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The Relationship between Corporate Environmental Performance and Suppliers' Credit Lending

Abstract. *Green supply chain management has gained traction in contemporary times against many environmental catastrophes and scandals involving prominent companies. Despite the strides made by lawmakers to address such challenges, an increasing number of corporations overlook environmental issues such as global warming, ecological concerns, reverse logistics, and global energy. Notwithstanding the contributions in prior studies, to the best of researchers' knowledge, no study has sought to link corporate environmental performance with suppliers' credit lending practices. Yet policymakers seek to develop regulations that incorporate the understanding of the collaboration among the supply chain members. Thus, we seek to establish the short-run and long-run dynamics between corporate environmental performance and suppliers' credit lending. Targeting companies listed in the FTSE/JSE RII, we draw a sample of 21 companies using a judgemental sampling technique. Furthermore, archival data were collected to compute a short panel data set. The panel data set for statistical analysis comprised 21 cross-sections over six years, totalling 126 observations. The study adopted the first differenced econometric models in data analyses, namely Panel Vector Error Correction Model (VECM) and, subsequently, Panel Least Squares (PLS), Wald Test, and Impulse Response Functions (IRF). Findings indicated a statistically significant positive relationship exists in the long run between corporate environmental performance and suppliers' credit lending. Conversely, the same endogenous variables produced a statistically significant negative relationship in the short run. The study contributes new insights to supply chain management literature and renders novel policy implications for lawmakers.*

Keywords: *environmental performance, supply chain, stakeholders, credit lending, supply chain member.*

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Зв'язок корпоративної екологічної діяльності з кредитуванням постачальників

Анотація. *В наш час екологічне управління ланцюгом поставок набуло популярності в умовах багатьох екологічних катастроф і скандалів, до яких причетні відомі компанії. Незважаючи на успіхи законодавців у вирішенні цих проблем, все більше корпорацій ігнорують екологічні проблеми, такі як глобальне потепління, екологічна ситуація, зворотна логістика та промислова енергетика. Незважаючи на внески попередніх досліджень, наскільки відомо дослідникам, жодне дослідження не намагалося пов'язати корпоративні екологічні показники з практикою кредитування постачальників. Тим не менш, політики прагнуть розробити правила, які включають розуміння співпраці між учасниками ланцюга постачання. У зв'язку з цим, ця стаття має на меті визначити короткострокову та довгострокову динаміку зв'язку між корпоративними екологічними показниками та кредитуванням постачальників. Орієнтуючись на компанії, зареєстровані в Індексі відповідального інвестування FTSE/JSE RII, автори відібрали 21 компанію, використовуючи метод оціночної вибірки. Крім того, були зібрані архівні дані для обчислення короткого набору даних панелі. Набір панельних даних для статистичного аналізу включав 21 переріз протягом шести років, загалом 126 спостережень. У дослідженні були використані перші диференційовані економетричні моделі для аналізу даних, а саме панельна векторна модель корекції помилок (VECM), а згодом панельні найменші квадрати (PLS), тест Вальда та функції імпульсної характеристики (IRF). Результати показали, що в довгостроковій перспективі існує статистично значущий позитивний зв'язок між екологічною діяльністю компанії та кредитуванням постачальників. І навпаки, ті самі ендогенні змінні спричинили статистично значущий негативний зв'язок у короткостроковій перспективі. Дослідження вносить нові ідеї в літературу з управління ланцюгами поставок і надає законодавцям важливі дані для розробки відповідних політик.*

Ключові слова: *екологічна ефективність, ланцюг поставок, стейкхолдери, кредитування, учасник ланцюга поставок.*

1. INTRODUCTION

Amidst the plethora of conferences, special publications, articles, and websites dedicated to the discourse on the green supply chain, a significant gap remains in the understanding of this concept in South Africa (Islam, Karia, Fauzi & Soliman, 2017:12). This paper aims to fill this void by examining the relationship between corporate environmental performance and suppliers' credit lending, and subsequently developing a conceptual framework. The interest in this topic is burgeoning, particularly in the face of the current challenges associated with sustainable supply chain management. However, as Sánchez-Flores, Cruz-Sotelo, Ojeda-Benitez, and Ramírez-Barreto (2020:26) point out, emerging economies, including South Africa, are still playing catch-up in terms of sustainable development. Therefore, our research is timely and crucial in advancing the understanding of green supply chain management in South Africa.

Two most recent domestic studies conducted confirm some of the gaps that need to be addressed from a global perspective (Sánchez-Flores et al., 2020:27). In one such study, Chinomona and Mahlatsi (2020:295) used a quantitative approach to survey to analyse green supply chain practices and supply chain performance in the beverage industry. The study focussed on the suppliers' green supply chain management practices relative to environmental performance and supply chain performance. Based on the gaps identified, there is an opportunity for the researcher to focus attention on the two components of the supply chain: the buyers' environmental performance and the suppliers' reaction to the supply chain. Carrim, Agigi, Niemann and Mocke (2020:150) also highlight another gap in the South African context, where a qualitative approach was used to perform a thematic analysis to investigate the role of buyer-supplier relationships in improving sustainable supply chain management. The gap is depicted by a lack of depth in the study. The data gathered through interviews did not encompass perspectives on buyers' environmental performance or alone enquire if these attract suppliers' support. Hence, this paper sought to fill these gaps in the emerging economies or the South African context in general.

Previous studies have highlighted the relationship between entities' green practices and suppliers' green supply chain decisions. For instance, a study by Yu, Zhang and Huo (2021:861) found that customers and suppliers benefit financially when maintaining a green supply chain, highlighting the mutual benefits of green practices. Another study by Szegedi, Gabriel and Papp (2017:259) and Kong, Feng, Huang & Cai (2020:1106) found that suppliers often maintain a green supply chain, indicating their keen interest in customers' environmental reporting. These findings, along with similar ones from studies by Szegedi, Gabriel and Papp (2017:423),

Yu, Zhang and Huo (2021:223), and Kong, Feng and Huo (2021:2255), underscore the significant impact of green supplier integration on various aspects of the supply chain, including financial performance. Our research aims to build on these findings and explore their applicability to FTSE/JSE RII listed companies in South Africa, thereby providing practical insights for businesses operating in this context.

Therefore, this paper aims to examine the relationship between corporate environmental performance and suppliers' credit lending and also underscores the importance of understanding this relationship for the advancement of green supply chain management in South Africa.

The paper has the following structure. Following this introduction, Section 2 presents the theoretical foundation and literature review. The stakeholder theory is discussed together with literature studies conducted locally and internationally. The research methodology and data analysis are presented in Section 3. Section 4 discusses the obtained results. Section 5 of this paper presents the conclusion, contribution, and recommendations.

2. THEORETICAL BACKGROUND AND LITERATURE REVIEW

2.1 The stakeholder theory

The theory posits a view of capitalism that emphasises the interconnected relationships between companies and their respective stakeholders who have somewhat interest in the organisation (Laplume, Sonpar & Litz, 2008:1152; Donaldson & Preston, 1995:65). The theory argues that a company has to create value for all stakeholders as opposed to just focussing on its primary stakeholders such as shareholders or investors (Parmar, Freeman, Harrison, Wicks, Purnell, De Colle & Simone, 2010:403). Thus, the current paper finds a premise for this theory as the paper deviates from the traditional investor-centric model to ascertain the relationship with an external stakeholder, i.e., the supplier. The anticipated model acknowledges that the decisions and actions of all stakeholders are critical to the company's success. According to Laplume, Sonpar, and Litz (2008:1152), the proponent of this theory is Edward Freeman, who crafted the stakeholder approach in 1984 to identify and model the stakeholder groups of a company. Furthermore, in the model, Edward Freeman recommended methods businesses can use to give due diligence to stakeholders' interests. Moreover, the theory addresses an organisation's values and morals in terms of the organisation's internal and external world.

2.2 Perspectives on suppliers' credit lending

While this paper focuses on the supplier-customer relationship regarding environmental performance, it considers that government plays a role. This is essential since suppliers often include large businesses, especially manufacturing companies, involved in activities that can potentially damage the environment. Park and Yoo (2022:107) investigated the government's intervention in the supply chains' environmental performance regarding working capital and trade credit issues. The study built three intervention models that can be adopted by the government, namely, indirect intervention using buyer incentives, direct intervention using the supplier, and no intervention. Accordingly, Park and Yoo (2022:680) postulate that government interventions, be they direct or indirect, will always outperform no intervention model regarding environmental performance. This always affirms that the government should be a key stakeholder in monitoring green supply chain practices. Conversely, both direct and indirect interventions are identical contributors to green supply chain improvements (Park & Yoo, 2022:690). Furthermore, Park and Yoo's (2022:790) study suggests that indirect intervention through the buyer is preferred. As such, pressure for sustainable supply chains normally bottoms up, with the supplier normally held accountable for the sustainable supply chain.

Zhang, Wang and Ma (2021:1347) contend that customers can also take responsibility for promoting green supply chain practices through incentives given to suppliers. Such customers recognise that suppliers always have financial constraints. Therefore, this becomes a way of promoting green supply chain innovation. It is argued that retailers, especially, adopt an optimal channel strategy where advance payments are made to a supplier who benefits from greening the supply chain (Zhang, Wang & Ma, 2021:1370). Bannier, Bofinger and Rock (2019:323) comment that such practices facilitate benefits realised through improved environmental and economic performance.

Notwithstanding Zhang, Wang and Ma's (2021:1333) study, which reveals the upstream efforts of customers toward greening the supply chain, prior studies also stressed the need for suppliers to take the lead in the adoption of the GSCM practices. In one such study, Duan, Hofer and Aloysius (2021:360) postulate that consumers show a positive attitude and higher purchase intentions if the company discloses suppliers' monitoring activities. This is evidence that stakeholders are putting pressure from all levels to ensure that supply chain members adhere to ESG principles and standards. Wong, Wong, and Boonitt (2020:589) note that customers' supplier monitoring activities are a means to ensure transparency for different stakeholders and show efforts being made upstream towards greening the supply chain.

2.2.1 Prior studies which posit a positive relationship between environmental performance and suppliers' credit lending

Numerous studies demonstrate a positive relationship between the variables being scrutinised, and this provides evidence that suppliers value their customers' environmental performance practices. This is presumably because customers are a crucial partner in the maintenance of a sustainable supply chain (Chen & Ho, 2019:333). In one such study in China, Sancha, Wong and Gimenez (2019:100) examined the impact of implementing assessment and collaboration practices on suppliers' performance outcomes. The study is commended for its sample size, which included 129 manufacturing companies in China for statistical

analyses. Sancha, Wong and Gimenez (2019:542) show that collaboration improves the performance of the supplier. Moreover, suppliers' dependence on customers could be leveraged to realise improved sustainability performance. Consequently, the results suggest that it is crucial for suppliers to consider customers' environmental performance to attain optimal benefits emanating from collaborative work in the supply chain. Although Sancha, Wong and Gimenez's (2019:100) study is informative, it concedes several criticisms. Firstly, it utilised self-reported data, which is often criticised for its social desirability. Secondly, the study is country-specific; besides, China is a developed country; as such, the results cannot be generalised, especially to developing countries. Thirdly, data collected was just a snapshot of one fiscal year, as such the results may be inconclusive as the association between variables may differ if studied over a longer period.

Building on the above findings, a comprehensive study spanning China, Canada, Japan, and Germany over 18 years aimed to develop practical models for companies to identify effective green supply chain management (GSCM) practices (Zhu, Sarkis & Lai, 2019:54). The study was a response to institutional pressures from various advocacy groups pushing for GSCM implementation. The findings were clear: all companies should comply to avoid unnecessary risks (Zhu, Sarkis & Lai, 2019:67). The study also highlighted the importance of understanding the product's position in its life cycle, leading to the development of a life cycle analysis (LCA) approach as a tool for companies to identify key GSCM practices. These practical implications can inspire companies to adopt more sustainable practices in their supply chains.

In line with the developed LCA approach, suppliers need downstream customers' cooperation if the suppliers' supply chain has a negative impact on the environment; this will ensure that there is better utilisation of resources through the recovery of materials (Zhu, Sarkis & Lai, 2019:68). It is evident that suppliers dealing with green products need to consider environmental practices of its customers in the supply chain given the level of dependency by the supplier. However, the drawbacks of this study pave the way for this paper. To this end, Zhu, Sarkis and Lai (2019:66) failed to collect data to demonstrate the effectiveness of proper GSCM practices statistically.

A study in India by Kashyap and Lakhanpal (2019:46) built upon the findings of previous studies by Sancha, Wong and Gimenez (2019) and Zhu, Sarkis and Lai (2019). It developed a framework that identifies the expectations of buyers, suppliers, and customers regarding environmental performance issues. The researchers emphasised the need for sustainable collaboration between suppliers and customers, stressing that each partner must understand the perspectives of all stakeholders in the value chain (Kashyap & Lakhanpal, 2019:56). This underscores the urgent need for collaboration among supply chain members and the critical role of suppliers in considering and valuing customers' environmental performance.

In agreement with the above findings, Mishra, Singh and Rana (2022:130) posit that there is strategic significance for customers to collaborate with suppliers to improve green supply chain performance. This means it is incumbent on the buyer to ensure they contribute to the green supply chain. Thus, suppliers would consider and value such strategies as they benefit from a sustainable green supply chain. Researchers further developed propositions to underscore the relationship between environmental collaboration, environmental orientation, and sustainable production and consumption practices (Mishra, Singh & Rana, 2022:619). Collaboration between the two key partners in the supply chain means that suppliers ought to understand the input of the buyer company in greening the supply chain upstream. Besides, the study emphasises the need to recognise customers' environmental performance practices. Though insightful, Mishra, Singh and Rana's (2022:130) study has been censured given several caveats: (1) The complexity of adopting environmentally friendly practices needs to be studied in the long run. As a result, these findings may be inconclusive. (2) The study lacks objectivity since making use of SSI to collect data tends to cause subjective biases. (3) The study is limited to the automobile industry; results cannot be generalised across different industry sectors.

Similarly, Kashyap and Lakhanpal (2019), Sancha, Wong and Gimenez (2019), Zhu, Sarkis and Lai (2019), Mishra, Singh and Rana (2022), and Busse (2016:28) agree with the findings above and suggest that the anticipation of performance effects crucial to the buyer accentuate efforts to improve suppliers' green supply chain practices and vice-versa. Moreover, Busse's (2016:47) study further identified and analysed causal pathways through which suppliers' green supply chain practices influence customers' performance to develop sustainable GSCM theory. Furthermore, the study assists suppliers in assessing customers, and customers make decisions about their suppliers. However, green supply chain risks rarely manifest themselves and customers' environmental performance is largely shaped by many factors. Therefore, theory may be developed from limited data as only large-scale secondary data analyses are required instead of survey research.

Wang, Zhao and Hou (2020:170) interrogated how the supplier green innovation efforts impact the supplier-customer relationship towards improved green supply chain practices. Findings revealed that the association between the suppliers' green innovation efforts rely on a few relationship-level and customer-level contingencies. Thus, Wang, Zhao and Hou (2020:180) claim that green innovation is of benefit to the relationship between two partners (suppliers and buyer-company) only if relational embeddedness and customer participation are high. The study was motivated by a rising demand for eco-friendly products, pushing suppliers towards greening the supply chain. Consequently, the study demonstrates that green innovation from the supplier's perspective must draw customers' attention as they are key participants in the partnership. Although insightful and commended for providing valuable guidance for green innovation, Wang,

Zhao and Hou (2020:178) employed dyadic data as suppliers were not paired with respective customers, thereby subjecting this study to bias. Moreover, the cross-sectional survey limits the researchers' ability to draw inferences among variables, yielding inconclusive findings.

Shah and Soomro (2021:1333) conducted a pioneering study exploring environmental performance through internal green integration, collaboration, and supplier greening. This research, which approached the supplier-customer relationship from the customers' perspective, employed SEM to analyse cross-sectional data collected via a survey statistically. The findings revealed a significant and positive impact of pro-environmental strategies on internal green strategies (Shah & Soomro, 2021:1344). Additionally, greening the supplier, environmental collaboration with suppliers, and internal green integration emerged as significant predictors of environmental performance. Thus, the study underscored that suppliers maintain a keen interest in the customers' green practices through environmental collaboration from both ends.

Building on the above findings, Abidin, Abdullah, Hassan, and Sobry (2016:2673) aimed to provide empirical evidence on the practical impact of customer and supplier integration on environmental performance. In simple terms, customer and supplier integration refers to environmental collaboration between companies to support environmental sustainability. Abidin et al.'s (2016:2673) study, which collected data through a survey of ISO14001 manufacturing companies in Malaysia, found a significant positive relationship between the variables tested and environmental performance (Abidin et al., 2016:2678). This confirms that customer and supplier integration are robust predictors of environmental sustainability performance. This collaborative approach in the supply chain implies that suppliers prioritise customers' sustainability performance to reap the benefits of a green supply chain.

To further validate the above findings, Kähkönen, Lintukangas, and Hallikas (2018:518) propose that GSCM practices constitute a significant portion of companies' environmental performance. Specifically, GCSM practices that mirror upstream supply chain management activities will ensure the environmental sustainability of the entire supply chain and enhance the company's environmental performance (Kähkönen, Lintukangas & Hallikas, 2018:530). In addition to its substantial contribution to the literature, the study is commended for its comprehensive data collection from 111 companies and focus groups, enabling a thorough quantitative analysis. The results prove that customers' significant contribution to the upstream supply chain responds to the suppliers' recognition of the buyer company's green practices. Similarly, Ahmed, Ashraf, Khan, Kusi-Sarpong, Arhin, Kusi-Sarpong, and Najmi (2020:04) used the SEM technique to analyse data collected from 126 representatives of manufacturing companies operating in Pakistan via a survey questionnaire. This was an effort to explore the impact of the supply chain partner's collaborative approach towards green practices on a company's environmental performance. As a result, Ahmed et al. (2020:21) found that customer monitoring and institutional pressure significantly and positively influence companies' adoption of GSCM practices. Furthermore, internal and external GSCM practices were found to have a significant positive relationship with the companies' sustainability performance (Ahmed et al., 2020:22).

In a replica study in Malaysia, Iranmanesh, Zailani, Hyun, Ali, and Kim (2019:01) focussed on the impact of lean manufacturing practices on companies' environmental performance by considering lean culture as a moderator. The study used the lack of literature in this area as a motivation. Yet, companies in Malaysia are increasingly showing interest in environmental issues (Fernando, Chiappetta Jabbour & Wah, 2019:20). Iranmanesh et al. (2019:19) claim that product design, equipment and process, customer and supplier relationships have a significant positive impact on environmental performance. The customer-supplier relationship requires that both partners in the supply chain care about downstream and upstream environmental practices. This is evident in suppliers' value of the buyer company's CSR activities, even instituting supplier monitoring activities.

2.2.2 Studies which present a negative relationship between environmental performance and suppliers' credit lending

Sahoo and Vijayvargy (2020:862) explored the impact that GSCM has on companies' performance. The study identified five dimensions of GSCM practices, which were tested on three dimensions of companies' performance. The study employed SEM to analyse data collected from 160 manufacturing companies. Accordingly, green purchasing and internal environmental management as part of GSCM dimensions were found to have a negative impact on company performance dimensions (Sahoo & Vijayvargy, 2020:886). These GSCM dimensions were tested against operational performance as one of the dimensions of organisational performance. The two GCSM dimensions (green purchasing and internal environmental management) entail a thorough internal assessment of the issues of environmental performance to ensure that there is collaboration with green suppliers. Thus, the negative findings are indicative of suppliers' ignorance of buyer-company's green practices. Despite its original contribution to literature, the study is criticised for using cross-sectional data, which only gives a snapshot of the association between these variables; a longitudinal study may yield different results. Moreover, data utilised in the analysis may be biased, given that only one respondent answered the questionnaire.

In a significant Italian study, Gualandris and Kalchschmidt (2016:2470) found that as GSCM develops, the environmental performance of manufacturing companies tends to improve. The study also highlighted the direct impact of internal business practices on environmental performance and the mediating role of key sustainability performance in the

impact of external practices. The study's findings, which also emphasised the significant role of buyer-supplier trust, have practical implications for companies aiming to improve their sustainability performance.

Notwithstanding the valuable and timely contribution of the study, it concedes criticisms of the current premise. First, Gualandris and Kalchschmidt's (2016:2470) study used cross-sectional data, which does not allow the sequence necessary to assess causality. Secondly, given the nature of the variables being tested, the study is shallow regarding construct variables employed. Thirdly, data collected from the Italian manufacturing industry is not accurate and free of country or industry effects. Additionally, questioning the accuracy of the results is further exacerbated by a lack of verifiability on the issues of reliability and validity.

In contrast to findings in Malaysia (Abidin et al., 2016:2673), a related study critically evaluated whether the adoption of selected GSCM practices will propel environmental performance among ISO14001 manufacturing companies in Malaysia (Foo, Lee, Tan & Ooi, 2018:01). Additionally, the significance of the association between environmental performance and GSCM practices was also interrogated statistically. Foo et al. (2018:14) demonstrated an insignificant negative association between supplier selection and supplier evaluation with environmental performance. Moreover, cooperation with customers was found to be significantly negative when tested with environmental performance. These astounding findings imply that suppliers do not consider customers' sustainability performance imperative.

Foo et al.'s (2018:01) study is applauded for being comprehensive, with primary data collected from 178 ISO14001 Malaysian manufacturing companies using a self-administered questionnaire. However, cross-sectional study implies that data is a snapshot of a particular fiscal year or at a point in time. Thus, it fails to ascertain the magnitude and direction of causality among the studied variables. Moreover, self-reported data collected through survey questionnaires concedes social desirability; more objective data may yield more conclusive results. Besides, by merely using the ISO14001-certified manufacturing companies, Foo et al.'s (2018) study excluded service companies that offer logistics and transportation services.

In concurrence with the above findings, Lechler, Canzaniello and Hartmann (2019:64) suggest that optional supplier collaboration and assessment practices are executed collaboratively among members of strategic alliances to enhance suppliers' compliance with the focal company's environmental performance standards. This assertion is founded on the basis that it is focal companies that manage both lower-tier and first-tier suppliers to curb reputational damage emanating from sustainability violations in the entire supply chain (Wu, Subramanian, Abdulrahman, Liu, Lai & Pawar, 2015:3838; Gong, Gao, Koh, Sutcliffe & Cullen, 2019:88). Simply put, suppliers are perceived to be uncaring of the focal companies' environmental performance, as such focal companies embrace the responsibility to collaborate and assess suppliers in a bid to ensure green supply chain practices. Although informative, Lechler, Canzaniello, and Hartmann (2019:77) concede that this multiple case study inherently possesses the difficulty of generalising the results.

2.2.3 Literature indicating a mixed relationship between environmental performance and suppliers' credit lending

In a landmark study conducted in the USA, Chen and Ho (2019:333) examined whether suppliers' sales from their customers depend on the customers' environmental performance and how suppliers' sustainability performance moderates this association. The study was founded on two hypotheses. Firstly, the supplier will realise higher sales from a customer if the supplier's sustainability performance level aligns with the customer's environmental performance level. Secondly, when the customer's environmental performance level is higher, the supplier tends to realise more sales from its sustainability performance (Chen & Ho, 2019:344). Additionally, this comprehensive study was arguably the first large-scale study covering a longitudinal period from 2006 to 2016 using data collected from manufacturing entities in the USA.

The mixed findings from Chen and Ho's (2019:351) study indicate that the impact of a supplier's sustainability performance on sales revenue was significantly higher only if the customer's environmental performance level was higher. In contrast, the results also demonstrate that a supplier's sales from a customer were higher if the supplier's sustainability performance level did not surpass the customer's environmental performance level Chen and Ho (2019:352). Thus, the former implies that suppliers would value customers' green supply chain practices, while the latter shows that some suppliers may not necessarily value such practices.

Consistent with the above studies, Saghiri and Mirzabeiki (2021:101) examined the role of environmental supplier development programmes championed by buying companies on supplier environmental practices. The study further tested the moderating role of the supplier in collaboration with the buyer and resource allocation. In this United Kingdom (UK) landmark survey, mixed findings indicated that supplier collaboration is imperative in enhancing the suppliers' transport and logistics activities in the supply chain. However, other mediating effects tested also showed that supplier resource allocation mediates the impact of environmental supplier development on the same activities (Saghiri & Mirzabeiki, 2021:132). The study is applauded for its depth in the sample selection, given that it comprises 267 supplier companies in the UK.

In an Italian study, Esposito De Falco, Scandurra, and Thomas (2021:1528) investigated the influence of different stakeholders on companies' decisions to adopt green practices. Awan, Dunnan, Jamil, Mustafa, Atif, Gul, and Guangyu (2022:11) argue that companies are accountable to different stakeholders in adopting eco-innovations. As part of the contractual stakeholders,

suppliers were found to exert a significantly stronger influence on the buyer company's sustainable supply chain practices (Esposito De Falco, Scandurra & Thomas, 2021:1531). On the one hand, considering stakeholders included in the study, investors were found not to influence the buyer company's eco-innovations.

Xiao and Choi (2022:2634) developed two models to interrogate a green manufacturer's greenness decisions and product line choices. The models developed demonstrated that both partners in the supply chain, that is., supplier and customer, show green supply chain behaviour. Moreover, the models depicted that suppliers tend to extend the product line when the customers' environmental responsibility level is low (Xiao & Choi, 2022:2644). This, in turn, improves both the suppliers' utility and environmental performance. Conversely, Xiao and Choi (2022:2648) also document divergent findings indicating that suppliers with high environmental responsibility levels tend to extend the product line and consequently increase environmental performance without considering customers' sustainability practices. Notwithstanding its modest contribution to existing literature, Xiao and Choi's (2022:2648) study considered only a single period, limiting the depth and applicability of the two developed models.

Similarly, Fan, Xiao, Zhang and Guo (2021:102) found that China has experienced sustainability-related scandals emanating from upstream suppliers, which then have a spillover effect on downstream buyer companies. Intertwined with these scandals is the neglect of GSCM practices and uncaring attitude towards the environmental performance practices of downstream customers (Grekova, Calantone, Bremmers, Trienekens & Omta, 2016:1861). This highlights the potential risks associated with neglecting GSCM practices, emphasising the need for proactive measures to mitigate these risks.

Fan et al. (2021:362) conducted a panel data analysis of 768 company-year observations to produce a mixed relationship between the studied variables. First, the association between customer satisfaction and suppliers' sustainable development initiatives was found to be negatively moderated by firm reputation. Simply put, reputable firms are perceived as incognisant of customers' sustainability issues and prioritise these to improve the green supply chain (Fan et al., 2021:449). These findings were in sync with prevailing environmental-related scandals involving large companies in China. Secondly, Fan et al. (2021:449) further found that companies' intensive advertising and public relations activities positively moderated the association between the two variables. This is evidence that some companies are responsive to customer initiatives earmarked for restoring customer-supplier integration and collaboration towards greening the supply chain.

Given the gaps identified and discussed above on the relationship between environmental performance and suppliers' credit lending, the following questions have remained unanswered:

– Does environmental performance influence suppliers' credit lending in the long run?

– Does environmental performance influence suppliers' credit lending in the short run?

Therefore, this paper attempts to answer these questions to fill the research gap identified in the prior literature.

3. METHODOLOGY AND DATA ANALYSIS

3.1 Research design, population, and sample

Meissner, Creswell, Klassen, Ann Plano, Smith, and Katherine (2011:18) postulate that a researcher must establish a study's philosophical assumptions. Thus, the researcher adopted positivism to frame this paper (Morgan, 2007:48). This paradigm is preferred because of its association with quantitative techniques, where variables are empirically tested through observation and measurement (Crowe, Cresswell, Robertson, Huby, Avery & Sheikh, 2011:08). As a philosophical stance of the natural scientist, positivism focuses on observable and measurable facts (Saunders & Lewis, 2028:107). Therefore, the positivist paradigm's quantitative nature makes it suitable for this paper. According to Groenewald (2004:42), quantitative research is used when researchers are interested in testing the relationship between the variables. Furthermore, the population comprised all companies appearing on the FTSE/JSE RII from 2016 to 2021. This means the population constituted 60 companies listed on the FTSE/JSE RII as of 28 June 2021. Accordingly, Hui, Foxcroft, Richardson, and Macfadyen (2011:768) refer to a sample as a subsection of a population chosen to participate in the study. Thus, the researcher employed the judgemental sampling technique. Judgemental sampling is a non-probability sampling method employed when the researcher's judgement is used to select elements for the sample based on a range of premises (Etikan, 2016:04). As a result, the sample will comprise 21 companies drawn from the 60 FTSE/JSE SRI for the fiscal year 2021. This list is based on the researcher's judgement informed by specific criteria.

3.2 Research data

The use of content analysis has been extolled by prior studies for its aptness where objectives set for the study are to be accomplished (Cowan, 2007:109; De Villiers & Van Staden, 2006:763; O'Donovan, 2002:246; Jose & Lee, 2006:311; Kamala, 2012: 189; De Villiers & Lubbe, 2001:81). Therefore, this paper employed content analysis technique to collect data needed to meet the objective of the study. Hsieh and Shannon (2005:1277) posit that this method is highly flexible, permitting the researcher to utilise it in varying degrees of complexity. The researcher may use this approach to sift through archival documents to identify the needed data for the phenomena being studied (Guthrie, Petty, Yongvanich & Ricceri, 2004:282). The communication channels identified for this study are Integrated Annual Reports (IARs) and Sustainability Reports (SRs). A short panel data set of 21 cross-sections for the fiscal years 2016 to 2021 was generated in Microsoft Excel spreadsheets in preparation for the data analysis process using Eviews 13 and STATA statistical software packages.

Operationalisation of independent variables

In this paper, corporate environmental performance is measured by several key performance indicators, namely, consumption of water (CoW), consumption of energy (ConsE), and emissions of greenhouse gases (GHG). These environmental performance indicators are deemed useful to stakeholders such as suppliers who make economic decisions that affect the company. Table 1 shows how the independent variable and its sub-variables were measured in the paper.

Table 1. **Measurement of corporate environmental performance**

Variable	Variable name	Variable sub-name	Measurement method
Independent variable	Corporate environmental performance	Consumption of water *(CoW)*	Million cubic metres (*Mm3*) and kilolitres (*Kl*).
		Consumption of energy *(ConsE)*	Giga-joules (*Gj*) or Mega-watt hours (*Mwh*)
		Emissions of greenhouse gases *(EmGHG)*	Metric tonnes of CO2 equivalent (*Mt CO2e*)

Source: Authors' compilation (2023).

Operationalisation of dependent variables

Table 2 suggests measurement methods to be employed in testing suppliers' credit lending responsiveness to environmental performance. Using the total value of creditors is justifiable as this depicts the degree of the supplier-customer dealership. Besides, this variable includes environmental considerations suppliers make before granting credit to the buyer-company. Wang, Zhao and Hou (2020:170), Kong, Feng and Huo (2021:2255), Zhang, Pan and Feng (2020:693), Ali et al. (2019:713) and Simpson and Power (2015:60) are some of the proponents of proxies adopted in measuring the variables utilised in this paper.

Table 2. **Measurement of suppliers' green supply chain performance and control variables**

Variable	Variable name	Measurement method
Dependent variable	Supplier loyalty *(SL)*	Total value of creditors control reflected in the IARs
Control variables	Total monetary value of collateral *(MvCOL)*	Total tangible fixed assets reflected in the IARs
	Level of profit *(LvP)*	Profit (loss) value reflected in the IARs

Source: Authors' compilation (2023).

In terms of statistical analysis, several statistical diagnostic tests were performed comprising panel data tests for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. Subsequently, the cointegration test was performed to check if a long-run relationship existed between variables, given that all variables were stationary at the first difference – I(1). As a result, the paper employed STATA to generate a pairwise correlation matrix. After that, Eviews 13 was utilised to run the panel Vector Error Correction model (PVECM), given that the variables under consideration were cointegrated. The researcher employed the same software package, Eviews 13, to perform Panel Least Squares (PLS) estimations, Wald Test, and Impulse Response Functions (IRFs). Therefore, the adopted research design and methodological approach employed in this paper were deemed adequate to test the null hypotheses restated below:

H1: Environmental performance does not influence suppliers' credit lending in the long run.

H2: Environmental performance does not influence suppliers' credit lending in the short run.

Decision rules

Pairwise correlation: If $P < 0.05$, where $\alpha = 0.05$ is the significance level, then reject the null hypothesis of no correlation between the variables. This follows that the alternative hypothesis of evidence of correlation between variables is accepted.

Long-run coefficients of Panel Vector Error Correction Model: Following the PLS estimations, accept the null hypothesis indicating evidence of long run relationship only, and only if the speed of adjustment (ϕ) is negative and statistically significant at $P < 0.05$, where $\alpha = 0.05$ is the level of significance. The negative sign indicates the ability to bounce back to equilibrium in a disequilibrium situation, while the positive signs show movement away from equilibrium.

Short-run coefficients of Panel Vector Error Correction Model: Following the PLS estimations, accept the null hypothesis indicating evidence of short-run relationship only, and only if the short run coefficient is negative and statistically significant at $P < 0.05$, where $\alpha = 0.05$ is the level of significance.

Short-run coefficients Wald Test: If $P < 0.05$, where $\alpha = 0.05$ is the significance level, then reject the null hypothesis at any conventional level, indicating evidence of no short-run relationship between variables in favour of the alternative hypothesis that the short-run relationship exists.

3.3 Statistical modelling of the study

As mentioned above, corporate environmental performance is measured by variables CoW, ConsE and EmGHG, whereas BLP measures banks' loan pricing. Panel data about these variables covered the fiscal periods 2016 to 2021. Getzmann, Lang and Spremann (2014:81) argue that statistical models in research can render intuitive visualisations that aid the researcher in identifying relationships between variables being studied and making predictions using such statistical models to raw data. To achieve the objectives set for this paper, the researcher adopted the Vector Error Correction Model (VECM) introduced by Engle and Granger (1987), which suggests the double-set technique for modelling cointegrated I(1) type series. In equation (i) below, a long-run model is estimated to obtain the residuals. As a result, the cointegrated equation (ii) depicts the lagged residuals for the long-run relationship among variables. Consequently, the VECM is formulated by adding the lagged residuals to the short-run terms, as presented in equation (iii) below.

$$Yit = \beta 0i - \beta i1X\,it + \varepsilon it \quad \text{……..…..…….(i)}$$

$$\varepsilon\ it\text{-}1 = ECT\ it\text{-}1 = Y\ it\text{-}1 - \beta 0i - \beta i1X\ it\text{-}1 \quad \text{……..……..…..…..(ii)}$$

$$\Delta Yit = \alpha i + \sum_{k=1}^{p} \beta_i \Delta Y_{it-k} + \sum_{k=0}^{q} \delta_i \Delta X_{it-k} + \emptyset_i ECT_{it-1} + \mu_{i,t} \quad \text{……...…..(iii)}$$

Where:

Equation (i)	=	the long-run cointegrating regression model;
Equation (ii)	=	Lagged residuals (cointegrating equation);
Equation (iii)	=	Vector Error Correction Model;
ECT_{it-1}	=	Error Correction Term (lagged residuals from the long-run model);
$\emptyset_i$	=	Speed of adjustment;
Subscript 'i'	=	represents each subject in the panel;
k	=	the number of lags.

The VECM model stated as equation (iii) above were operationalised to address the main objective pursued in this paper. Thus, to establish if corporate environmental performance influences suppliers' credit lending both in the short-run and long-run, the VECM equation is estimated as follows:

$$\Delta SL_t = \varphi_1 + \sum_{i=1}^{p} \varphi_{2,i} \Delta SL_{t-1} + \sum_{k=1}^{q} \varphi_{3,k} \Delta CoW_{t-1} + \sum_{l=1}^{q} \varphi_{4,l} \Delta ConsE_{t-1} + \sum_{j=1}^{q} \varphi_{5,j} \Delta EmGHG_{t-1} + \emptyset ECT_{t-1} + \mu_{,4t} \quad \text{……..…..... (iv)}$$

Where:

SL	= Suppliers' loyalty, which represents suppliers' corporate support as a stakeholder;
$\boldsymbol{\varphi}$	= parameter to be estimated in the model;
CoW	= Consumption of water;
ConsE	= Consumption of energy;
EmGHG	= emissions of greenhouse gases, are vectors capturing corporate environmental performance;
μ	= indicator for uncorrelated errors;
$\emptyset$	= speed of adjustment or cointegration coefficient;
ECT	= indicates the error correction term which represents the estimated residual value from the cointegration regression.

Following the VECM estimations, the impulse response function (IRF) analysis was conducted. The statistical software Eviews 13 was employed to perform this analysis after which the results were presented graphically for further analysis interpretation. According to Cao and Sun (2011:356), the subscript 'i' is omitted in the analysis since impulse response function does not depend on this index and fixed effects in the system. Accordingly, the impulse response function matrix is defined as follows:

$$\phi_j = \frac{\partial \gamma_t + j}{\partial u_t{}'} \quad \text{…….. (v)}$$

Where:

The (k, ℓ)-th element of the matrix specified above describes the response of this element to one standard deviation unit impulse in ℓ-th element of γ_t whereby all variables dated t or earlier are ceteris paribus.

3.4 Basic regression assumptions

Table 3 presents numerous statistical diagnostic tests for normality, serial correlation, multicollinearity, heteroskedasticity, and stationarity. Given that all variables were stationary at I(1), the cointegration test was performed to check if a long-run relationship existed between variables. While all tests were fulfilled, the cointegration tests indicated a long-run relationship between variables, hence adopting the VECM for analysis.

Table 3. **Statistical diagnostic tests for panel data**

Assumptions	Test employed	Decision rule	Remark
Stationarity	Panel unit root test – "Fisher type" based on the Augmented Dickey-Fuller approach (ADF)	Non-stationary, if P < 0.05	fulfilled
Normality	Jarque-bera tests	Normal distribution, if P > 0.05	fulfilled
Heteroskedasticity	VEC Residual heteroskedasticity tests	Homoscedasticity present, if P > 0.05	fulfilled
Multicollinearity	Variance Inflation Factor (VIF)	VIF values must be less than 10	fulfilled
Serial correlation	LaGrange Multiplier (LM) test	No serial correlation of any order, if P > 0.05	fulfilled

Source: Authors' compilation (2023).

Cointegration Test for panel data

Congruent with the above tests, which yielded favourable results, similar results were obtained following a Kao Residual Cointegration Test. The null hypothesis of no cointegration among variables is rejected was rejected only and only if P < 0.05. The series tested for long-run relationship among variables comprised SL, EmGHG, ConsE, CoW, LvP and MvCOL. Figure 1 below provides evidence of the cointegration test which reveals existence long-run relationship among these endogenous variables. This is supported by the P value of 0.0196 reflected in the figure below for ADF test which is indicative of an acceptable alternative hypothesis of cointegration among the specified variables.

Series: SL CONSE EMGHG COW MVCOL LVP
Sample: 2016 2021
Included observations: 126
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
Automatic lag length selection based on SIC with a max lag of 0
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-2.063050	0.0196
Residual variance	15.30294	
HAC variance	12.48449	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Sample (adjusted): 2017 2021
Included observations: 105 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-0.695341	0.094567	-7.352909	0.0000

R-squared	0.322279	Mean dependent var	0.712240
Adjusted R-squared	0.322279	S.D. dependent var	4.129131
S.E. of regression	3.399257	Akaike info criterion	5.294469
Sum squared resid	1201.715	Schwarz criterion	5.319745
Log likelihood	-276.9596	Hannan-Quinn criter.	5.304711
Durbin-Watson stat	2.037990		

Figure 1. **Kao Residual Cointegration Test**

Source: Authors' compilation (2023).

4. RESULTS AND DISCUSSION

4.1 Pairwise Correlation

Although insightful, SL does not provide evidence of correlation when paired with the main environmental performance exposure variables, namely CoW, ConsE and EmGHG. However, only statistically acceptable positive associations are observed with control variables MvCOL, LvP and CoSZ. These control variables generated positive correlation coefficient values with the corresponding P values below 0.05 significance level. This excludes LEV, which presented a negative correlation coefficient value of - 0.182 with a P value of 0.041. Table 4 presents CoW, EmGHG and ConsE with correlation coefficient values of 0.076, 0.083 and 0.110, respectively. However, these are rejected given that the corresponding P values exceed the 5 percent acceptable significance level.

Table 4. **Pairwise Correlation Matrix**

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) SL	1.000					
(2) CoW	0.076	1.000				
	(0.395)					
(3) EmGHG	0.083	0.297*	1.000			
	(0.355)	(0.001)				
(4) ConsE	0.110	0.232*	0.446*	1.000		
	(0.219)	(0.009)	(0.000)			
(5) MvCOL	0.409*	0.073	0.181*	0.069	1.000	
	(0.000)	(0.415)	(0.043)	(0.441)		
(6) LvP	0.409*	0.132	0.188*	0.236*	0.372*	1.000
	(0.000)	(0.141)	(0.035)	(0.008)	(0.000)	

****** p<0.01, ** p<0.05, * p<0.1***

Source: Authors' compilation (2023).

4.2 The Vector Error Correction Model results on suppliers' credit lending

The VECM estimation commences with the analysis of the long-run model as represented by equation (i) above. This long-run model estimation is crucial since it produces the residuals and the short-run terms. Once added, a complete VECM, stated as equation (iii) above, is formulated for further analysis of long-run and short-run dynamics between variables. In Appendix XV, the coefficient of the lagged residuals is - 0.410200. This means that the model will restore its equilibrium in the long run at an adjustment speed of 41 percent in case of any disturbances. Moreover, the two negative target variables (SL and CoW) provide evidence of statistically significant convergence from short-run dynamics towards long-run equilibrium. The concerned Error Correction coefficients are 41 percent and 0.67 percent for SL and CoW, respectively. However, ConsE and EmGHG produced positive and statistically insignificant adjustments towards long-run equilibrium in a disequilibrium situation.

The long-run model results on suppliers' credit lending

Consistent with the long-run model specified as equation (ii) above, the endogenous variables SL, CoW, ConsE and EmGHG were estimated on Eviews 13 for long-run relationships. The outcome of this model specification is presented below as equation (vi). Notwithstanding the importance of the standard error and t-statistic values in the cointegration equation, attention was given to insightful coefficient values of all the endogenous variables. Thus, CoW and EmGHG revealed negative coefficient values of 0.895302 and 0.778989, respectively. Moreover, the intercept of 8.786664 was realised, whereas ConsE produced a positive coefficient of 0.132768, as shown in the equation below.

$$\varepsilon_{it-1} = 1.000000SL_{it-1} - 0.895302CoW_{it-1} + 0.132768ConsE_{it-1} - 0.778989EmGHG_{it-1} + 8.786664 \ldots\ldots(vi)$$

Using Eviews 13, PLS estimations were performed for the main objective of this paper, and results were processed to analyse long-run and short-run relationships among endogenous variables utilised. This complemented the cointegration equation (vi) results specified above. The PLS estimations are also preferred, given that the P values are generated to further scrutinise the model's short- and long-term coefficients. Moreover, the Durbin-Watson statistic, Adjusted R^2 and overall F-statistic can be interrogated to arrive at somewhat conclusive results. Thus, Figure 2 below shows the results of the PLS estimations with SL as the target variable stationary at first difference.

Dependent Variable: D(SL) Method: Panel Least Squares Sample (adjusted): 2018 2021 Periods included: 4 Cross-sections included: 21 Total panel (balanced) observations: 84				
	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-0.410200	0.113456	-3.615497	0.0005
C(2)	0.007409	0.118951	0.062285	0.9505
C(3)	-0.054866	0.255427	-0.214803	0.8305
C(4)	0.145773	0.115391	1.263296	0.2102
C(5)	-0.094664	0.283498	-0.333914	0.7393
C(6)	1.530888	0.451820	3.388267	0.0011

R-squared	0.193940	Mean dependent var	1.608637
Adjusted R-squared	0.142270	S.D. dependent var	4.065544
S.E. of regression	3.765251	Akaike info criterion	5.558255
Sum squared resid	1105.815	Schwarz criterion	5.731885
Log likelihood	-227.4467	Hannan-Quinn criter.	5.628053
F-statistic	3.753410	Durbin-Watson stat	1.524174
Prob(F-statistic)	0.004256		

Figure 2. **Panel least squares estimations**

Source: Authors' compilation (2023).

In congruent to the results of the residual correlation test performed in this paper, Durbin Watson statistic also produced the value of 1.52 which is leaning towards 0. This, once again, confirms the absence of serial correlation among variables under consideration. Furthermore, the F-statistic value of 0.004256 also confirms a statistically significant relationship between environmental performance and SL. Figure 2 reports evidence of the long-run relationship since the cointegration coefficient of 0.410200 is negative and statistically significant at a P value of 0.0005. The Adjusted R^2 validates these crucial findings by reflecting 14 percent value for this PLS estimations.

The short-run model results on suppliers' credit lending

The cointegration equation stipulated in equation (vi) above shows the long-run relationship among the endogenous variables utilised in this paper. The equation below presents the results of the VECM, which also explains the short-run dynamics with SL as the dependent variable stationary in the first order.

$$\Delta SL_{it} = -\ 0.410200 ECT_{it-1} + 0.007409 \Delta SL_{it-1} - 0.054866 \Delta CoW_{it-1} + 0.145773 \Delta ConsE_{it-1} - 0.094664 \Delta EmGHG_{it-1} + + 1.530888 \qquad \text{(vii)}$$

The equation above was formulated based on the VECM estimates. Notwithstanding the importance of the speed of adjustment (negative 0.410200), attention is drawn to the coefficient values of the endogenous variables SL, CoW, ConsE and EmGHG. The results reveal that a percentage increase CoW will lead to a decline in SL by 5.5 percent. Similarly, a percentage increase in EmGHG will produce a decline of 9.5 percent in SL. However, an increase of 14.6 percent in SL will be realised because of a percentage increase in ConsE. However, Figure 2 above suggests that these effects are statistically insignificant as the P values C(2), C(3), C(4) and C(5) are greater than 5 percent. Thus, the null hypothesis of a short-run relationship between SL and environmental performance is rejected. The results of a follow-up Wald Test estimated from Eviews 13 in Figure 3 further confirm this assertion.

Consistent with the findings of the VECM estimates, the follow-up Wald Test results rejected the null hypothesis of a short-run relationship between environmental performance and SL. The Wald Test was performed using the equation with endogenous variables CoW, ConsE and EmGHG. The respective coefficients of these variables produced the F-statistic and Chi^2 of 62 percent and 61.8 percent, respectively. These values are statistically insignificant as they are greater than the probability value of 5 percent.

Test Statistic	Value	df	Probability
F-statistic	0.595984	(3, 78)	0.6195
Chi-square	1.787953	3	0.6176

Null Hypothesis: C(3)=C(4)=C(5)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(3)	-0.054866	0.255427
C(4)	0.145773	0.115391
C(5)	-0.094664	0.283498

Restrictions are linear in coefficients.

Figure 3. **Wald Test for sub-objective 3 short-run dynamics**
Source: Authors' compilation (2023).

4.3 Impulse responses of environmental performance measures to standard deviation shocks in suppliers' fidelity measure

Notwithstanding the insights obtained from the VECM results, the IRF analysis was performed to reinforce findings on the long-run and short-run dynamics specified in equation (vii) above. Thus, Eviews 13 was employed for this purpose, with SL as the target variable to produce impulses for ConsE, CoW and EmGHG. Although similar, figure 4 shows a sharp impact of one standard deviation shock to SL on ConsE between periods 1 and 2. This impact lessens going into year 3, when a peak is reached. The peak is maintained at a static state, which means that the response neither increases nor decreases for the foreseeable future. Additionally, Figure 5 indicates that the innovation in SL initially impacts CoW sharply for the first three years. Thereafter, the impulse response of CoW hits a steady state value from year 3 and beyond. Furthermore, the impulse response of EmGHG to one standard deviation shock in SL is congruent with the impulse responses exhibited by ConsE (see Figure 6). It is imperative to note that the IRFs in all cases presented below lie within the 95 percent confidence levels.

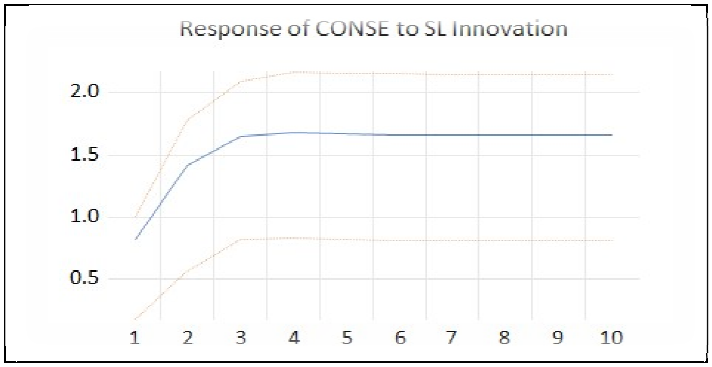

Figure 4. **Impulse response of ConsE to shocks in SL**

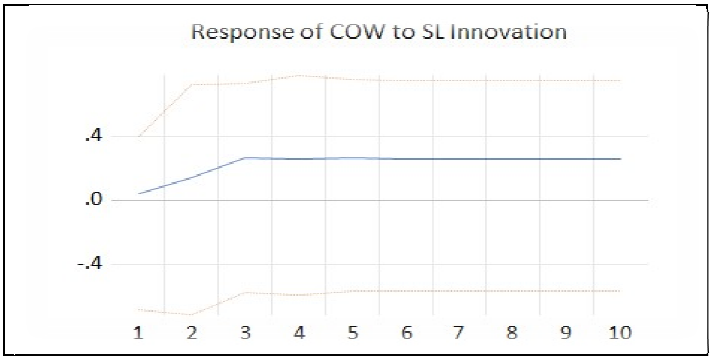

Figure 5. **Impulse response of CoW to shocks in SL**

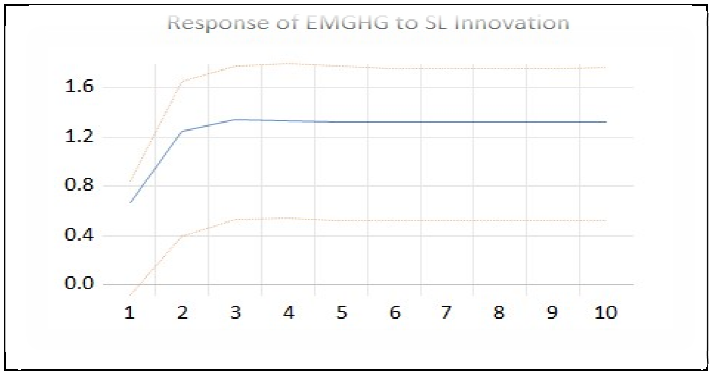

Figure 6. **Impulse response of EmGHG to shocks in SL**

The results of the IRF analysis, which was performed, are insightful in understanding the short-run and long-run dynamics of the variables concerned. Thus, on overage, one standard deviation shock to SL positively impacts EmGHG, CoW and ConsE in the first three years. However, CoW has a lesser impact than ConsE and EmGHG. This is consistent with the intuition expectation that suppliers may exhibit similar performance in the consumption of water.

5. CONCLUSION

The primary objective of this paper was to uncover the intricate dynamics, both in the short and long run, between corporate environmental performance and suppliers' credit lending. This study was driven by a notable gap in research that connects corporate environmental performance with suppliers' credit lending practices. Despite the growing prominence of green supply chain management, there has been a corresponding surge in environmental crises and scandals involving major corporations. Despite the efforts of policymakers to address these challenges, companies have persisted in neglecting environmental issues such as global warming, ecological concerns, reverse logistics, and global energy. By focusing on companies listed in the FTSE/JSE RII, a sample of 21 companies was selected using a judgemental sampling technique, and archival data was collected to create a short panel data set. This panel data set was then used for statistical analysis using the first differenced econometric models. The results revealed a statistically significant positive relationship in the long run between corporate environmental performance and suppliers' credit lending.

Interestingly, the same endogenous variables (SL, ConsE, EmGHG and CoW) showed a statistically significant negative relationship in the short run. These findings align with previous studies, suggesting suppliers are more interested in acquiring customers in the short run (Okunuga, 2022:232). Therefore, suppliers' short-term goals may not prioritize corporate environmental performance, with market growth taking precedence. However, sustainability practices become crucial to suppliers in the long run, as the buyer company is seen as a partner in maintaining a green supply chain. This implies that companies with visible environmental practices will likely gain suppliers' support in the long run. This study provides new insights into the supply chain management literature and offers fresh policy implications to lawmakers.

To summarise the findings generated in this paper, the F-statistic value of 0.004256 confirmed a statistically significant relationship between environmental performance and SL. In addition, the paper reports evidence of the long-run relationship since the cointegration coefficient of 0.410200 was negative and statistically significant at a P value of 0.0005. Moreover, the Adjusted R^2 validated these crucial findings by reflecting a 14 percent value for the PLS estimations. These results were congruent with the IRF analysis executed using the model variables to gain more insight into the short-run and long-run dynamics. Thus, the IRFs show that one standard deviation shock to SL positively impacted EmGHG, CoW and ConsE. Although the IRFs are within the positive region in all cases, it was evident that CoW has a lesser impact than ConsE and EmGHG. The results were consistent with the intuition expectation that suppliers may exhibit similar performance in the consumption of water.

The VECM and PLS estimations were generated to examine the short-run dynamics among variables. The results suggested that short-run coefficients in the model are statistically insignificant since, for these coefficients, $P > 0.05$. Thus, the null hypothesis in support of a short-run relationship between SL and environmental performance was rejected. Furthermore, the results of a follow-up Wald Test estimated from Eviews 13 confirmed the results of the PLS estimations. The Wald Test results rejected the null hypothesis of a short-run relationship between environmental performance and SL. This test was performed using the equation with endogenous variables CoW, ConsE and EmGHG. The respective coefficients of these variables produced the F-statistic and Chi^2 of 62 percent and 61.8 percent, respectively. In support of these results, the SL did not provide evidence of correlation when paired with the main environmental performance exposure variables, namely CoW, ConsE and EmGHG. Instead, statistically acceptable positive associations were only observed with control variables MvCOL, LvP and CoSZ. These control variables generated positive correlation coefficient values

where P < 0.05. To further confirm these claims, the pairwise correlation produced correlation coefficient values of 0.076, 0.083 and 0.110 for the three environmental performance predictors. These indicate no correlation since the corresponding P values are higher than 0.05 acceptable significance level. Drawing from the findings of this paper, Figure 7 shows a schematic diagram of the suggested conceptual framework.

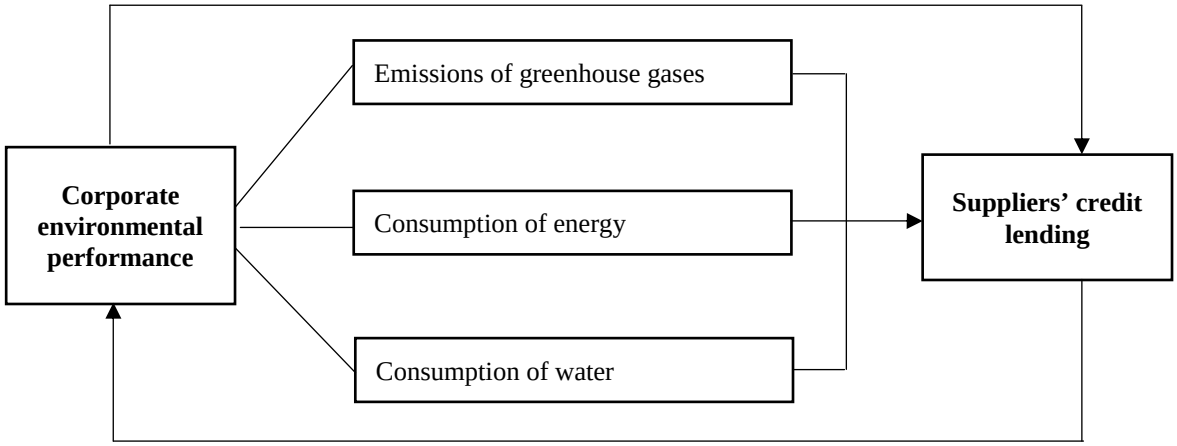

Figure 7. **The proposed conceptual framework**

Source: Authors' compilation (2023).

Limitations of the study

Although insightful, the main constraint of the paper stems from the use of the content analysis methodology. The data obtained using this approach may be subjective since the quality of sustainability reporting is still questioned. Moreover, using mainly IARs and sustainability reports (SRs) has been criticised for underestimating the quality and quantity of environmental data disclosed by companies on various platforms (Shelley & Barker, 2016:307). Thus, the communication channel selected for this paper (IARs and SRs) may be rendered incomplete regarding reporting on environmental performance. However, future research could combine content analysis with interviews and survey questionnaires to solicit the preparer's and users' views. Moreover, future research may also seek to understand the responsiveness of other key supply chain members to corporates' environmental performance.

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