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We perform while we go green! Green procurement as a responsible environmental tool for the performance of manufacturing enterprises in Tanzania

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Abstract

Purpose – This study examines the relationship between green procurement practices and manufacturing enterprises' performance in Tanzania.

Design/methodology/approach – This study employed cross-sectional design to collect quantitative data from 56 procurement managers of large manufacturing enterprises in Temeke Municipality in Tanzania, whereby an ordinal logistic regression hypothesized the relationship between green procurement practices and performance.

Findings – The study's main findings unveiled that green procurement practices, which include green specifications, green procurement awareness, reverse logistics and green procurement enforcement mechanisms, are crucial in enhancing the performance of manufacturing enterprises in Tanzania.

Research limitations/implications – This study didn't investigate how green procurement is engaged for different categories of green products and consumer segments. Therefore, future studies should describe how different categories of green products and consumer segments are embracing green procurement practices.

Practical implications – The study calls for capacity building on green procurement towards manufacturing performance. This is crucial as green procurement is found to improve performance through cost reduction. Furthermore, policy and legal strengthening towards eco-friendly practices are needed. This may be relevant as fostered by sustainable development goal number 12.

Originality/value – This study contributes to the application of eco-friendly procurement practices as the vehicle towards the performance of manufacturing enterprises of developing nations, including Tanzania. Theoretically, the study disclosed the application of the stakeholder's theory in the green procurement of manufacturing enterprises of Tanzania through the inclusion of environment-friendly attributes.

Keywords Green procurement awareness, Green specifications, Reverse logistics, Green procurement enforcement mechanisms

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1. Introduction

Environmental awareness is today's critical concern (Prakash, Sharma, Singh, Vijayvargy, & Nilaish, 2023). Strong sustainability practices are important in safeguarding the environment responsibly (Shehawy *et al.*, 2024; Elias & Changalima, 2024; Mwenda, Israel, & Mahuwi, 2023; Odongo & Kazungu, 2023). It is worth noting that procurement is the major feeder of what is consumed and produced by manufacturing enterprises (Lysons & Farrington, 2006). Sustainable Development Goals (SDGs) encourage responsible production and consumption via goal number 12. Thus, green procurement is regarded as an added ingredient needed to enhance environmental performance (Kimario, Ernest, Festo, Nicodemus, & Shilemba, 2023). This calls for products that are integrated with environmental features and specifications (Mwenda *et al.*, 2023). Additionally, this process encourages early supplier involvement, increasing the purchasing of environment-friendly products with minimum waste emissions (Menon & Ravi, 2022).

Early green supplier involvement is a communication aspect crucial for the relationship between the procuring entity and the supplier (Kimario & Mwagike, 2021). In developed nations, green procurement practices have emerged as the new-fanged competitive edge (Mojumder, Singh, Kumar, & Liu, 2022). It has been detailed that there is a high cost in the management of green procurement (Chersan, Dumitru, Gorgan, & Gorgan, 2020). Most of the Organisation for Economic Co-operation and Development (OECD) countries have developed policies in favor of environmental ambitions in the procurement practice whilst monitoring their outcomes (Daugbjerg, 2023). Also, green procurement needs to be accompanied by leadership commitment (Sharma, Raut, Sehrawat, & Ishizaka, 2023). On the same weight, reverse logistics practices are associated with green buying (Pinto, 2023). The move to ensure performance of operations is executed in favor of the efficacy of the enterprises recognized prior supplier involvement as vital (Menon & Ravi, 2022).

Green procurement practices are now at the forefront of developing countries, considering the advantage reaped by developed countries. The emphasis from Kenya is pointed towards having an environmental policy in favor of green procurement practices (Mutangili, 2025). Equally important, the suppliers to be engaged should be advanced of environmental concerns so that they can deliver sustainably (Effendi, Widjanarko, & Sugandini, 2021). The perception and the decisions of the top management vested in the leadership serve as one of the central keys to the adoption of green procurement (Guo, Sarpong, Asante Antwi, & Adjei Mensah, 2020). Nevertheless, the specific way that such green procurement practices reduce manufacturing costs is not well known. Generally, reverse logistics is documented as of the same essence (Daniel, 2023). A study by Langat and Otieno (2022) from Kenya recommends that future studies should focus on analyzing the affiliation of green procurement with the efficiency of enterprises. Equally important, there is considerable variation between Kenya and Tanzania; it is in the rationale of those concepts that this study is aimed at analyzing the relationship between those practices and the performance in the milieu of manufacturing enterprises in Tanzania.

In a more specific way, Orio (2020) described the environmental concerns of procurement in the public sector of Tanzania as highly connected to top management support, specification process and engagement of suppliers. Moreover, attributes tested by Orio (2020) needed to be tested in the milieu of similar private enterprises in Tanzania using inferential statistical analysis to reveal the existing causation between green procurement practices versus the performance of manufacturing operations in the setting of the private sector. The situation further describes that green procurement policy in the government-owned institution is of great help (Mangula, 2019). Apart from that, for the sustainability of the entity's procurement, there should be a commitment of the top management towards the acquisition of environmental user-friendly products in tour-related small enterprises (Masele, 2019). The findings of Mangula (2019) and Masele (2019) prompted the need to test scientifically the same attributes in the milieu of manufacturing enterprises of the private sector. In Tanzania, green procurement is insisted on in the Public Procurement Act (PPA) of 2022, which guides public procuring enterprises only (United Republic of Tanzania (URT), 2022a). Therefore,

privately owned manufacturing enterprises lack specific laws and regulations addressing them, leaving them regulated by the National Environment Management Act (NEMA) (URT, 2004) and National Environmental Policy (URT, 2022b) alone. It is insisted that green specifications are of the essence in public procurement (URT, 2022a). This study aimed at examining green procurement practices in the milieu of privately owned manufacturing enterprises in Tanzania, given the considerable variation of goals of the public sector and those of the private sector.

Large manufacturing enterprises are documented to cherish fashionable best practices for their performance (Kimario & Mwagike, 2024; Kamau, 2013). Environmental concern is described as essential for curbing pollution (Oguge, 2020). The reality has been the opposite, as evidenced by charges for noncompliance with environmental best practices (URT, 2016). Penalties are charged due to the emission of waste from the manufacturing operations. Green innovation is described by the developed nations as one of the aspects of the Environmental Social Governance agenda to be accommodated by the enterprises for the welfare of the environment (Zheng, Feng, Jiang, & Chang, 2022). Tanzania is envisioned to transform its economy into a semi-industrialized one by 2025 (URT, 2017). Therefore, it is very important to intervene in a scholarly manner; otherwise, such expectations will be hampered.

Previous study by Shehawy (2023) highlighted that developed nations are more cherishing green procurement behavior compared to the developing ones. However, there is a global move to support manufacturing operational investments that are environment-friendly (Núñez, Velloso, & Da Silva, 2022). Therefore, given what has been argued by Shehawy (2023) versus Núñez *et al.* (2022), it remained very crucial to undertake this study in the context of developing nations using Tanzanian manufacturing firms so that developing nations may not be disadvantaged in terms of their investments. Green procurement remains a valuable tool for bringing in consumables that are environmentally responsible. Moreover, how each procurement practice is associated with the performance of the enterprises was not well articulated until the results of hypothesis testing were disclosed through analysis of the cause-and-effect relationship between the two. Therefore, the main objective of this study was to examine the link between green procurement practices and the performance of manufacturing enterprises specifically by achieving the following;

RQ1. To describe the relationship between green procurement awareness and the performance in manufacturing enterprises in Tanzania.

RQ2. To analyze the relationship between green procurement specifications and the performance of manufacturing enterprises in Tanzania.

RQ3. To explain the relationship between reverse logistics and the performance of manufacturing enterprises in Tanzania.

RQ4. To describe the relationship between green procurement enforcement mechanisms and the performance of manufacturing enterprises in Tanzania.

Also, to achieve the specific objectives of this study, the following research questions were considered important to be answered to address the study problem scientifically;

RQ1 Does green procurement awareness influence performance in manufacturing enterprises in Tanzania?

RQ2 Do green procurement specifications influence the performance of manufacturing enterprises in Tanzania?

RQ3 How does reverse logistics influence the performance of manufacturing enterprises in Tanzania?

RQ4 Do green procurement enforcement mechanisms influence the performance of manufacturing enterprises in Tanzania?

2. Theoretical review and study hypotheses

2.1 Stakeholder theory

Stakeholder theory was founded by Edward Freeman (Freeman, 1984). Specifically, stakeholder theory addresses morals and values for the management of organizations (Freeman, Dmytriyev, & Phillips, 2021). The theory has successfully identified two major types of organizational stakeholders as internal and external stakeholders. Stakeholder Theory is premised on the postulation that enterprises are efficacious when they serve the purposes of a large proportion of their stakeholder. This signifies that, among other things, such as profile, environmental safeguarding is also of fundamental importance. The theory values that strategic management accounts for multiple constituencies surrounding the enterprises (Bouguerra, Hughes, Cakir, & Tatoglu, 2023). The theory argues that different stakeholders of the manufacturing enterprise's organizations are supposed to be integrated to exert pressure on green management practices (Waheed, Shahid Khan, Warraich, & Ali, 2024; Shahzad, Qu, Ur Rehman, Ding, & Razzaq, 2022). The relevance of this theory matches the research questions and hypothetical relationship in order to keep clarity of the findings, as insisted by Panda and Mohapatra (2024), through showing how different green procurement practices serve as an antecedent for the performance. Stakeholders' expectations center on the green procurement awareness and the incorporation of environment-friendly specifications in procurement (Changalima *et al.*, 2021; Shehawy *et al.*, 2024). Literature further advocates that stakeholders of green procurement who are enforcing mechanisms for implementation of environmental user-friendly practices are more likely to yield better outcomes (Singh, Singh, Singh, & Misra, 2024; Shadrina, Vinogradov, & Kashin, 2022). Reverse logistics is further detailed as another interesting part of stakeholder analysis, requiring the entire supply chain actors to move back the unusable products from the ultimate consumers backwardly to the point of origin for different reasons, such as recycling, re-use, re-manufacturing, damage and shipping overage, all leading to sustainable performance (Salas-Navarro, Castro-García, Assan-Barrios, Vergara-Bujato, & Zamora-Musa, 2024). However, the stakeholder theory has been criticized for holding the assumption that various stakeholders of the organization are equally and mutually serving their interests, contrary to the Patriotic Conception of Corporations (Wright, 2004). Despite the criticism made to stakeholder theory, it guided this study because stakeholder analysis has been used in Corporate Social Responsibility (CSR) methods (Nwogu, 2023). CSR is of high stake for the well-being of relationships in the community (Bandeira Pinheiro *et al.*, 2021). Therefore, since green procurement is one of the drivers of CSR, then the same theory appears to be highly relevant to this study (Hsu & Chen, 2023). Moreover, green procurement is documented to involve either of the following stakeholders: users and/or suppliers (Kabra, Srivastava, & Ghosh, 2023).

2.2 Study's hypotheses

Stakeholders' theory advocates that different stakeholders can be internal and external and are required to integrate to achieve the corporate goals of the enterprises. Green procurement practices as a global agenda need to integrate different actors through their practices. On the same trend, the following stakeholders are mentioned as of key importance in accomplishing the mission of green procurement: users who facilitate the designing of specifications, top management through approvals of green innovations, suppliers to be engaged, the government through the development of policies, rules and regulations, and generally all actors of the supply chain who manage logistics (Ramoglou, Zyglidopoulos, & Papadopoulou, 2023). Further, to come up with the hypotheses, different empirical gaps were identified from the findings of the previous studies as follows.

2.2.1 Green procurement awareness and performance in manufacturing enterprises. Green procurement awareness and the performance of manufacturing enterprises are highly related to each other (Zameer, Wang, & Yasmeen, 2020). The readiness of consumers, including

procuring entities, to utilize environmental user-friendly products is linked to the performance of firms (Shehawy & Khan, 2024). Green procurement is a newly adopted, fashionable supply chain management practice that demands society's awareness of its relevance (Kimario *et al.*, 2023). However, since the study of Kimario *et al.* (2023) was conducted empirically and at the same time called for quantitative findings aiming at testing the hypotheses mathematically, it was therefore prompted to conduct this scientific investigation under hypothetical deductive testing by means of the following hypothesis for wide generalizations;

H1. Green procurement awareness influences performance in manufacturing enterprises.

2.2.2 Green specifications and performance in manufacturing enterprises. The use of environmental user-friendly requirements in procurement during the specification process is detailed to be useful for the performance of firms (Awino, 2025; Magoma, Kimario, & Kasheshi, 2024; Effendi *et al.*, 2021). The professional supplier selection is the one that takes into consideration the use of suppliers who shall deliver environmental user-friendly products (Nongwe & Shatta, 2025). However, the study described that the procurement of requirements that are user-friendly to the environment is a challenge for developing countries due to the high cost involved (Orio, 2020). Since this study is conducted in the context of a developing country using the Tanzanian manufacturing environment as a reference, it remained very crucial to establish the following hypothesis to rule out whether the use of environmental user-friendly requirements in procurement during specification affects the performance of firms in developing countries.

H2. Incorporation of environmental user-friendly requirements in procurement influences the performance of manufacturing enterprises.

2.2.3 Reverse logistics and the performance of manufacturing enterprises.. Practices of reverse logistics, such as reuse, recycling and re-manufacturing, are documented to be in practice for the performance of firms in developed countries (Salas-Navarro *et al.*, 2024; Ni, Chan, & Tan, 2023; Yang & Thoo, 2023). Contrarily, the practices from developing countries such as Tanzania disclosed the extent of sticking to green procurement, yet it is not promising (Mwenda *et al.*, 2023). Having in difference between the application of reverse logistics in developed countries and developing ones despite the emphasis of the United Nations (Halkos & Gkampoura, 2021), which fosters the need for responsible production and consumption, has motivated the need to test the below proposed hypothesis in the context of a developing country for fair global generalization;

H3. Reverse logistics influences the performance of manufacturing enterprises.

2.2.4 Green procurement enforcement mechanisms versus manufacturing performance. The use of green procurement enforcement mechanisms, such as environment-friendly policies, laws and regulations in procurement, is articulated by different nations as useful for performance (Odongo & Kazungu, 2023; Zameer *et al.*, 2020). However, policies, laws and regulations about the general conduct of doing things vary across different nations based on the environmental setup of a particular state. Therefore, due to considerable variations among nations, the following hypothesis was hypothesized to determine if green procurement enforcement mechanisms can be harmonized across different nations due to their versatility:

H4. The use of green procurement enforcement mechanisms influences the performance of manufacturing enterprises.

2.3 Conceptual framework

Figure 1 shows a diagrammatic representation of the relationship between green procurement practices and the enterprise's performance. Specifically, green specifications, green procurement awareness, reverse logistics and green procurement enforcement mechanisms

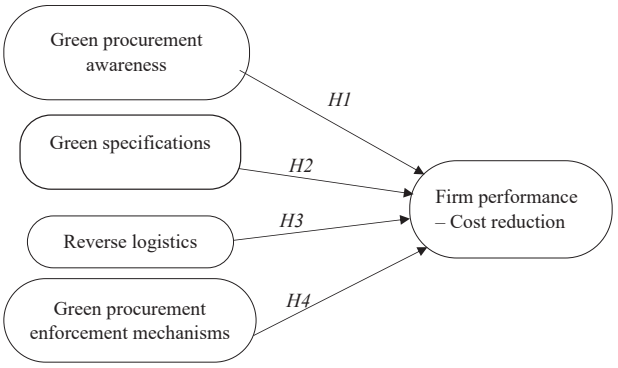

Figure 1. Conceptual framework. Source(s): Adopted from the literature review (2023)

serve as the independent variables influencing the enterprise's performance, which was used as the dependent variable of this study.

3. Methodology

3.1 Study area and approach

This study was conducted in Temeke Municipality in Dar es Salaam-Tanzania. The study was done in this area, which is characterized by several large manufacturing enterprises. This is the case as 56 of those enterprises, which correspond to 54% of all the large manufacturing enterprises in Tanzania, are situated in Temeke (URT, 2016). That is why the area has been considered the country's paramount manufacturing zone (URT, 2015). The related study, which analyzed the relationship between supply chain management practices and the performance of manufacturing enterprises in Tanzania, chose Temeke (Kimario and Mwagike, 2024). On the other hand, the study employed a quantitative approach, which is suitable once there is a necessity for subjecting hypotheses and theories to testing (Creswell & Creswell, 2018). Thus, the approach has enabled it to elucidate the connection between green procurement practices and performance whilst testing the relevant theories via the expressed hypothesis in Tanzania.

3.2 Sampling and data collection procedure

The study included large manufacturing enterprises at the Temeke Municipal Council from the Dar es Salaam region. The study included all 56 enterprises in the sample size, as the number in the target population was manageable. Therefore, the complete enumeration (census approach) was preferred to include all enterprises, as the sample size and hence fair representation of the findings. The use of the census approach reduces bias with its exceptional advantage of an increase in accuracy due to a more fair representation of the study population (Davis, 2021). Other procurement and supply chain management-related studies that opted for a census approach had the following sample size: Kamau (2013) – 56, Kimario and Kira (2023) – 102 and Mwakyeja and Kimario (2024) – 67, and hence, the sample size used in this study was within the common range of the previous studies. Managers who are responsible for procurement activities in the respective enterprises were purposely chosen as they have pertinent knowledge regarding matters of procurement within enterprises. The approached managers were given structured questionnaires which comprised main questions on the aspects of green procurement practices and performance. Data were collected only once; hence, a cross-sectional design was used. For validity concerns, it studies mathematically checked both discriminant and construct validity. Discriminant validity was evaluated through

the Heterotrait-Monotrait (HTMT) ratio, while construct validity was average variance extracted (AVE). In order to ensure the validity of the sample, Kaiser–Meyer–Olkin (KMO) was used to check on the adequacy of the sample before the inferential statistical analysis. Also, in order to ensure the data dealt with are clean, diagnostic tests such as linearity tests using Nagelkereke-adjusted R-square and multicollinearity were done prior to inferential statistical analysis of the ordinal regression technique (French & Shotwell, 2022). However, there was no big issue with the quality of the data, and perhaps if it could have been raised as an issue, some value would have been deleted. However, the normality test was not that useful given the smallness of the sample size (Shatz, 2024).

3.3 Operationalization of study variables and data analysis techniques.

The study has two main variables, independent and dependent variables. Green procurement practices include several variables that were measured on the 5-point Likert scale. The variables include green procurement awareness (prior involvement of the suppliers before preparation of specification to inquire information on how to take care environmental considerations and familiarity with green procurement), green specification (preparation of environmentally responsible requirements), reverse logistics (backward movement of materials for re-use, recycling, re-manufacturing and shipping errors) and green procurement enforcement mechanisms (compliance to policies, laws and regulations on acquisition of environmentally user friend products). Other social science scholars who analyzed their scientific best practices using the ordinal scale with 5 points are Changalima and Kimario (2025), Magoma (2021), Mushi, Mwaiseje and Changalima (2021) and Magoma, Mwakolo, Ernest and Letema (2019). On the other hand, the performance of manufacturing enterprises was measured using the reduction of the cost linked with the emission of harmful by-products to the environment on an ordinal scale. Reduction of cost as a performance index was conceptualized by minimized penalties resulting from environmental non-compliance. Since there is no standard measure for gauging the amount of penalty charged on different occasions, it remained very useful to gather these data expressively using ordinal responses similar to what was done by other social scientists, such as Mwakyeja and Kimario (2024) and Matimbwa and Kamala (2024), who counter-checked a similar phenomenon. Disparately, aliening with the study's purpose to test the link between green procurement practices and performance, ordinal logistic regression analysis was utilized. More specifically, the choice of ordinal regression techniques was prompted by the presence of a cause-and-effect relationship featured by multiple categorical ordinal independent variables and one dependent ordinal variable (Mishra, Pandey, Singh, Keshri, & Sabaretnam, 2019). Further, the ordinal regression technique tested all hypotheses at a confidence interval of 95% allowing a degree of error of only 5% (p-value of 0.005).

3.4 Methodology chart

Figure 2 shows the summary of the methods used in this study in the form of research strategies, sampling/census approach, data collection and analysis techniques.

4. Findings and discussions

4.1 Reliability and validity tests of the findings

To ensure the internal consistency of this study, Cronbach alpha approach was used to check for the reliability of the study. The results showed that all coefficients were above 0.7 and hence reliable as ruled by Purwanto, Asbari, Santoso, Paramarta, and Sunarsi (2020). The findings were as follows: green procurement awareness (0.78), green specification (0.74), reverse logistics (0.82) and green procurement enforcement mechanisms (0.74). The Statistical Package for the Social Sciences (SPSS) results demonstrated that the sample sufficiency index from KMO, which matches the magnitudes of the perceived correlation

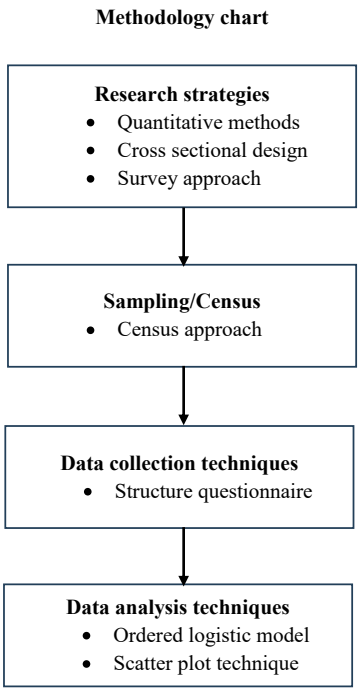

Figure 2. Methodology chart of the study. Source(s): Summary of methodology (2024)

coefficients as compared to the partial ones for the aggregate summation of learning variables, is 0.542 and hence valid because it is over 0.5. The study further tested validity mathematically by means of both discriminant and construct validity. Discriminant validity was evaluated to check for external validity through the HTMT, while construct validity was assessed to check for internal validity using AVE.

In Table 1, the HTMT value between green procurement practices and the performance of enterprises was 0.83. This was lower than the threshold cut-off value of 0.85 recommended by Dirgiatmo (2023). The distinction between green procurement practices and the performance of enterprises confirms the absence of overlap, thereby establishing discriminant validity.

According to Table 2, the AVE value for green procurement practices was 0.78. dos Santos and Cirillo (2023) indicated that an AVE of 0.5 or greater signifies construct validity.

4.2 Diagnostic tests of the findings

The principles of inferential statistical analysis argue that undertaking diagnostic tests is very useful (Garren & Osborne, 2021). Therefore, linearity and multicollinearity were remained tested to facilitate the running of ordinal logistic regression. Nagelkerke *R*-square was used to

Table 1. Discriminant validity (HTMT)

Construct	Green procurement practices	Performance of enterprises
Green procurement practices	0.74	
Performance of enterprises	0.83	0.62

Source(s): Field Data (2023)

Table 2. Convergent validity (AVE)

Construct	Average variance extracted (AVE)
Green procurement practices	0.78

Source(s): Field Data (2023)

check the extent, whereby the value was 76.5%. The obtained value shows that predicting variables (green procurement awareness, green specification, reverse logistics and green procurement enforcement mechanisms) jointly explain 76.5% of the variance of the dependent variable. The best practice reveals that the obtained pseudo R^2 must be greater than 10% (Falk & Miller, 1992). Interestingly, the R^2 was 76.5%; therefore, it was confirmed that the chosen model aligned with the used data. Moreover, the analysis of pseudo R^2 in ordinal regression because of the heteroscedasticity of the data was conducted. Besides that, the log likelihood ratio test was employed. The findings for model fitting information gave values of −2 log probability for the intercept-only and ultimate model, and a chi-square test to check the change between the −2LL associated with those two models. The statistically significant chi-square statistics ($p < 0.0001$) indicate that the final model is fit (Willis, 2010). The model chi-square of 766 and $p < 0.001$ implies significant effects of green procurement practices on performance, as ruled by Turhan (2020). On the multicollinearity tests, the ideal situation is that independent variables should not be extremely related. It has been opined that Variance Inflation Factor (VIF) is the most authoritative technique for testing multicollinearity. Therefore, multicollinearity was tested with a VIF greater than 5, indicating the existence of multicollinearity as recommended (Shrestha, 2020). The values of the predictor variables were all less than 5, as indicated in Table 3, and hence, it is evident that there is multicollinearity.

4.3 Results on ordinal logistic regression for study's hypotheses

The researcher's next step, after satisfying that the assumptions of ordinal regression had been tested satisfactorily, was to get into inferential statistical scrutiny by subjecting the hypothesis to real testing (Mishra *et al.*, 2019). During the interpretation of ordinal regression outcomes, the significance (p) value becomes noteworthy once it is below 0.05, designating the tolerable degree of error as only 5% (Di Leo & Sardanelli, 2020). Thus, hypotheses whose p-values were below 0.05 were supported significantly, as presented in Table 4.

4.3.1 Green procurement awareness. Table 4 reveals that the p-value of green procurement awareness is <0.001 and the β-value of 1.26 is crucial at $p < 0.05$, $\beta > 1$. Therefore, the findings reveal that manufacturing enterprises ought to offer support on performance-related outcomes, as evidenced by the results of the surveyed enterprises, and hence, the H2 was accepted. It is worth noting that large manufacturing enterprises buy large volumes of materials and plant

Table 3. Multicollinearity tests

Model	Collinearity statistics Tolerance	VIF
Green procurement awareness	0.40	4.0
Green specifications	0.72	1.5
Reverse logistics	0.69	1.4
Green procurement enforcement mechanisms	0.30	3.6

Source(s): Field Data (2022)

Table 4. OLS results on green procurement practices vs. performance

Practices	Estimate	Wald statistics	Df	Sig.	95% Confidence interval Lower bound	Upper bound
Green procurement awareness	1.26	43.41	1	0.000	0.89	1.63
Green specifications	0.50	9.19	1	0.002	0.18	0.82
Reverse logistics	0.55	10.17	1	0.001	0.21	0.89
Green procurement enforcement mechanisms	0.37	11.29	1	0.001	0.15	0.56

Note(s): Nagelkerke $R^2 = 0.765$

Source(s): Field Data (2022)

machinery with long life cycles. Green products involve eventual high costs because of their nature, while in reality, the total ownership cost (total acquisition cost) is very low in the course of usage of the items, comparatively. The great emphasis of the actors of the buying enterprises has always been on immediate cost-cutting measures. Therefore, immediate cost-cutting measures are the knowledge that everyone has in the country, given the fact that most of the items produced by the manufacturers for local consumption are not required to meet environmental standards as demanding as those to be exported to the foreign market. Based on the prevailing circumstances, it is purely evident that there is a lack of sufficient knowledge on green procurement practices in developing nations; it is one of the aspects that impairs the performance of manufacturing enterprises. Therefore, the awareness should be well directed towards eco-friendly products during purchases to ensure that products procured are matched with SDG number 12, which encourages the need for manufacturing firms to produce and consume environmental user-friendly products. Generally, the findings concur with those of the previous findings from China, which reinforced the need for investing in green procurement awareness and hence a global concern (Zameer *et al.*, 2020; Guo *et al.*, 2020).

4.3.2 Green specifications. Table 4 shows that the *p*-value of green specifications is 0.002, and the β-value is 0.50, and hence, H1 was accepted at $p < 0.05$, $\beta > 1$. Specifically, the need for users to develop specifications that are user-friendly to the environment is highly urged. Manufacturing operations do purchase a variety of materials, equipment and machines, all of which are supposed to be utilized in a way that protects the environment. The use of eco-design aimed at purchasing products that are user-friendly to the environment is a global agenda in line with SDG 12, because the root cause of environmental degradation originates from the specification of the items. The findings concur with the findings of another study conducted in Tanzania that argued that the adoption of green specifications in the operations of enterprises is paramount (Mwenda *et al.*, 2023). Equally important, the findings reveal that while developed nations have already adopted this communication philosophy, emerging economies are still lagging behind at the expense of environmentalists' pressure. Furthermore, the findings concur with the previous scholar from Indonesia who called for the need to ensure the effective involvement of the suppliers in the green procurement procedures as an approach to enhancing the best results (Effendi *et al.*, 2021). Therefore, these findings support those of the previous findings conducted in the context of other developing nations, both from Africa and Asia.

4.3.3 Reverse logistics. Table 4 reveals that the *p*-value for the relationship between reverse logistics and performance is 0.001 and the β-value is 0.55. Therefore, the H3 was accepted significantly at $p < 0.05$ and $\beta > 1$. Thus, the manufacturing enterprises are supposed to make sure that their end products are conveniently stirred back across the supply chain systems to the manufacturing enterprises for diverse motives such as shipping errors, re-use, re-manufacturing and recycling. This situation is smoothed by ensuring that the nature of packaging materials aligns with reverse logistics chucks as insisted by SDG number 12 to act environment-friendly in manufacturing operations. Reusable and recyclable materials

continuously need a slice to do with eco-design, packaging, value analysis and value engineering. The findings show how reverse logistics plays a pivotal role in the sustainability of enterprises, as supported by the findings from other nations. Among the previous findings detailing how reverse logistics enhances performance is Mwenda *et al.* (2023), which supports this study's findings. Despite the diversity of the scope of the study of Mwenda *et al.* (2023), which concentrated on food processing as compared to this study, which concentrated on manufacturing, consistency shows that reverse logistics is of great importance for the financial performance of the firms.

4.3.4 Green procurement enforcement mechanisms. The study also supports H4 of green procurement enforcement mechanisms on the performance of manufacturing enterprises, given its *p*-value of 0.001 and the β-value of 0.37 at $p < 0.05$ and $\beta > 1$. Specifically, the manufacturing enterprises within Tanzania rely on the policy of National Environment Management Council (NEMC). However, NEMC is responsible for overseeing all aspects of environmental policy in the whole country. Most of the manufacturing enterprises of Tanzania are privately owned, and hence, when it comes to green innovations, they are guided by the policies of NEMC. The case is very different in the public sector, where green procurement is overseen by both the Public Procurement Policy and the National Environmental Policy. The established Public Procurement Policy is strictly confined to the acquisition of requirements for government-owned institutions and those of the private-oriented sector, which are funded by taxpayers' funds. Based on the scenario, there is no specific policy addressing green procurement aspects of all enterprises, regardless of their ownership. Generally, the findings show that policies in favor of the environment are of fundamental importance for the efficiency of operations (Odongo & Kazungu, 2023). Green procurement rules are fashioned by enforcing procurement in favor of environmental protection. The green procurement conducted by manufacturing enterprises of Tanzania, which, of course, are privately owned, is guided by NEMA (URT, 2004). The instance is quite different for green procurement conduct of the public sector, where there is double enforcement from the Public Procurement Act of 2022 and the National Environmental Management Act of 2004. Given the fact that the Public Procurement Act of the country governs only public entities, compliance with the rules is higher in the public-oriented sector as compared to the private industrial sector. Equally important, the established regulations clarifying more on how to specifically implement green procurement in manufacturing operations are of prime importance. The findings concur with other previous studies of Odongo and Kazungu (2023) conducted in the neighboring country of Kenya, and hence, it can be ruled out that, regardless of the variation of these two countries in terms of social, cultural and economic factors, the emphasis is on ensuring an enforceable mechanism for the implementation of green procurement. Further compliance with environmental policies, laws and regulations serves as part of the implementation of SDG 12.

5. Conclusion, implications and limitations

5.1 Conclusion

Generally, the study provides novel insights by showing how stakeholder theory is a resource advantage for awakening different stakeholders of business by describing that green procurement practices should be animated to ensure responsible production and consumption of manufacturing enterprises, as advocated by SDG 12. Specifically, green specifications, awareness of green procurement, reverse logistics and enactment of the policies, rules and regulations in the interest of green procurement are of fundamental prominence. Correspondingly, the practices that are related to green procurement, which are employed in other parts of the world, are supposed to be accommodated for the manufacturing enterprises of developing countries, including Tanzania. Therefore, it remained imperative to rule out that we perform well when we go green in procurement undertakings.

5.2 Implications of the study findings

5.2.1 Practical implications. Given the emphasis on SDG 12 of Responsible Production and Consumption, the government of the United Republic of Tanzania, through the Ministry of Environment and Climate Change, is recommended to facilitate capacity building to manufacturing enterprises on how procurement practices should be embraced in favor of environmental consideration through green specifications and reverse logistics and compliance with the statutory requirements. Moreover, capacity building should start with top management, given the fact that they have been thinking green products are very expensive, while, in reality, failure to use green procurement attracts double impact on the cost structure of the enterprises and the society at large. Also, it is advised that there should be a very specific green procurement policy, for which therefrom formulation of specific laws and regulations on green procurement shall also be done.

5.2.2 Theoretical implications. The study has disclosed the application of stakeholder theory in the local context of manufacturing enterprises in Tanzania by describing how different stakeholders, such as manufacturing firms, environmentalists, suppliers, policy and law-making bodies, are supposed to cooperate to ensure the acquisition of environmental user-friendly products by the organizations.

5.3 Limitations of the study

This study has succeeded in disclosing the cause-and-effect relationship that exists between green procurement practices and the performance of manufacturing enterprises. However, it didn't further investigate how different green procurement is engaged for different categories of green products and consumer segments. Therefore, future studies should extend the knowledge by describing how different categories of green products and consumer segments are embracing green procurement practices. Also, this study is limited to analyzing the cause-and-effect relationship that exists between green procurement practices and enterprise performance using a cross-sectional design approach. Given the global inclination to investigate the role of environmental best practices in the circular economy, future studies should be extended to examining green procurement practices for the circular economy of Tanzania. Furthermore, since green procurement is a best practice that has been adopted in recent decades, it is suggested that future studies should use a longitudinal design to track how green procurement is embraced over time.

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