees towards the uptake of green or sustainability practices (Panghal *et al.*, 2024; Lee and Dong, 2023).Further, communication is seen as a very important aspect in promoting change (Reilly and Hynan, 2014; Dong *et al*., 2024), implying that employees are likely to adopt green logistics practices once the information is effectively delivered. Further, Men and Yue (2019) and Tung *et al.* (2014) advance that internal communication in firms enables achievement of expected outcomes, while Arif *et al.* (2023) argue that internal communication nature strategic attributes among employees, thus resulting in the achievement of desired objectives. In addition, Suh and Battaglio (2022) affirm that internal communication enhances people's understanding of firm goals such as those relating to the adoption of green inbound logistics practices. Whereas internal communication may help create awareness of the kind of green inbound logistics practices that may be undertaken, actions are seen to speak better than words, thus implying that firms have to walk the talk (Reilly and Hynan, 2014). Further, environmental communications are taken to be precursors for the environmental management process (Santi and Grenna, 2003). However, some researchers advance that too much environmental information shared through internal communication leads to saturation points among employees, resulting in diminished awareness of green inbound logistics issues. Diminished awareness reduces the urge for adopting the green practices (Kühn and Weber, 2015). Also, communication messages on green inbound logistics practices that are touching and convincing stimulate immediate action among employees. Thus, with the above discussion, it can be hypothesized that:

H1. Internal environmental communication positively influences the adoption of green inbound logistics practices.

2.3 Internal environmental communication and organizational environmental governance

Internal communication refers to communication flows among employees at different levels in a firm (Pološki Vokić *et al.*, 2021). Internal communications may be made formally or informally. Environmental governance on the other hand consists of rules, institutions, policies and practices that guide how employees have to interact with the environment. Existing research puts less emphasis on the internal communication of sustainability aspects but assesses the contribution of internal communication in other contexts such as human resource management where focus is placed on employee behavior, loyalty and engagement (Sibeko, 2022; Sinitsyna *et al.*, 2024). Further, earlier research relates external communication with improved internal firm governance (Ho *et al*., 2008). In some research, communication is linked to relational governance (Holden and O'Toole, 2004), while in other research, scholars argue that effective communication results in effective governance (Ojogiwa, 2021; Lee and Kim, 2021). Cornelissen (2023) argues that communication creates awareness of the firm's vision, goals, policies and strategic intentions that may be embedded in their governance

mechanism, while Evangelista and Ruão (2011) assert that environmental communication creates social cohesion towards a common goal. Similarly, Elving (2005) argues that internal firm communications inform about the established policies in a firm. Thus, every activity undertaken in a firm is guided by its vision, mission, policies, programmes, initiatives or objectives. Besides, Tung *et al*. (2014) show that communication of environmental policies or objectives enables employees to understand and accept established environmental targets and responsibilities. With the above discussion, it can be hypothesized that:

H2. Internal environmental communication positively influences organizational environmental governance in firms.

Organizational environmental governance mediates the relationship between internal environmental communication and the adoption of green inbound logistics practices.

Research examining the mediating role of organizational environmental governance in the relationship between internal environmental communication and the adoption of green inbound logistics practices in public sector firms is nonexistent. Sancha *et al*. (2023) define governance as the way a firm leads and equitably manages the interests of its stakeholders such as external and internal customers and the community. In earlier research, environmental governance is examined in relation to the disclosure behavior, eco-innovations and carbon emissions reduction of firms (Albitar *et al*., 2023), and a general approach is taken when examining the green logistics concept, focusing on third-party logistics firms (Nikseresht *et al*., 2024; Kamewor *et al*., 2024). Besides green logistics, earlier research shows that environmental governance can be implemented through communication (Erbaugh *et al*., 2024). Seroka-Stolka (2016) advances that good communication and environmental governance mechanisms such as environmental policies are key in promoting the adoption of environmentally friendly practices such as green inbound logistics practices. For instance, green public procurement policies in firms mount pressure on suppliers to reduce the negative impact caused on the environment. Contrarily, in some research, environmental governance in firms is argued to take place through established environmental committees that reign over important environmental issues (Tingbani *et al*., 2020; Sancha *et al*., 2023) through the development of environmental initiatives, policies and programmes. Furthermore, Van Assche *et al*. (2020) argue that engagement in environmental governance comes with a purpose that culminates in the creation of a vision on how to get there. However, the use of environmental governance initiatives develops gradually in firms in an attempt to address environmental concerns. Further, Sancha *et al*. (2023) find that governance in firms positively influences environmental operations management practices. However, the research is conducted on private firms, and it assesses the effect of governance on firms that are at the maturity level for practices implementation. Also, cross-functional environmental communications are seen to result in pollution control mechanisms throughout a firm's logistics activities (Seroka-Stolka, 2016). Although one-way communication may be common, two-way informational communication plays a great role in aligning employees' cognitive frames and interests, thus greatly impacting cognitive frames, interests and adoption of environmental behaviors (Erbaugh *et al*., 2024). For communication to have a greater impact on environmental governance, the medium used for communication needs to be trusted and the timing of the environmental information needs to be considered. Besides communication impacting governance, organizational environmental governance mechanisms like environmental policies, initiatives and programmes speed up the transition to environmentally friendly practices (Jayarathna *et al*., 2023; Rahman *et al*., 2020). Given the above discussion, it can be hypothesized that:

H3. Organizational environmental governance mediates the relationship between internal environmental communication and the adoption of green inbound logistics practices.

3. Methodology

In this section, we provide the research design, study population, sample size and sampling technique, data collection and preliminary findings.

3.1 Research design

A quantitative cross-sectional survey design was applied. The survey involved collecting data from respondents at a single point in time. A deductive approach was taken because there was a need for testing the established research hypotheses.

3.2 Study population and sampling

The study population was made up of public sector firms in the central procuring and disposing entities category in Uganda. Public sector firms in the category of the central procuring and disposing entities in Uganda were chosen because Uganda, like any other developing countries and countries in Africa, has public procurement accounting to the biggest percentage of the government expenditure (Ministry of Finance, Planning and Economic Development, 2019). Thus, public sector firms are major customers in Uganda's market space.

Uganda has a total of 173 public sector firms in the central procuring and disposing entities category (Government of Uganda E-Procurement Portal, 2024). The public sector firms in the central procuring and disposing entities category comprised the unit of analysis, while procurement officers and one member of the contracts committee formed the unit of inquiry. The procurement officers and contracts committee members were chosen given that they have adequate information on the variables under study. Thus, these were purposively selected.

Out of the 173 public sector firms in the central procuring and disposing entities category, a sample of 121 central procuring and disposing entities was used. The sample size was determined using Yamane's (1973) sample size determination formula. The Central procuring and disposing entities were selected using the rand ( ) function in Excel. Random values were generated and assigned to each central procuring and disposing entity. The central procuring and disposing entities were then arranged in ascending order, and the first 121 firms were taken. However, the actual sample size for the study was composed of 105 central procuring and disposing entities, indicating a response rate of 86%.

3.3 Data collection method

A survey questionnaire plotted on a seven-point Likert scale was used in the data collection process. The scale was used because it provides for a wide range of options to the respondents, thus allowing for sensitivity consideration when measuring attitudes or opinions. The questionnaire had three variables (internal environmental communication, organizational environmental governance and adoption of green inbound logistics practices). The adoption of green inbound logistics practices was measured using items from Rao (2014), organizational environmental governance was measured using measures from UK Environmental Agency (2004) and internal environmental communication was measured using Uusi-Rauva and Nurkka (2010).

The data were collected using a drop-and-pick-up method where questionnaires were dropped off to the research participants after an appointment was given and consent to participate obtained. The research participants were given three weeks to complete the questionnaire, and any respondent who hadn't completed it within the three weeks was considered uninterested in participating in the survey.

3.4 Data analysis

Data were entered in the Statistical Package for Social Scientists software (SPSS). Using both the SPSS and SMART PLS version 4 software, initial tests including normality,

multicollinearity, reliability, common method bias (CMB) and construct validity (convergent and discriminant validity) were conducted. CMB results were secured using Harman's single factor test in SPSS, while multicollinearity, normality, reliability, convergent and discriminant validity and factor analysis results were attained using Smart PLS. Skewness results were less than 3, and kurtosis results were less than 10, implying the presence of normality (see Appendix 1) as indicated in the work of Matore and Khairani (2020). There were no multicollinearity problems, as the variance inflation factors were lower than 10.0 (Ahmad, 2021). CMB values were lower than 0.50 and were between 33.94 and 46.865 (see Appendix 1). Such results don't affect the statistical validity of the research findings (Uzir *et al*., 2021). Reliability results were greater than 0.70, where all values above 0.70 indicate that the scale used is reliable (Sürücü and Maslakçi, 2020) (see Appendix 1). Composite reliability values were over and above the established threshold of 0.40 (ranged between 0.83 and 0.89), indicating the existence of convergent validity (Ju *et al*., 2024) (see Appendix 1). Similarly, average variance extracted results were higher than the established threshold of 0.50 (ranged between 0.543 and 0.720), confirming that the items converged to their respective constructs. Discriminant validity values were acquired through the heterotrait-monotrait method, and the results were lower than the established threshold (0.90) (values ranged between 0.654 and 0.875) (Habes *et al*., 2023), thus indicating the presence of discriminant validity (see Appendix 2).

3.5 Factor analysis

A factor analysis provides information on the association between the measurement items and their respective constructs and helps determine whether the measurement items are enough and sufficiently explain their constructs. The association between the measurement items and the constructs they are measuring is shown using factor loadings. Factor loadings greater than 0.30 show that moderate relationships exist between measurement items and the factor. The item loadings for the variable items were greater than 0.30 (see Tables 1–3). Constructs covered in the study included the adoption of green inbound logistics practices, internal environmental communication and organizational environmental governance.

4. Findings

The structural model results were obtained using Analysis of Moment Structures (AMOS) SPSS version 26. The results were obtained by testing three established research hypotheses. Below is the presentation and discussion of the findings.

Table 1. Organizational environmental governance

Items	Loadings	*p*-value
Our firm has a vision for contracting providers that provide environmentally friendly supplies	0.807	$p \leq 0.001$
Our firm has established environmental policies, programmes and initiatives for reducing environmental emissions during supplies delivery	0.855	$p \leq 0.001$
Our firm put in place individuals to oversee the contracted supplier's environmental performance	0.891	$p \leq 0.001$
Our firm trains employees on how to reduce environmental emissions during the delivery of supplies and environmentally friendly procurement	0.835	$p \leq 0.001$
Our firm requires suppliers to submit environmental impact assessment reports prior to having the contract signed	0.721	$p \leq 0.001$

Source(s): Authors' own creation

Table 2. Internal environmental communication

Items	Loadings	*p*-values
Our firm tailors environmental messages to different employee groups based on what is relevant to them in their jobs	0.790	$p \leq 0.001$
Environmental messages in our firm best encourage employees to take environmental action when they are clear, practical, and easy to implement	0.770	$p \leq 0.001$
Employees in our firm are positively oriented towards environmental action only if environmental messages shared do not require too much effort from them	0.765	$p \leq 0.001$
Emphasizing cost-savings and optimization in environmental communications motivates employees to consider the environmental impact of their work in our firm	0.880	$p \leq 0.001$

Source(s): Authors' own creation

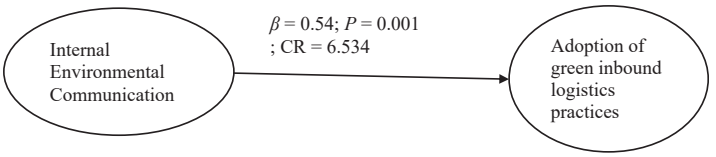
Table 3. Adoption of green inbound logistics practices

Items	Loadings	*p*-values
Our procuring and disposing entity tries to reduce the purchase of hazardous materials	0.800	$p \leq 0.001$
Our procuring and disposing entity purchases more amounts of recycled, recyclable, reused or reusable materials	0.756	$p \leq 0.001$
Our procuring and disposing entity tries to reduce the purchased volume of such items which are difficult to dispose off	0.767	$p \leq 0.001$
Our procuring and disposing entity encourages suppliers to supply only environment friendly materials	0.770	$p \leq 0.001$
Our procuring and disposing entity minimizes packaging unless it is unavoidable	0.840	$p \leq 0.001$
Our procuring and disposing entity requires suppliers to use more of bio-degradable and returnable packaging	0.889	$p \leq 0.001$
Our procuring and disposing entity encourages suppliers to incorporate environmental initiatives into their processes	0.700	$p \leq 0.001$
Our procuring and disposing entity holds environmental awareness seminars for suppliers	0.758	$p \leq 0.001$
Our procuring and disposing entity imparts environmental know-how and helps the suppliers establish green production in their operations	0.820	$p \leq 0.001$

Source(s): Authors' own creation

Internal environmental communication and adoption of green inbound logistics practices

Findings from the analysis indicate the presence of a positive influence between internal environmental communication and the adoption of green inbound logistics practices (see Figure 2). A more detailed analysis of the results shows that tailoring environmental messages to different employee groups based on what is relevant to them in their jobs, environmental messages that encourage employees to take environmental action when they are clear, practical and easy to implement, employees' positive orientation towards environmental action that does not require too much effort from them and the presence of contact persons in



Source(s): Authors' own creation

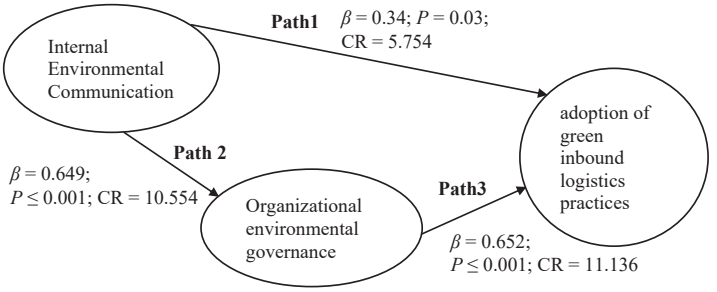
Figure 2. Finding on internal environmental communication and adoption of green inbound logistics practices

each department that employees can approach on environmental initiatives improves adoption of green inbound logistics practices in public sector firms (see Appendix 3).

The results are supported by earlier researchers that argue that communication is an important aspect for the uptake of green logistics (Panghal *et al*., 2024; Lee and Dong, 2023). Other scholars see communication as a precursor for promoting change (Reilly and Hynan, 2014; Dong *et al*., 2024), indicating that employees are more likely to adopt green logistics practices once the information is clear and effectively delivered. In addition, Suh and Battaglio (2022) assert that internal communication enhances understanding of established goals such as those relating to the adoption of green inbound logistics practices. Further, environmental communication is seen to be a precursor for the environmental management process (Santi and Grenna, 2003). Zikargae (2018) asserts that internal environmental communication improves environmental performance. However, the environmental performance can be achieved through green practices adoption such as the adoption of green inbound logistics practices once the environmental communication is passed on to employees.

4.1 Organizational environmental governance and the adoption of green inbound logistics practices

The findings indicate that organizational environment governance positively influences the adoption of green inbound logistics practices (see Figure 3). A detailed review of the findings indicates that public sector firms that have a vision for contracting suppliers that provide environmentally friendly supplies and establish environmental policies or programmes or initiatives for reducing carbon emissions arising from the delivery of supplies, select employees responsible for reporting on the environmental performance of suppliers, train their procurement officers in environmentally friendly purchasing and request environmental assessment reports prior to contract signing enhance the adoption of green inbound logistics practices (see Appendix 4). Currently, green inbound logistics is being enhanced through training of procurement officers in various public sector firms in Uganda. Further, public sector firms in Uganda with branches in various geographical areas use a centralized approach for procurement, which promotes consolidation of the procurement requirements. Although this may be seen as a means of reducing the number of times deliveries may be made, it increases the movement of delivered items on the side of the public sector firms, given that the procured supplies have to be delivered to the various branches, thus contributing to the production of carbon emissions. Also, within Uganda's green growth strategy of 2019, public procurement is considered as an avenue through which environmentally polluting suppliers can be eliminated from engaging in public procurement contracts (United Nations Development Programme (UNDP), 2019). Eliminating them from participation will



Source(s): Authors' own creation

Figure 3. Findings

enhance a reduction in the amount of waste that goes out to the environment and use of environmentally friendly production processes and freight transport processes.

Besides, earlier research shows that communication creates awareness of the firm's vision, goals, policies and strategic intentions that may be embedded in their governance mechanism (Cornelissen, 2023). Evangelista and Ruão (2011) further assert that environmental communication creates social cohesion towards a common goal. Similarly, Elving (2005) advances that internal firm communications provide information on established policies, initiatives or programmes in a firm. Thus, every activity undertaken in a firm is guided by its vision, mission, policies, programmes, initiatives or objectives. Also, communication of environmental policies or objectives enables employees to understand and accept established environmental targets and responsibilities (Tung *et al*., 2014).

The mediating role of organizational environmental governance in the relationship between internal environmental communication and the adoption of green inbound logistics practices.

The results show that organizational environmental governance partially mediates the relationship between internal environmental communication and the adoption of green inbound logistics practices (see Figure 3). The mediation effect was obtained through running a simultaneous mediation analysis where all the variables were present in the model. To obtain the mediation effect, the product of the two paths (Path2 = β = 0.649 and Path3 = β = 0.652) was obtained. According to Demming *et al*. (2017), the mediation effect can be obtained through multiplying the standardized beta coefficients for the path from the independent variable to the mediator variable and the mediator variable as long as all paths are significant. The mediation effect was (β = 0.423). An in-depth analysis of the collected data shows that public sector firms that tailor environmental messages to job requirements, provide clear, practical and easy-to-implement environmental messages that encourage employees to take environmental action, positively orient their employees towards environmental action and assign contact persons to each department who everyone can then approach with environmental initiatives achieve good environmental governance (see Appendix 5). A positive attitude towards environmental communications made to employees in public sector firms shows that they welcome the established environmental rules, policies, initiatives or programme that are meant to govern their environmental behavior and decision-making on environmental issues. The detailed review of the results further shows that public sector firms that select suppliers that engage in environmentally friendly production processes and use environmentally friendly raw material and freight transportation, establish environmental policies, programmes and initiatives aimed at curbing environmental emissions during supplies delivery, put in place individuals to oversee the contracted supplier's environmental performance, train their procurement staff on how to reduce environmental emissions during the delivery of supplies and environmentally friendly procurement and consider environmental impact assessment reports on suppliers during bid evaluation obtain an improvement in the adoption of green inbound logistics practices (see Appendix 4). Besides the detailed analysis of results, Uganda's green recovery action plan shows that promoting green public sector procurement and sustainable supply chains through internal environmental communication such as green procurement awareness creation and establishment of environmental governance mechanisms that include establishment of environmental standards, promotes the adoption of green practices regardless of the sector (Ministry of Finance, Planning and Economic Development, 2021).

Aside from the above, environmental governance is implemented through communication (Erbaugh *et al*., 2024). For instance, Zikargae (2018) argues that internal environmental communication enhances policy implementation. Seroka-Stolka (2016) also advances that good communication and environmental governance mechanisms are key in promoting the adoption of green practices. Also, cross-functional environmental communications are seen to result in pollution control mechanisms in a firm's logistics activities (Seroka-Stolka, 2016). In addition, Erbaugh *et al*. (2024) argue that two-way informational communication plays a great

role in aligning employees' cognitive frames and interests and the adoption of environmental behaviors. Other than communication affecting governance, organizational environmental governance mechanisms accelerate the transition to environmentally friendly practices (Jayarathna *et al.*, 2023).

5. Conclusion

The study aimed at examining the effect of internal environmental communication on the adoption of green inbound logistics practices and organizational environmental governance and the mediating role of organizational environmental governance in the relationship between internal environmental communication and the adoption of green inbound logistics practices. The observations from the findings show that internal environmental communication influences both organizational environmental governance and the adoption of green inbound logistics practices, while a partial mediation effect of organizational environmental governance is observed, implying that the effect of internal environmental communication exists even in the presence of a mediator. Further, the results support the institutional theory because employees in firms have to conform to established governance mechanisms such as rules or programmes and work towards achieving established expectations.

The results show support for the achievement of Sustainable Development Goal 11 on sustainable cities and communities, Goal 12 on sustainable production and consumption and Goal 13 on climate action. This is because the adoption of green inbound logistics practices among the public sector firms in the central procuring and disposing entity category results in reduced environmental emissions through minimizing the purchase of environmentally polluting products, use of nonenvironmentally friendly freight transport during product delivery and waste (both packaging and product), given that they are seemingly located in the urban areas and are major customers to the suppliers.

Findings show that both internal environmental communication and organizational environmental governance intensify the adoption green of inbound logistics practices. For instance, organizational environmental governance involves developing green procurement policies that encourage group procurement, procurement of durable, reusable or recyclable products and the use of environmentally friendly disposal methods, procuring from environmentally friendly suppliers that have a good environmental impact record, using freight trucks that use environmentally friendly fuels and are fuel efficient.

Apart from the above, the study has theory, practice and policy implications. To theory, the study examined the influence of organizational environmental governance and internal environmental communications on the adoption of green inbound logistics practices in the public procurement and public sector setting for the first time. Much of the research currently focuses on SME participation in public sector procurement and compliance with procurement laws and regulations. Although public sector procurement contributes to the existing climate change problems, attention is placed on sustainable public procurement where aspects such as sustainability aspects are incorporated in specifications and evaluation.

To practice, the study widens the green public procurement literature through examining the adoption of green inbound logistics in public sector firms. Currently, public sector firms in Uganda are focusing on sustainable procurement, which requires public sector suppliers to demonstrate that their firms have good social practices and environmental practices such as environmentally friendly production, products and freight transportation. Placing attention on sustainable procurement alone and taking a holistic approach to sustainable procurement may not solve the emission problems caused by public sector buyers. However, having a wider coverage of each component of sustainability such as the green/environmental components creates an in-depth understanding of how procurement officers can advance environmental protection through public sector procurement. Thus, public sector firms will establish environmental governance mechanisms that include developing an environmental vision that

will enhance contracting providers who engage in environmentally friendly production and produce environmentally friendly products and have environmentally friendly transport practices, establishing strategies for reducing environmental emissions and waste during supplies delivery and training employees on green procurement and green inbound logistics practices where employees will be empowered in making green specifications and evaluation as well as considering a life cycle approach when acquiring the procurement requirements. Also, public sector firms will be able to choose the most suitable communication channel for the environmental message to be shared, design and the content for the message and the most suitable model of communication whether one way or two way. Nonetheless, a two-way model of communication has been seen to be most effective by earlier researchers.

To policy, the government will be able to develop public sector-specific green logistics policies that can guide public sector firms when formulating organizational environmental governance mechanisms that will result in engagement in green inbound logistics practices. Currently, the existing National Transport and Logistics policy focuses more on the transportation of freight and passengers without integrating the green aspects. Therefore, it is meant to regulate transport and logistics in the private sector but not public sector firms. Also, rather than the national sustainable procurement action plan, a national sustainable public procurement policy that captures all the aspects related to green inbound logistics and also green procurement governance in public sector firms may be formulated.

The study is without areas of further research. Methodologically, the study employs a cross-section survey design and a deductive approach. Also, the study focuses on organizational environmental governance, internal environmental communication and the adoption of green inbound practices, all of which have been categorized as behavioral variables in previous research. Thus, to test for causality among the variables, a longitudinal survey design is more suitable given that behavior improves with time. Further, a qualitative approach is pertinent if an in-depth understanding of the variables is to be obtained, which helps dig deep into detail how, for example, environmental communication occurs and how the environmental messages flow across the firm. In addition, future research may examine the impact of proactive internal environmental communication on organizational environmental governance and the adoption of green inbound logistics practices. Also, the impact of proactive external environmental communication on the adoption of green logistics practices by public sector suppliers may be examined. Lastly, given that the effectiveness of the internal communication may depend on the existing communication environment in the firm, the moderating role of a firm's communication climate in the relationship between internal environmental communication and adoption of green inbound logistics practices needs to be examined.

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Appendix 1

Table A1. Reliability, common method variance (CMV), composite reliability, and collinearity values

Variables	Reliability values	Composite reliability	Collinearity statistics (VIF)	Skewness	Kurtosis	AVE	CMB
Adoption of green inbound logistics practices	0.789	0.89	N/A	−0.665	0.025	0.543	30.71
Internal environmental communication	0.790	0.85	2.145	−0.374	−0.547	0.570	44.10
Organizational environmental governance	0.858	0.83	1.179	−0.643	−0.295	0.720	40.75

Source(s): Authors' own creation

Appendix 2

Table A2. Discriminant validity

Variables	Hetero-Trait Monotrait ratio
Internal environmental communication → Adoption of green inbound logistics practices	0.654
Organizational environmental governance → Adoption of green inbound logistics practices	0.875

Source(s): Authors' own creation

Appendix 3

Table A3. Internal environmental communication and adoption of green inbound logistics practices

Internal environmental communication	Adoption green inbound logistics practices	
Items	Remains constant	Improves
Our firm tailors environmental messages to different employee groups based on what is relevant to them in their jobs		√
Environmental messages in our firm best encourage employees to take environmental action when they are clear, practical, and easy to implement		√
Employees in our firm are positively oriented towards environmental action only if environmental messages shared do not require too much effort from them		√
Emphasizing cost-savings and optimization in environmental communications motivates employees to consider the environmental impact of their work in our firm		√
Our firm assigns contact persons to each department who everyone can then approach with environmental initiatives		√

Source(s): Authors' own creation

Appendix 4

Table A4. Organizational environmental governance and adoption of green inbound logistics practices

Organizational environmental governance	Adoption green inbound logistics practices	
Items	Remains constant	Improves
Our firm has a vision for contracting providers that provide environmentally friendly supplies		√
Our firm has established environmental policies, programmes and initiatives for reducing environmental emissions during supplies delivery		√
Our firm has established environmental policies, programmes and initiatives for reducing environmental emissions during supplies delivery		√
Our firm trains employees on how to reduce environmental emissions during the delivery of supplies and environmentally friendly procurement		√
Our firm requires suppliers to submit environmental impact assessment reports prior to having the contract signed		√

Source(s): Authors' own creation

Appendix 5

Table A5. Internal environmental communication and organizational environmental governance

Internal environmental communication	Organizational environmental governance	
Items	Remains constant	Improves
Our firm tailors environmental messages to different employee groups based on what is relevant to them in their jobs		√
Environmental messages in our firm best encourage employees to take environmental action when they are clear, practical, and easy to implement		√
Employees in our firm are positively oriented towards environmental action only if environmental messages shared do not require too much effort from them		√
Emphasizing cost-savings and optimization in environmental communications motivates employees to consider the environmental impact of their work in our firm		√
Our firm assigns contact persons to each department who everyone can then approach with environmental initiatives		√

Source(s): Authors' own creation

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