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Beyond greenwashing: Green supply chain management, environmental performance, and economic success in Ethiopia's bottled water industry

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A B S T R A C T

Ethiopia's bottled water industry faces mounting pressure to balance economic growth with environmental responsibility. This study investigates the effect of green supply chain management (GSCM) on Ethiopian bottled water companies' economic performance, with environmental performance as a potential mediator. We employ structural equation modelling (SEM) on survey data from managers of 99 bottled water firms in Ethiopia. The findings revealed that while some GSCM practices indirectly enhance the bottom line through improved environmental impacts, others, like investment recovery initiatives, directly enhance economic performance. Notably, the study demonstrates that GSCM fosters an environmentally sustainable future for Ethiopia's bottled water industry, where environmental responsibility ultimately leads to long-term economic performance. This research offers valuable insights for policymakers and stakeholders seeking to promote balanced environmental and economic growth within the Ethiopian bottled water industry, moving beyond mere "greenwashing" towards genuine sustainability.

1. Introduction

In the present-day global economy, sustainability in the industry is an issue that is a central point for producers who are under the influence of consumer demands and the enforcement of environmental regulations (Lai et al., 2023). On the other hand, businesses have to figure out how to achieve both economic growth and environmental responsibility in such a highly competitive market (Susitha, 2023). Many scholars have agreed that integrating environmental aspects into conventional supply chain operations and helping achieve sustainability is green supply chain management (Ali et al., 2022; Gandhi & Vasudevan, 2023). In green supply chain management, there is a vast range of practices such as green purchasing, customer cooperation, internal environmental management, eco-design, and investment recovery, all of which are meant to reduce environmental impacts throughout the supply chain (Moreira et al., 2022; Mughal et al., 2023). However, proactive GSCM practices can help improve the environmental impact of the industry (Chatzoudes & Chatzoglou, 2023; Shahzad et al., 2022). Previous studies have emphasized the significance of GSCM practices in enhancing economic performance (Bolaji et al., 2022; Park et al., 2022). Such findings have motivated many organizations to embrace GSCM practices as a means to gain a competitive advantage, making it a valuable strategy for manufacturers looking to balance environmental responsibility with economic success. However, there is still a notable gap in understanding the immediate impact of individual GSCM practices on economic performance. This research addresses this gap by analysing the direct and indirect relationships between five GSCM practices (green purchasing, customer cooperation, internal environmental management, investment recovery, and eco-design), environmental performance, and economic performance. Furthermore, the other research gap pertains to the contextual specificity of these relationships. While existing studies have provided valuable insights, they often focus on developed economies, neglecting the unique context provided by firms in emerging markets, such as Ethiopia. Managers lack clear insights into how adopting GSCM practices impacts economic performance.

Thus, the main goal of this study is to fill this research gap by investigating the connection between GSCM practices and

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economic success in the context of Ethiopian bottled water companies. In particular, this study has two distinct objectives. First, it looks at how GSCM practices affect economic and environmental performance, offering a thorough study of how they interact. Second, this study extends beyond examining direct relationships by exploring the mediating role of environmental performance and shedding light on the underlying mechanisms that drive the relationship. The data was collected from various Ethiopian bottled water companies of different sizes and market positions using survey questionnaires. The data was analysed using structural equation modelling (SEM) to thoroughly examine the results. Studying Ethiopian bottled water companies in this research adds to the current academic knowledge of GSCM practices and provides practical insights for industry professionals. Comprehending the connection between GSCM practices, environmental performance, and economic performance will assist Ethiopian bottled water companies in creating efficient ways to enhance environmental performance and economic benefits. Policymakers and industry groups can use the findings to create specific interventions and frameworks that encourage environmentally friendly practices in and outside of the bottled water business.

The next section of the study includes a theoretical literature review, research methodology, and an in-depth examination of the research results in the following parts. The discussion section presents the implications of the findings for Ethiopian bottled water companies implementing GSCM practices. Finally, the paper concludes with a compelling synthesis of the results, discussion, and implications, offering a comprehensive overview of the contributions of this study to the field of GSCM practices in the Ethiopian context.

2. Literature review

2.1 Theoretical framework

Growing awareness of the negative environmental effects and resource depletion is the reason for intensified efforts to save the environment with reusing and recycling as strategic approaches, emphasized within resource-intensive industries, for example, water-bottling factories. The natural resource-based view (NRBV) theory proposed by Hart (1995) is used in this study to examine the link between green supply chain management (GSCM) practices and economic performance (ECONP). We posit that environmental performance (ENVP) acts as a mediator, amplifying the positive impact of GSCM on ECONP. The NRBV, which extends the Resource-Based View (RBV) theory, argues that firms gain a competitive advantage by effectively managing and using their natural resources and environmental capabilities (Barney, 1991; Hart, 1995). In the bottled water context, water itself and the ability to manage it sustainably are critical resources. The NRBV proposes that firms can achieve competitive advantage through fundamental capabilities, including pollution prevention, product stewardship, and sustainable development (Gupta & Gupta, 2020). These capabilities translate into improved environmental performance, leading to cost advantages, enhanced brand image and consumer loyalty, and potential access to new markets (Y. Wang & Ozturk, 2023; Yadav et al., 2023).

Research demonstrates that pollution-prevention practices and environmental proactivity positively influence firm value. Companies adopting environmentally sustainable practices and achieving improved environmental performance tend to exhibit higher firm value (Eti Yustika Hartono et al., 2023). These practices generate cost savings and improve financial performance, contributing to increased firm value (Qalati et al., 2023; Sari & Sutopo, 2023). Moreover, implementing environmental policies and complying with regulations can also positively influence firm value (Sudimas et al., 2023). Raza et al. (2021) found that effective implementation of internal green practices led to improved environmental and economic performance for firms. Therefore, incorporating the use of resources and capabilities to achieve environmental sustainability from a natural resource management perspective is crucial (Andersén, 2021; Rehman et al., 2021). Additionally, studies have observed a link between corporate environmental protection investment and firm value, indicating that investments in environmental protection can enhance firm value (Wang et al., 2023). Overall, by integrating GSCM practices and improving environmental performance, firms can enhance their financial performance and ultimately increase their firm value. In the bottled water industry, GSCM practices such as green purchasing, customer cooperation, internal environmental management, investment recovery, and eco-design can all help the environment and the bottom line. These practices include managing water sources, using renewable energy, making packaging that lasts, and cutting down on waste (Carballo-Penela et al., 2023; Yang et al., 2023). The NRBV theory provides a framework for understanding how bottled-water firm resources influence GSCM practices and how these practices can create value for firms.

2.2 GSCM practices and economic performance

The influence of green supply chain management (GSCM) practices on a company's economic performance (ECONP) is a topic of substantial research interest, with findings offering mixed results (García Alcaraz et al., 2022; Le, 2020; Sahoo & Vijayvargy, 2020). Ahmed and Najmi (2018) highlight that cost reductions in energy, materials, waste disposal, and environmental penalties can significantly influence ECONP. Similarly, the natural resource-based view (NRBV) posits that green initiatives can yield financial benefits through reduced energy costs, enhanced brand image, increased market share, and lower waste treatment fees (Sarwar et al., 2021).

The relationship between GSCM practices and economic performance is complex and multifaceted. While research exploring this relationship in manufacturing firms has produced mixed results, several studies suggest a positive influence. Studies by Bolaji et al. (2022) and Nureen et al. (2022) demonstrated a positive association between GSCM practices and ECONP. Further support comes from Le (2020) and Sahoo and Vijayvargy (2020), highlighting the impact of green design and manufacturing on ECONP. Sahoo & Vijayvargy (2020) additionally emphasizes the indirect enhancement of ECONP through GSCM. Similarly, Park et al. (2022) identifies positive influences from internal environmental management, customer collaboration, and eco-design in the electronics industry. However, contrasting findings exist. García Alcaraz et al. (2022) report no significant relationship between GSCM practices and ECONP in manufacturing firms. Younis et al. (2016) similarly found a significant impact on operational performance but not on ECONP in the UAE context. These contrasting results suggest that the impact of GSCM practices on ECONP may depend on the specific practices implemented and the unique context of each firm. Based on the existing literature and industry context, we hypothesize that:

H_1: *Green purchasing practices significantly improve economic performance.*
H_2: *Customer cooperation positively affects economic performance.*
H_3: *Internal environmental management practices lead to improved economic performance.*
H_4: *Investment recovery practices have a positive effect on firm economic performance.*
H_5: *Eco-design practices enhance firm economic performance*.

2.3 GSCM practices and environmental performance

Green Supply Chain Management (GSCM) integrates environmental considerations into traditional supply chain practices with the primary goal of minimizing environmental impact and enhancing environmental performance (Ayaz, 2022). While conventional approaches emphasize collaboration among stakeholders such as suppliers, manufacturers, retailers, logistics providers, and customers for operational and economic optimization (Ghosh et al., 2021; Rupa & Saif, 2022), GSCM broadens this perspective. It frames these interactions as drivers not only of economic success but also of sustainable competitive advantages built upon principles such as minimizing gas emissions, optimizing resource utilization, and reducing waste (Dong et al., 2021). Empirically, García Alcaraz et al. (2022) demonstrates that implementing GSCM practices, particularly environmental management systems, can significantly reduce environmental impact and generate cost savings. Further studies by Nureen et al. (2023) and Asghar (2023) support this notion, highlighting how GSCM, green human capital, and green innovation collectively contribute to firm performance. Asghar (2023) specifically identified a direct relationship between GSCM and organizational performance, particularly within the automotive industry. Moreover, Qalati et al. (2022) emphasizes the positive influence of GSCM on corporate performance. Afzal et al. (2023) further pinpoints eco-design, green information systems, customer cooperation, and green manufacturing as significant predictors of firm performance. Collectively, these studies underscore the crucial role of GSCM practices in enhancing environmental performance in manufacturing firms. Our discussions suggest the following hypothesis:

H_{1A}: *Green purchasing practices are positively and significantly associated with superior firm environmental performance.*
H_{2A}: *Customer cooperation significantly contributes to positive firm environmental performance.*
H_{3A}: *Strong internal environmental management practices lead to significant improvements in the firm's environmental performance.*
H_{4A}: *Investment recovery practices significantly enhance firm environmental performance.*
H_{5A}: *Eco-design practices are positively and significantly associated with improved firm environmental performance.*

2.4 Environmental and economic performance

The relationship between environmental and economic performance in manufacturing firms remains a complex and contested topic, with research yielding a range of findings. Several studies have identified a positive and significant relationship between improved environmental performance and economic performance (ECONP) (Nishitani & Kokubu, 2020; Qalati et al., 2023; Tzouvanas et al., 2020). This positive effect is attributed to the cost-saving potential of internal GSCM practices such as eco-design and environmental management, which can reduce resource consumption (e.g., hazardous materials, energy, and water) (Abdallah & Al-Ghwayeen, 2020). Additionally, Saputra & Murwaningsari (2021) supports this, finding a positive relationship between environmental performance and economic performance, although their study also identified a negative influence of environmental disclosure. However, not all studies agree on this relationship. Cek & Eyupoglu (2020) found that social and governance performance, but not environmental performance, significantly influence ECONP. Zhang & Ma (2021) further explored this by highlighting the complex interplay of factors such as green innovation and environmental leadership in the ENVP-ECONP relationship. These contrasting findings suggest that the relationship is multifaceted and context-dependent. Collectively, these studies underscore the need for further investigation into the nuances of the ENVP-ECONP relationship across different settings. This study aims to address this gap by examining this relationship in a less developed country and a high-impact industry, namely bottled water manufacturing. By doing so, we hope to gain a deeper understanding of the factors influencing this crucial relationship. Based on this exploration, we formulate the following hypotheses:
H6: Strong environmental performance leads to significantly improved economic performance of firms.

2.5 Mediating role of environmental performance

This study investigates the mediating role of environmental performance in the relationship between GSCM practices and economic performance within the bottled water-manufacturing sector, drawing upon the well-established NRBV theory. We posit that GSCM practices enhance ENVP by reducing resource consumption, waste generation, pollution, and greenhouse gas emissions (Debnath et al., 2023; Novitasari & Agustia, 2021). This improved ENVP, in turn, catalyzes positive ECONP through various pathways, including cost reduction, enhanced brand image, attraction of environmentally conscious consumers, and access to new markets with stringent environmental regulations (Nayak et al., 2023). The potential of ENVP as a mediator has gained significant interest in recent research, offering valuable insights into the "green-to-gold" pathway (M. Ahmed et al., 2024; Ermawati et al., 2024). Empirical evidence suggests that specific GSCM practices such as eco-design and green purchasing positively influence ENVP, leading to improved economic performance for manufacturing companies (Agyabeng-Mensah et al., 2020; Feng et al., 2018). Al-Ghwayeen & Abdallah (2018) further demonstrated the mediating role of ENVP in enhancing export performance within the Jordan manufacturing industry. Their findings indicate that GSCM practices improve ENVP, which facilitates export performance by lowering trade barriers and increasing customer satisfaction. These studies collectively suggest a positive influence of GSCM on both environmental and economic performance, with ENVP acting as a crucial mediator in this relationship. Based on the theoretical underpinnings and empirical support presented, we propose the following hypotheses:

H_{6A}: *Environmental performance mediates the relationship between green purchasing and economic performance.*
H_{6B}: *Customer cooperation positively influences economic performance, with environmental performance acting as a mediator.*
H_{6C}: *Internal environmental management practices positively influence economic performance through the mediating effect of environmental performance*.
H_{6D}: *Investment recovery practices positively contribute to economic performance, mediated by environmental performance.*
H_{6E}: *Environmental performance mediates the positive relationship between eco-design and economic performance.*

3. Material and methods

3.1 Research design and data collection

Using a quantitative, cross-sectional research design, this paper aims to study the implications of GSCM practices on environmental performance and economic performance in the case of bottled water manufacturing companies in Ethiopia. With this design, we can explore the co-relationships between variables by examining data collected at a point-in-time cross-section that provides the current picture of the bottled water industry (Sekaran & Bougie, 2016). A survey questionnaire was chosen as the main way to collect data because it fit with the study's objectives and was an easy, quick, and cost-effective way to obtain standardized data from a broad range of bottled water companies in Ethiopia about their GSCM practices, environmental performance, and economic performance (Saunders et al., 2019). All participants responded to the same set of questions, encouraging honest and unbiased responses and enabling consistent data comparison and analysis (Creswell & Creswell, 2018).

3.2 Target population and sampling strategy

The target population for this study consisted of managers from 99 registered bottled water-manufacturing firms listed in the Ethiopian Bottled Water and Soft Drink Manufacturing Industry Association (EBSMIA) database as of November 2023. A sample size of five managers per firm was determined, resulting in a sample size of 495. This approach ensures that sufficient participants are included to provide comprehensive insights into the research problem. Purposive sampling techniques were employed to select participants directly involved in making strategic and operational decisions regarding GSCM practices at the plant level within their respective companies (Gandhi & Vasudevan, 2023). This technique allows the inclusion of managers with direct influence and knowledge of GSCM initiatives, maximizing the relevance and depth of insights gathered (Chatzoudes & Chatzoglou, 2023). By focusing on individuals with first-hand experience in implementing and managing GSCM practices, this study aims to capture the most accurate and reliable data on their impact on environmental and economic performance.

3.3 Data collection procedures and ethical considerations

The process of administering the survey questionnaire involved several steps. Initially, participant selection was conducted by identifying and reaching out to managers from the targeted population. The questionnaire surveys were personally handed out to the identified participants, a strategy that ensured effective data collection while protecting the anonymity of respondents (Creswell & Creswell, 2018). We boosted response rates in several ways, among which were clear communication of research objectives, the importance of participating, and assurance of privacy. This kind of measure led to increased participation and cooperation among the respondents. Three hundred twenty three completed questionnaires were received at a response rate of 65%, which was deemed satisfactory. Informed consent was obtained from all participating managers, who were treated with strict anonymity and confidentiality during the research process.

3.4 Measurement development

Five well-known constructs were used to operationalize green supply chain management (GSCM) practices: internal environmental management, green purchasing, customer-supplier cooperation, eco-design, and investment recovery (Assumpçao et al., 2022; Susitha, 2023; Vijayvargy & Sahoo, 2021). Twenty-one items measuring these constructs were adapted from Zhu et al. (2008). Environmental performance was measured using five adapted items from Zhu et al. (2008). Similarly, to measure economic performance, the scale proposed by Zhu et al. (2008) was used, which measured this construct through six items. A consistent 5-point Likert scale ranging from "1 = not at all" to "5 = very great extent" was employed for all constructs, facilitating clear interpretation and comparison of results (Hair et al., 2019). Before the main data collection, a rigorous pretesting procedure was conducted involving three academics and four supply chain management practitioners. This pre-test served two critical purposes: 1) validating the content of the instrument by verifying item clarity and relevance to the target respondents, and 2) informing subsequent refinements to optimize the survey tool for the final data collection. Finally, a pilot test involving a random sample of 10 bottled water firms not included in the study population was conducted to enhance the internal validity and reliability of the findings.

4. Results

The relationships between GSCM practices, environmental performance, and economic performance were examined using structural equation modelling (SEM), and the hypotheses were tested using this approach. SEM is a very comprehensive technique that has been developed through the combination of factor analysis and multiple regression analysis aimed at testing a set of regression equations and would suggest several very complicated causes that would connect all of the variables in a structural model (Sarstedt et al., 2022). This allows for the examination of both the measurement and structural model (J. Hair et al., 2020). Before presenting the primary study results, a potential issue of common method variance (CMV) was examined, as its occurrence could be inferred because only a single self-administered questionnaire was used to collect data from the same respondents (Baumgartner et al., 2021). This design could result in an inflation of correlations among variables, thus increasing the likelihood of both Type I (i.e., false positive) and Type II (i.e., false negative) errors. To address this issue, an exploratory factor analysis (EFA) of the collected data was conducted using principal axis factoring with Promax rotation. EFA examines the underlying structure within the data and reveals potential common latent factors that affect multiple measures (J. F. Hair et al., 2019). The suitability of the data for exploratory factor analysis was first confirmed. This showed that the EFA was adequate as the KMO value was 0.820 and Bartlett's test was statistically significant [χ^2 (496) = 5,447.486, $p < 0.000$]. While Podsakoff et al. (2003) suggested that CMV might be a concern when the extracted common factor explains more than 50% of the variance, the analysis using SPSS in this study revealed a common factor explaining only 17.2% of the variance. This value falls well below the 50% threshold, suggesting that common method variance was not a significant issue in the present study (Baumgartner et al., 2021). Consequently, further data analysis was conducted with increased confidence in the reliability and validity of the findings.

4.1 Reliability and validity of the measurement model

In our study, we prioritized the assessment of measurement quality for our constructs through rigorous reliability and validity tests based on the maximum likelihood estimation method (see Table 1 and 2 for details). To evaluate the reliability of the construct, we employed two widely recognized tests: Cronbach's alpha and composite reliability (CR). These tests are frequently used in research to assess the consistency and reliability of measurement scales (Hair et al., 2019). By conducting these tests, we aimed to ensure that our constructs were reliable and yielded consistent results. For the evaluation of the instrument's validity, we utilized several measures. The average variance extracted (AVE) was used to check convergent validity, which shows how well different items on a scale measure the same concept (Fornell & Larcker, 1981). AVE provides a measure of the shared variance among the items and serves as an indicator of the convergent validity of the measurement instrument. To establish the discriminant validity of our instrument, we employed the square roots of AVE and the Heterotrait-Monotrait ratio (HTMT). The square root of AVE allows us to assess the distinctiveness of the constructs, ensuring that each construct measures a unique concept (Henseler et al., 2015). The HTMT ratio compares the correlation between different constructs with the correlation of items within the same construct, further confirming the discriminant validity. We have included detailed results of these assessments in Tables 1 and 2, with panels A and B presenting the relevant data. All measurement scales passed the reliability test, with Cronbach's alpha and CR values consistently above the recommended level of 0.7. This means that the scales were highly consistent and reliable (Cheung et al., 2023). Additionally, the AVE values, ranging from 0.511 to 0.757, exceeded the threshold of 0.5, thus indicating adequate convergent validity (Fornell & Larcker, 1981; Sarstedt et al., 2022). These combined findings provide compelling evidence for the internal consistency and convergent validity of our measurement scales, thereby ensuring the reliability of the constructed measurement. Discriminant validity was also established. The Fornell-Larcker criterion was met, as AVE values for each construct exceeded the squared correlations between all construct pairs (see Table 2). The HTMT ratios were also all less than 0.85 (ranging from 0.012 to 0.277), which is within the acceptable range. This suggests that the latent constructs are different and do not measure the same underlying phenomenon (Rönkkö & Cho, 2022). This further corroborates the discriminant validity of the measurement scales, ensuring that the constructs capture unique dimensions of the research model.

Table 1
First-order Construct Measurement Model Assessment

Indicators	Constructs	Factor loads
Green Purchasing (GP)		
Cronbach's alpha: 0.942 ; CRI: 0.940; AVE: 0.757		
GP1	Our company cooperates with suppliers for environmental objectives	.822
GP2	Our company provides design specifications to suppliers that include environmental requirements for items purchased	.870
GP3	Our company selects suppliers using environmental criteria	.916
GP4	Our company conducts audits of its suppliers' internal environmental management	.902
GP5	Our company evaluates the environmentally-friendly practices of its second-tier suppliers	.838
Economic Performance (ECONP)		
Cronbach's alpha: 0.841 ; CRI: 0.842; AVE: 0.512		
ECOP2	Decrease in the energy consumption cost	.716
ECOP3	Decrease in fees for waste treatment	.733
ECOP4	Decrease in fees for waste discharge	.769
ECOP5	Decrease in fines for environmental accidents	.700
ECOP6	Decrease in the costs of production	.671
Customer Cooperation (CC)		
Cronbach's alpha: 0.893 ; CRI: 0.895; AVE: 0.680		
CC1	Our company cooperates with customers for eco-design of products	.846
CC2	Our company cooperates with customers for cleaner production	.830
CC3	Our company cooperates with customers for green packaging	.864
CC4	Our company cooperates with customers to use less energy during product transportation	.754
Environmental Performance (ENVP)		
Cronbach's alpha: 0.851; CRI: 0.852; AVE: 0.535		
ENVP1	Reduction of air pollution	.735
ENVP2	Reduction in waste water	.720
ENVP3	Reduction in solid waste	.789
ENVP4	Reduction in environmental accidents	.705
ENVP5	Improved compliance with environmental standards	.704
Internal Environmental Management (IEM)		
Cronbach's alpha: 0.882 ; CRI: 0.866; AVE: 0.620		
IEM1	Our top managers are committed to implementing GSCM practice	.664
IEM2	The implementation of green supply chain management practice is supported by our mid-level managers	.717
IEM3	Our company has pollution prevention plans	.871
IEM4	Our company emphasizes environmental compliance and auditing programs	.876
Investment Recovery (IR)		
Cronbach's alpha: 0.755 ; CRI: 0.765; AVE: 0.527		
IR2	Our company sells scrap and used materials	.573
IR3	Our company would sell its excess capital equipment	.845
IR4	Our company would sell its refurbished product	.734
Eco-design (ED)		
Cronbach's alpha: 0.749 ; CRI: 0.756; AVE: 0.511		
ED1	Our company emphasizes the design of products for reduced consumption of material/energy	.744
ED2	Our company emphasizes design of products to reduce use of harmful/toxic material	.784
ED3	Our company emphasizes the design of products that can be reused, recycled and recovered	.603

Notes: CRI: Composite Reliability Index; AVE: Averaged Extracted Variance

Table 2
Reliability, validity, and discriminant validity

Panel A. Fornell–Larcker Criterion

Variables	1	2	3	4	5	6	7
1. Green purchasing	**0.870**						
2. Economic performance	0.072	**0.718**					
3. Customer cooperation	0.046	0.019	**0.825**				
4. Environmental performance	0.224	0.205	0.247	**0.731**			
5. Internal environmental mgmt.	-0.027	0.001	0.153	0.222	**0.787**		
6. Investment recovery	0.186	0.174	0.031	0.218	-0.006	**0.726**	
7. Eco-design	0.080	0.152	0.106	0.257	0.021	0.202	**0.715**

Notes: *Diagonal elements (bold) are the square root of the variance shared between the constructs and their measures. For discriminant validity, diagonal elements should be larger than off-diagonal elements.*

Panel B. HTMT (Heterotrait-Monotrait Ratio)

Variables	1	2	3	4	5	6	7
1. Green purchasing							
2. Economic performance	0.081						
3. Customer cooperation	0.051	0.028					
4. Environmental performance	0.234	0.208	0.246				
5. Internal environmental mgmt.	0.019	0.013	0.154	0.223			
6. Investment recovery	0.180	0.211	0.045	0.229	0.012		
7. Eco-design	0.095	0.160	0.116	0.277	0.005	0.243	

4.2 Structural model evaluation

Initially, we examined the model fit using the chi-square to degrees of freedom ratio (CMIN/DF), which yielded a value of 1.125, as depicted in Figure 1. This ratio, below the recommended threshold of three, indicates a favourable fit for the model (Kline, 2016). The root mean square residual (RMR) demonstrated a value of 0.027, signifying a satisfactory fit. Notably, the goodness of fit index (GFI), comparative fit index (CFI), and Tucker-Lewis index (TLI) exceeded the widely accepted minimum threshold of 0.90 (Hu & Bentler, 1999). Furthermore, the root mean square error of approximation (RMSEA) yielded a value of 0.020, indicating a desirable level of model fit, well below the critical value of 0.08 for good fit (Hu & Bentler, 1999). These all-fit indices provide strong evidence that the proposed structural model demonstrates adequate fit to the data, supporting its suitability for estimating the economic performance of the firm. Further details regarding the specific hypotheses tested in this study are presented in Table 3.

The analysis revealed noteworthy results concerning the relationships among different green supply chain management (GSCM) practices, environmental performance, and economic performance, specific to Ethiopian bottled water firms. It was revealed that certain GSCM practices did not exhibit statistically significant direct relationships with economic performance, contrary to expectations. Specifically, green purchasing ($\beta = 0.006$, $p = 0.918$), customer cooperation ($\beta = -0.030$, $p = 0.647$), and internal environmental management ($\beta = -0.029$, $p = 0.654$) yielded non-significant results. Hence, hypotheses H1, H2, and H3 were not supported.

Table 3
Hypotheses testing results

Hypothesized Relationships	**β**	***p-value***	**Support**
H1: Green purchasing→ Economic performance	.006	0.918	No
H2: Customer cooperation → Economic performance	-.030	0.647	No
H3: Internal environmental management → Economic performance	-.029	0.654	No
H4: Investment recovery→ Economic performance	.143	0.037	Yes
H5: Eco-design → Economic performance	.088	0.209	No
H1A: Green purchasing→ Environmental performance	.190	0.001	Yes
H2A: Customer cooperation → Environmental performance	.197	0.001	Yes
H3A: Internal environ. Mgmt. → Environmental performance	.201	0.001	Yes
H4A: Investment recovery→ Environmental performance	.153	0.018	Yes
H5A: Eco-design → Environmental performance	.200	0.003	Yes
H6: Environmental performance → Economic performance	.158	0.033	Yes
Indirect Effects			
H6A: Green purchasing→ Environmental performance →Economic performance	.030	0.039	Yes
H6B: Customer cooperation → Environmental performance → Economic performance	.031	0.033	Yes
H6C: Internal environ. Mgmt. → Environmental performance → Economic performance	.032	0.037	Yes
H6D: Investment recovery→ Environmental performance → Economic performance	.024	0.038	Yes
H6E: Eco-design → Environmental performance → Economic performance	.032	0.034	Yes

However, investment recovery practices had a positive and significant effect ($\beta = 0.143$, $p = 0.037$) on economic performance, supporting H4. While eco-design practice exhibited a positive effect ($\beta = 0.088$), it did not reach the conventional level of significance ($p = 0.209$), leaving H5 unsupported. Interestingly, the SEM analysis revealed a significant and positive direct relationship between environmental performance and economic performance ($\beta = 0.158$, $p = 0.033$), supporting H6. The results also showed that all five GSCM practices—green purchasing ($\beta = .190$, $p = .001$), customer cooperation on environmental initiatives ($\beta = .197$, $p = .001$), internal environmental management practices ($\beta = .201$, $p = .001$), investment recovery ($\beta = .153$, $p = .018$), and eco-design ($\beta = .200$, $p = .003$)—are positively and significantly related to environmental performance. This supports Hypothesis H1A-5A. This study further examined the indirect effects of GSCM practices on economic performance, mediated by environmental performance. The results confirmed that environmental performance indeed plays a significant mediating role in the relationship between each GSCM practice and economic performance. Green purchasing ($\beta = 0.030$, $p = 0.039$), customer cooperation ($\beta = 0.031$, $p = 0.033$), internal environmental management ($\beta = 0.032$, $p = 0.037$), investment recovery ($\beta = 0.024$, $p = 0.038$), and eco-design ($\beta = 0.032$, $p = 0.034$) have statistically significant indirect effects on economic performance via environmental performance. These findings support hypotheses H6A, H6B, H6C, H6D, and H6E.

5. Discussion

This study explored the relationships between green supply chain management (GSCM) practices, environmental performance (ENVP), and economic performance (ECONP) in Ethiopian bottled water firms, particularly focusing on the mediating role of environmental performance. The findings provide valuable insights into these relationships; however, some unexpected results necessitate further investigation into the impact of GSCM on ECONP. Contrary to expectations and existing literature (Mughal et al., 2023; Park et al., 2022), the study found no direct significant impacts of green purchasing, customer cooperation, and internal environmental management practices on economic performance. This divergence suggests the need for context-specific research that considers industry-specific factors and local conditions that influence these relationships. Future studies could explore the moderating effects of factors such as resource availability, government regulations, or consumer preferences to gain a deeper understanding of the nuanced dynamics in different contexts. However,

investment recovery practices were found to have a positive and significant direct effect on economic performance, supporting the notion that effective resource and waste management leads to economic benefits (Alsuraihi et al., 2022; Cankaya & Sezen, 2019).

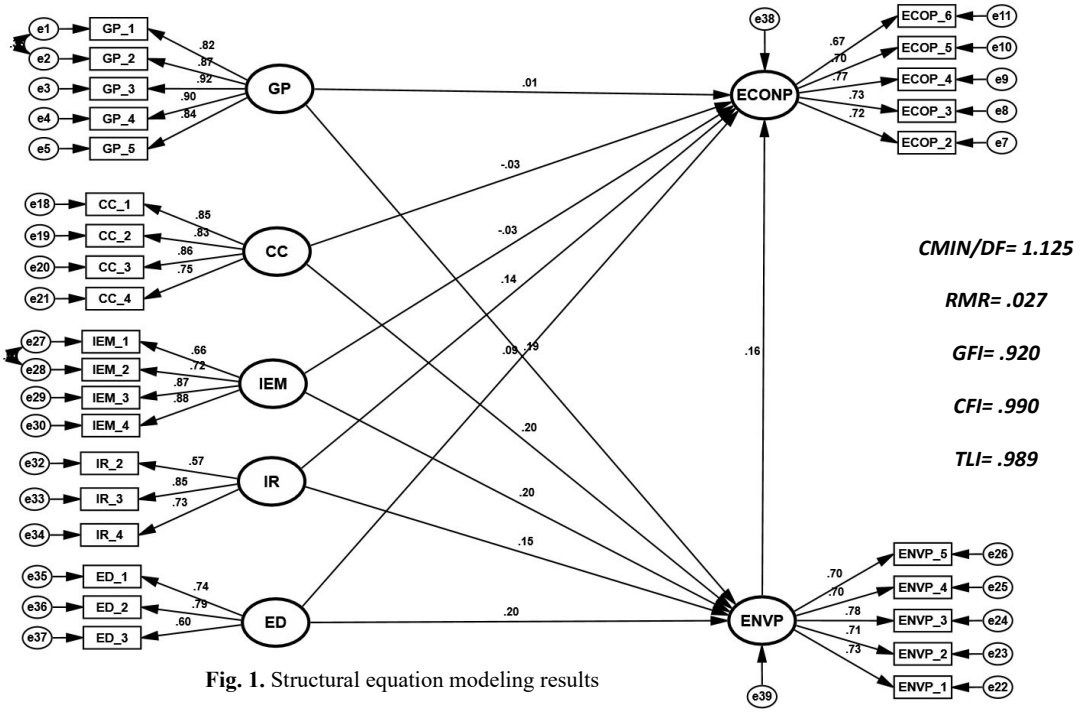

Fig. 1. Structural equation modeling results

Additionally, eco-design showed a positive, albeit non-significant, effect on economic performance, suggesting potential benefits. This aligns with the mixed evidence found in the existing literature (Li & Yan, 2021; Sahoo & Vijayvargy, 2020) and warrants further investigation to fully understand its economic impact. Interestingly, the results demonstrated a significant and positive direct relationship between environmental and economic performance. This finding aligns with the existing literature, which has consistently emphasized the positive impact of improved environmental performance on economic performance (Nishitani & Kokubu, 2020; Qalati et al., 2023; Tzouvanas et al., 2020). This suggests that firms that prioritize environmental sustainability and effectively manage their environmental impacts are more likely to achieve improved economic performance. Moreover, the study found that all five GSCM practices (i.e., green purchasing, customer cooperation on environmental initiatives, internal environmental management practices, investment recovery, and eco-design) were positively and significantly related to environmental performance. These findings are consistent with prior research that has highlighted the role of GSCM practices in improving environmental performance (Appiah et al., 2022; Ojo et al., 2022; Y. Wang & Ozturk, 2023). They reinforce the notion that adopting and implementing GSCM practices can lead to better environmental outcomes for Ethiopian firms operating in bottled water. This study also examined the mediating role of environmental performance in the relationship between GSCM practices and economic performance. The results confirmed that environmental performance indeed mediates the relationship between each GSCM practice and economic performance. This shows that GSCM practices might enhance economic performance through improved environmental performance. It also highlights the need for more comprehensive theoretical frameworks that capture the multi-dimensional nature of the GSCM-ECONP relationship, acknowledging the mediating role of environmental performance. These results support previous studies (Gelmez, 2020; Ma et al., 2022; Marri et al., 2021), which also found that environmental performance plays a key role in the relationship between GSCM and economic performance. The findings of this study have several implications for both theory and practice in the field of GSCM practices. From a theoretical perspective, the study's results contribute to the ongoing theoretical debate on the relationship between GSCM practices and economic performance. Some GSCM practices do not have significant direct relationships with economic performance. This shows the need for more context-specific research that considers factors unique to each industry and the local situation. Future studies could investigate the moderating effects of factors such as resource availability, government regulations, or consumer preferences to better understand the nuanced relationship between GSCM practices and economic performance in different contexts. Moreover, the study's findings underscore the importance of environmental performance as a mediator in the GSCM-economic performance relationship. By highlighting the mediating role of environmental performance, the study enhances our understanding of the underlying mechanisms through which GSCM practices influence economic performance. This insight can

inform the development of more comprehensive theoretical frameworks that capture the multi-dimensional nature of the GSCM-economic performance relationship. From a practical standpoint, the findings provide valuable guidance for Ethiopian bottled water firms seeking to improve their environmental and economic performance through GSCM practices. The non-significant direct relationships between certain GSCM practices and economic performance suggest that firms should not solely rely on these practices to achieve immediate financial benefits. Instead, they should prioritize investment recovery practices, which positively and significantly affect economic performance. Firms should allocate resources and develop strategies to effectively manage their investments and recover valuable resources throughout their supply chain. Moreover, the study's conclusions have wider ramifications for industry stakeholders and policymakers than just specific companies. Using the knowledge gathered from this study, policymakers may create and enforce laws that reward GSCM activities and push businesses to use sustainable business practices. Industry associations and organizations may be extremely helpful in promoting cooperation among member companies, sharing best practices, and offering resources and training. Industry stakeholders may assist businesses in simultaneously improving their environmental and financial performance by encouraging group action.

6. Conclusion

This study explores the intricate relationships between GSCM practices, environmental performance, and economic performance within the Ethiopian bottled water industry, a sector grappling with balancing resource utilization, environmental impact, and economic viability. By delving into this under-researched context, we aimed to contribute valuable insights to the evolving discourse on the effectiveness of GSCM practices. Our findings unveiled a nuanced picture where the anticipated direct relationship between certain GSCM practices and economic performance was not always statistically significant. This underscores the importance of tailoring GSCM implementation to industry specificities, market maturity, and organizational goals. While practices like green purchasing, internal environmental management, and customer cooperation might not yield immediate economic benefits, their contribution to ENVP highlights the crucial role of a holistic approach that prioritizes long-term environmental stewardship. Furthermore, the significant mediating role of ENVP reinforces the notion that a holistic approach prioritizing ENVP improvement can lead to indirect economic performance through resource efficiency, waste reduction, and improved brand image. Moreover, the study underscores the need for a long-term perspective when assessing the economic performance of GSCM practices, which offers valuable insights into the dynamics at play. Their potential delayed impact necessitates a shift beyond short-term profitability measures and towards a more comprehensive evaluation framework that considers long-term sustainability and environmental responsibility. Despite its contributions, this study acknowledges several limitations that offer avenues for future research. First, the stud's focus on bottled water firms in Ethiopia restricts the generalizability of its findings to other industries and contexts. To enhance the robustness of the results, future research could undertake a broader examination of GSCM practices and their economic performance implications across a wider range of industries and geographical locations. Second, the study's reliance on self-reported data introduces the possibility of biases and inaccuracies. Future research could incorporate objective measures and employ longitudinal designs to fortify the validity and reliability of the findings. Third, the current study concentrates on the mediating role of environmental performance in the relationship between GSCM practices and economic performance. Future research could delve into the moderating effects of additional variables, such as firm size, industry characteristics, consumer preferences, and regulatory factors, to provide a more holistic understanding of the relationships under investigation. Fourth, the study's cross-sectional design impedes the establishment of causal relationships. Future research could utilize longitudinal designs or experimental approaches to more rigorously explore the causal connections between GSCM practices, environmental performance, and economic performance. Finally, this study does not explore the potential interaction effects among different GSCM practices. Future research could investigate the synergistic or complementary effects of multiple GSCM practices on environmental and economic performance.

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