# BEYOND SAFETY: DO SUSTAINABILITY SUPPLY CHAIN PRACTICES DRIVE COMMUNITY DEVELOPMENT IN MINING? INSIGHTS FROM INDONESIA

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**Abstract:**

**Background:** The mining industry plays a significant role in the national economy but poses substantial environmental and social challenges. Sustainability has become a global priority, emphasized through initiatives such as the Sustainable Development Goals (SDGs). Among these, community welfare is a key focus area that mining companies are expected to support. Regulation No. 3 of 2020 on mineral and coal mining mandates that companies demonstrate social responsibility and environmental stewardship. However, implementation gaps persist, particularly in the post-mining phase, where neglected infrastructure and unresolved community concerns regarding environmental degradation threaten long-term development objectives.
**Purpose:** This study investigates the influence of Green Supply Chain Management (GrSCM) practices, namely Internal Environmental Management, Green Purchasing, and Investment Recovery, on Community Development, with Occupational Health and Safety (OHS) as a mediating variable.
**Design/Methodology/Approach:** A quantitative approach was employed, utilizing data from 144 respondents across Indonesian mining companies. The structural relationships were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM).
**Finding/Result:** The results indicate that all three GrSCM practices have significant and positive direct effects on Community Development, highlighting their role in supporting the SDGs. Among them, only Internal Environmental Management has a significant effect on OHS. Additionally, while OHS has a direct positive effect on Community Development, it does not mediate the relationship between GrSCM practices and Community Development.
**Conclusion:** These findings suggest that sustainable operational practices in mining contribute directly to community outcomes, rather than through improvements in safety performance alone.
**Originality/value/research gap:** This study contributes to sustainability research by clarifying the distinct roles of environmental management and occupational safety in promoting community development within the mining sector.

**Keywords:** green supply chain management, community development, occupational health and safety, sustainable development goals, mining industry in indonesia

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## INTRODUCTION

In recent years, the mining sector has faced increasing scrutiny from global stakeholders regarding its environmental and social impacts. While the industry has historically been associated with ecological degradation and community displacement, recent shifts in governance and corporate responsibility frameworks have pushed mining firms to adopt more sustainable practices. These changes are driven by global commitments to the Sustainable Development Goals (SDGs), particularly those related to environmental stewardship and community well-being. Among the sustainability initiatives gaining momentum is Green Supply Chain Management (GrSCM), which integrates environmental considerations into supply chain operations (Zhu & Sarkis 2004; Jabboura et al. 2014). GrSCM encompasses various practices, including internal environmental management (IEM), green purchasing (GP), and investment recovery (IR), all of which have demonstrated potential to reduce environmental footprints and enhance organizational performance (Srivastava, 2007; Colicchia et al. 2016). However, the implications of GrSCM practices go beyond operational efficiency; they may also foster broader social outcomes, such as improved health, safety, and community development. In the context of the mining sector, particularly in post-extraction phases where environmental and social legacies persist, the relevance of GrSCM to community development becomes even more crucial. This argument is further reinforced by the case of PT Vale Indonesia, whose long-standing Integrated Community Development Program demonstrates how environmentally responsible operational practices and structured social initiatives can simultaneously strengthen community capacity, enhance local economic resilience, and sustain the company's social license to operate in mining regions of Indonesia (Agus, 2020; PT Vale Indonesia, 2022).

Community development (CD) in mining regions typically encompasses initiatives aimed at enhancing the economic, educational, and social conditions of local populations. These include capacity building, infrastructure development, livelihood programs, and environmental rehabilitation. Effective CD depends not only on resource availability but also on the company's reputation, community trust, and perceived responsibility (van Schooten et al. 2003). Therefore, GrSCM may serve as a strategic lever in cultivating these enabling conditions, especially when paired with robust Occupational Health and Safety (OHS) systems that ensure a safe and responsible operating environment.Occupational Health and Safety has traditionally been viewed as an internal concern, focusing on safeguarding workers from occupational hazards. However, contemporary views increasingly position OHS as a bridge between internal operational practices and external social impact (Zohar & Luria, 2005). In the mining industry, where the risk of accidents and environmental disasters is relatively high, effective OHS systems can contribute to minimizing not only workplace incidents but also broader community exposure to health and safety risks. This expanded view of OHS aligns with the concept of corporate citizenship and highlights the potential of OHS to act as a mediating mechanism linking internal sustainability practices with community-level outcomes. This expanded view of OHS is not only theoretically vital but also empirically evident in the Indonesian mining sector, where the implementation of robust Occupational Health and Safety management systems has been shown to significantly enhance safety performance and mitigate risk exposure in high-risk mining operations (Simamora, 2025), thereby supporting GrSCM's role in linking internal sustainability practices with positive community-level outcomes.

Companies have a social responsibility toward the surrounding community, which is part of their sustainability program. Sustainability programs are very important not only as a long-term investment in the environment, but also for preventing environmental damage and ensuring that companies always uphold human rights through the protection of workplace accidents, respect for employee health, and the fulfillment of the needs of the surrounding community. This community development program can be carried out through educational, health, employment, and infrastructure activities, which is very beneficial in fostering good relations between the company and the community (Ansu-Mensah et al. 2023). In some companies, CSR is combined with occupational health and safety (OHS). This is not surprising, as OHS and CSR are both part of sustainability, which is required of international-class companies. CSR is closely related to OHS, particularly in terms of compliance with laws (Aldiyansyah et al. 2023). Support for OHS in the company is provided, among other things, through GrSCM, which has been proven to increase OHSE performance in the company by 30% (Sharopova, 2024).

Green supply chain management (GrSCM) practices in companies have been proven to improve the sustainable performance of mining companies, as evidenced by research from Ofori Antwi et al. (2022) Good mining practices in developing countries can improve mining performance not only from economic, social, and environmental perspectives. Research from Ngcobo et al. (2022) stating that GrSCM can improve company performance through better coordination with suppliers, improving internal processes, and thus enhancing company performance. Research from Jum'a (2023) revealing that GrSCM can be built through the variables of green purchasing, investment recovery, community development, and environmental sustainability.

Despite the logical connection among GrSCM, OHS, and community development, empirical studies examining their integrated effect in the mining sector remain limited. Most existing research has focused on the environmental or economic dimensions of GrSCM, with less emphasis on the social dimension, particularly community development. Furthermore, the mediating role of OHS in this relationship has not been adequately explored in emerging economies, such as Indonesia, where mining operations are frequently situated in remote and socioeconomically vulnerable areas (Hilson, 2012).Indonesia presents a compelling context for such investigation. As one of the world's largest producers of coal, nickel, and other mineral commodities, the country has seen growing tension between economic growth driven by mining and the social-environmental costs borne by local communities (Gobby et al. 2022). Regulatory reforms, such as the enactment of Law No. 3 of 2020 concerning Mineral and Coal Mining, increasingly require mining firms to demonstrate social responsibility and environmental care. Nevertheless, implementation gaps remain, especially in post-mining periods, where abandoned infrastructure and unresolved community grievances can undermine long-term development goals.

Green Purchasing refers to the procurement of goods and services with low environmental impact and from suppliers that comply with safety and sustainability standards (Walker et al. 2008). In mining, sourcing safe materials and engaging responsible suppliers may reduce hazardous exposure across the supply chain, thereby enhancing overall safety and community trust. Investment Recovery, on the other hand, involves the reuse, recycling, and proper disposal of materials and equipment (Mishra et al. 2020). This practice not only contributes to resource efficiency but also minimizes environmental contamination and potential health hazards. These GrSCM practices are hypothesized to enhance OHS performance by reducing exposure to environmental hazards, improving operational transparency, and fostering a culture of safety. In turn, improved OHS is expected to enhance community perceptions of corporate responsibility, reduce social conflict, and support the delivery of development initiatives. The mediating role of OHS is particularly important in illustrating how operational changes within the firm can translate into broader social benefits.

Given this background, this study investigates the influence of three key GrSCM practices, Internal Environmental Management (IEM), Green Purchasing (GP), and Investment Recovery (IR) on Community Development (CD), with Occupational Health and Safety (OHS) as a mediating variable. IEM refers to a business's development of its environmental management sustainability goals and measures to ensure environmental protection (Green et al. 2012). Businesses can successfully improve their GrSCM strategy, boost environmental performance, and obtain a competitive edge in the market by incorporating IEM principles throughout the firm (Wiredu et al. 2024). GP concentrates on working with producers to create eco-friendly goods (Sahoo and Vijayvargy, 2020). GP's objective is to ensure that acquired products and resources adhere to the environmental objectives of the purchasing company, which include removing waste sources and encouraging recycling, reuse, and resource replacement (Habib et al. 2020). "Recovery of investment" refers to a company's financial benefit from the disposal of surplus resources, scrap, and used materials as well as excess capital goods resulting from equipment replacement (Zhu et al. 2007). The study seeks to answer the following research question: To what extent do IEM, GP, and IR influence community development in mining areas through the mediation of OHS? By addressing this question, the study aims to contribute to a more integrated understanding of how operational sustainability initiatives can generate social value in the mining sector. The choice of IEM, GP, and IR as focal GrSCM practices is grounded in their relevance to the mining industry. Internal Environmental Management involves the development and enforcement of internal environmental policies, training programs, and audits that foster a culture of environmental responsibility (Jabboura et al. 2014). In the mining sector, where environmental risks are high, such practices are essential not only for compliance but also for risk mitigation, which can affect both employee and community safety. By bridging

GrSCM practices, OHS performance, and community development outcomes, this study contributes to the growing discourse on sustainable mining and corporate social responsibility. It offers practical implications for mining companies seeking to enhance their social license to operate and theoretical insights into the mechanisms through which internal operations can affect external stakeholder outcomes. Additionally, the study provides evidence-based recommendations for policymakers seeking to integrate environmental and social governance (ESG) principles into sectoral regulation.

In sum, the study aims to advance the understanding of how environmental and safety practices interact to shape community-level outcomes in the extractive industries. It underscores the importance of integrated management systems that align operational excellence with social responsibility, particularly in the high-risk and socially sensitive context of mining.

## METHODS

This research uses primary and secondary data. Primary data was collected through questionnaires distributed via Google Forms, and secondary data was obtained from the Directorate General of Mineral and Coal Resources and company data. Data from Indonesian mining companies, the study's target demographic, was gathered using a primary data gathering approach. Convenience sampling, a non-probability sampling technique that aids in drawing conclusions about the population (Malhotra, 2010), was applied, and a quantitative method was used to analyze the results. Employees in various management positions at Indonesian mining companies were given access to a standardized questionnaire online. Respondents were contacted through professional networks and industry-related communication channels, and the online questionnaire link was distributed directly to managerial-level employees in Indonesian mining companies. The study's sample size was determined by following the recommendations made by Hair et al. (2019), who suggested utilizing a higher sample size of 100 or more. Between January and March of 2025, 144 replies were obtained during the data collection period. To mitigate common method bias, the study applied procedural remedies by ensuring respondent anonymity, clearly separating predictor and criterion constructs in the questionnaire design, and using neutral and concise item wording to reduce evaluation apprehension and response consistency effects.

This study adopts a quantitative approach using Structural Equation Modeling–Partial Least Squares (SEM-PLS) to empirically test the hypothesized relationships among variables. Primary data were collected through surveys distributed to operational and CSR personnel in Indonesian mining companies. The research model includes direct paths from IEM, GP, and IR to OHS, and from OHS to CD, along with indirect paths testing the mediating role of OHS. The study also draws on established theoretical perspectives, including stakeholder theory and the resource-based view (RBV), to interpret the findings. As indicated in Table 1, every measurement item utilized in this study was taken from earlier research where the items were deemed to be reliable and valid.

The measurement instruments employed in this study were adopted from well-established and empirically validated sources to ensure conceptual rigor and construct validity. The GrSCM dimensions were measured using indicators developed by Jum'a (2023), as these indicators comprehensively capture managerial commitment, cross-functional coordination, supplier environmental integration, and formal environmental management systems that are widely recognized as core components of GrSCM implementation. Investment Recovery (IR) was measured following Sahoo and Vijayvargy (2020), whose framework emphasizes value recovery from excess materials and assets, a dimension particularly relevant to resource-intensive industries such as mining. Occupational Health and Safety (OHS) indicators were adapted from Mixafenti et al. (2025), as their measurement framework reflects a system-based and integrative view of OHS, encompassing top management commitment, risk assessment, employee participation, and alignment with sustainability policies, which is critical in high-risk mining environments. Finally, Community Development (CD) was measured using the stakeholder-oriented scale proposed by Ilyas et al. (2020), which captures structured communication, local economic participation, capacity building, and stakeholder engagement dimensions that align closely with the social sustainability expectations placed on mining firms operating in local communities. Collectively, the selected references provide a theoretically coherent and contextually appropriate measurement framework for examining the linkages between GrSCM practices, OHS, and community-level outcomes in the mining sector.

Table 1. Synthesis of Measurement Instrument of IEM, GP, IR, OHS & CD

| Construct | Operational Definition | Measurement Item | Source |
|---|---|---|---|
| IEM (Internal Environment Management) | The degree of dedication, internal mechanisms, and organizational structure of a business in incorporating environmental concepts into its procedures, policies, and day-to-day operations. | "Commitment of GrSCM from senior managers"<br>"Support for GrSCM from mid-level managers"<br>"Cross-functional cooperation for environmental improvements"<br>"Total quality environmental management"<br>"Environmental compliance and auditing programs"<br>"ISO 14001 certification"<br>"Environmental Management Systems exists" | (Jum'a, 2023) |
| GP (Green Purchasing) | The degree to which a business incorporates environmental factors into the procurement process, including the selection, assessment, and development of suppliers along the supply chain | "Eco labeling of products"<br>"Cooperation with suppliers for environmental objectives"<br>"Environmental audit for suppliers' internal management"<br>"Suppliers' ISO14000 certification"<br>"Second-tier supplier environmentally friendly practice evaluation" | (Jum'a, 2023) |
| IR (Investment Recovery) | The activity of businesses recovering the economic value of wasted assets, resources, and inventory through redistribution, recycling, or resale | "Investment recovery (sale) of excess inventories/materials"<br>"Sale of scrap and used materials"<br>"Sale of excess capital requirement" | (Sahoo & Vijayvargy, 2020) |
| OHS (Occupational Health and Safety) | The systems, rules, and practices of an organization that are designed to minimize the possible impact of operational hazards on the surrounding environment while protecting workers from occupational health and safety concerns. | "Top management shows strong commitment to occupational health and safety"<br>"Occupational health risk assessments are conducted regularly and followed up systematically"<br>"The incident reporting and handling system operates effectively and transparently"<br>"Employees actively participate in monitoring and evaluating workplace risks in the field"<br>"Occupational health risk assessments are conducted regularly and followed up systematically"<br>"The work environment supports ergonomic aspects and is significantly free from hazardous exposures"<br>"The OHS system is integrated with the company's environmental and sustainability policies" | (Mixafenti et al. 2025) |
| CD (Community Development) | A set of business initiatives that are methodically focused on enhancing the social, economic, and capability of local communities through sustainable social contributions, local economic development, and stakeholder engagement | "We communicate actions among internal stakeholders (e.g. meetings with staff, intranet, reports, etc.)"<br>"We communicate actions to external stakeholders (e.g. website, reports, etc.)"<br>"We have established metrics that monitor (e.g. amounts spent, allocated time, types of beneficiaries, etc.)"<br>"We favor local suppliers"<br>"We favor job creation in your region"<br>"We offer internships and contribute to student training"<br>"We consult stakeholders (employees, suppliers, clients, creditors, associations, NGO, etc.) for decisions concerning local development"<br>"We contribute to community cultural, sporting or teaching activities (public organizations or associations with social, cultural, sporting or teaching activities)" | (Ilyas et al. 2020) |

GrSCM practices, namely IEM, GP, and IR, were measured using a five-point Likert scale ranging from 1 (no consideration) to 5 (actively practiced). Meanwhile, OHS and SDGs practices were measured using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

The model structure developed in this study is: Independent variables (IVs) (Internal Environmental Management (IEM); Green Purchasing (GP); Investment Recovery (IR)); Mediating variable: Occupational Health and Safety (OHS); Dependent variable: Community Development (CD). This model is full mediation (IV → OHS → CD).

**Direct Effect of GrSCM on OHS**

H1a: Internal Environmental Management (IEM) has a significant positive effect on Occupational Health and Safety (OHS).
H1b: Green Purchasing (GP) has a significant positive effect on Occupational Health and Safety (OHS).
H1c: Investment Recovery (IR) has a significant positive effect on Occupational Health and Safety (OHS).

**Direct Influence of OHS on Community Development**

H2: Occupational Health and Safety (OHS) has a significant positive effect on Community Development (CD).

**The Mediating Role of Occupational Health and Safety**

H3a: Occupational Health and Safety (OHS) mediates the relationship between Internal Environmental Management (IEM) and Community Development (CD).
H3b: Occupational Health and Safety (OHS) mediates the relationship between Green Purchasing (GP) and Community Development (CD).
H3c: Occupational Health and Safety (OHS) mediates the relationship between Investment Recovery (IR) and Community Development (CD).

According to the study's conceptual framework, the independent variables include Internal Environmental Management (IEM), Green Purchasing (GP), and Investment Recovery (IR), which are fundamental aspects of Green Supply Chain Management (GrSCM). Occupational Health and Safety (OHS), a mediating variable, is thought to have an indirect impact on Community Development (CD) as a result of these practices. In this approach, internal GrSCM practices are converted into more comprehensive outward social results through the explanatory mechanism of OHS. Accordingly, the model proposes that enhanced OHS performance allows mining firms to translate ecologically conscious supply chain practices into real advantages for community development.

As is evident, there are a number of societal issues with the mining sector, and an examination of its sustainability practices is becoming more and more necessary. Studies examining GrSCM practices in this sector in connection to the SDGs are scarce, nevertheless, particularly in developing nations like Indonesia. Consequently, the following conceptual framework has been presented, as seen in Figure 1, based on the previously discussed discussion.

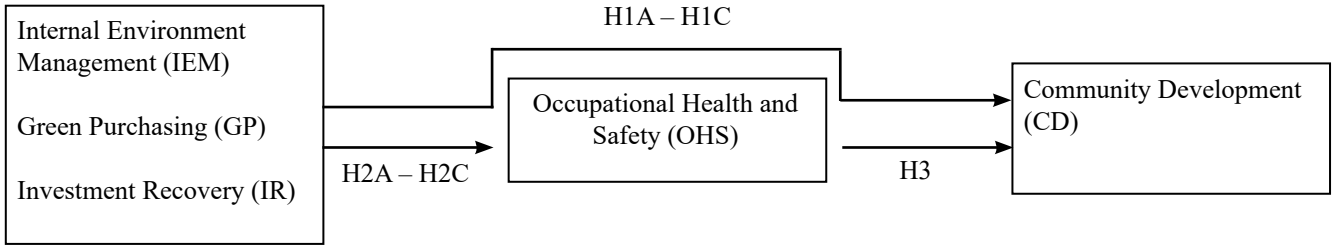


Figure 1. Conceptual Framework of IEM, GP, IR, OHS & CD

## RESULTS

A statistical program for social sciences (SPSS) version 27 and SmartPLS version 4 were used to analyze the survey data (n = 144) in this section. Among the analyses were descriptive analysis, multicollinearity identification, measurement model analysis for assessing convergent and discriminant validity, and structural model analysis for evaluating hypotheses.

### Descriptive Statistics of IEM, GP, IR, OHS & CD

Descriptive statistics such as mean, standard deviation, skewness, kurtosis, and standard error were used in the preliminary data analysis, as shown in Table 2. OHS received the highest mean score, according to the data (M = 4.020, SD = 0.588). However, the mean score for green purchasing was the lowest (M = 3.386, SD = 0.805).

Kurtosis levels also vary from -0.884 to 2.147. All constructs lie nicely within the ±3 range, with the exception of Occupational Health and Safety (kurtosis = 2.147), showing neither extreme peakedness nor flatness. The Occupational Health and Safety kurtosis result falls within acceptable bounds for applied social science research and does not show severe non-normality, despite slightly exceeding the more stringent ±2 criteria. Overall, there appears to be no significant breach of the univariate normality assumptions based on the skewness and kurtosis statistics. Furthermore, the observed small deviations do not raise methodological issues because this work used SEM-PLS, which does not require a strict normal data distribution. As a result, the data are deemed appropriate for further multivariate analysis.

### Multi-collinearity assessment of IEM, GP, IR, OHS & CD

High levels of collinearity between independent constructs may have an impact on the findings of structural model analysis. To identify this issue, common techniques like tolerance values and the variation inflation factor (VIF) are employed. The VIF and tolerance criteria are set at 5 and 0.10, respectively, in accordance with Hair et al.'s (2019) recommendations. This multicollinearity is not present in the research data, as Table 3 demonstrates. As a general guideline, formative indicator collinearity becomes problematic when VIF values exceed 3–5, with values close to or below 3 being ideal, while the condition index (CI) may serve as an additional but less commonly applied diagnostic tool (Hair et al. 2022).

### Measurement Model Analysis of IEM, GP, IR, OHS & CD

Confirmatory factor analysis was used to examine the measurement model. It was found that every measurement item loaded onto its corresponding latent variable, and every latent variable satisfied acceptable threshold levels for factor loadings, Cronbach's alpha, composite reliability, and average variance extracted (AVE). The findings in Table 4 demonstrated that every factor loading, Cronbach's alpha, and composite reliability value was higher than the threshold level (>0.70) that Hair et al. (2019) recommended. Lastly, as the AVE values were likewise higher than 0.50, sufficient measurement model validity and reliability had been proven for additional analysis.

Table 2. Descriptive Statistics Results of IEM, GP, IR, OHS & CD

| Constructs | Mean | Std. Deviation | Skewness | Kurtosis |
|---|---|---|---|---|
| Internal Environment Management | 3.760 | 0.690 | -0.016 | -0.852 |
| Green Purchasing | 3.386 | 0.805 | -0.032 | -0.178 |
| Cooperation with Customer | 3.569 | 0.840 | -0.242 | -0.206 |
| Eco-Design | 3.796 | 0.816 | -0.530 | -0.057 |
| Investment Recovery | 3.546 | 0.796 | -0.276 | -0.004 |
| Occupational Health and Safety | 4.020 | 0.588 | -0.604 | 2.147 |
| Environment Sustainability | 3.870 | 0.652 | 0.083 | -0.884 |

Table 3. Collinearity Statistics of IEM, GP, IR, OHS & CD

| Constructs | CD | OHS |
|---|---|---|
| Internal Environment Management | 2.249 | 2.151 |
| Green Purchasing | 2.026 | 2.025 |
| Investment Recovery | 1.271 | 1.234 |
| Occupational Health and Safety | 1.168 | |
| Internal Environment Management | 2.249 | 2.151 |
| Green Purchasing | 2.026 | 2.025 |
| Coopoeration with Customer | | |
| Eco-Design | | |
| Investment Recovery | 1.271 | 1.234 |
| Occupational Health and Safety | 1.168 | |
| Environment Sustainability | | |

Table 4. Measurement model result of IEM, GP, IR, OHS & CD

| Constructs | Item | Factor Loading | Cronbach Alpha | Composite Reliability | AVE |
|---|---|---|---|---|---|
| Internal Environment Management | IEM_01 | 0.854 | 0.893 | 0.909 | 0.614 |
| | IEM_02 | 0.844 | | | |
| | IEM_03 | 0.788 | | | |
| | IEM_04 | 0.748 | | | |
| | IEM_05 | 0.809 | | | |
| | IEM_06 | 0.568 | | | |
| | IEM_07 | 0.837 | | | |
| Green Purchasing | GP_01 | 0.849 | 0.889 | 0.895 | 0.692 |
| | GP_02 | 0.862 | | | |
| | GP_03 | 0.860 | | | |
| | GP_04 | 0.770 | | | |
| | GP_05 | 0.818 | | | |
| Investment Recovery | IR_01 | 0.835 | 0.765 | 0.788 | 0.674 |
| | IR_02 | 0.824 | | | |
| | IR_03 | 0.805 | | | |
| Occupational Health and Safety | OHS_01 | 0.364 | 0.820 | 0.953 | 0.575 |
| | OHS_02 | 0.855 | | | |
| | OHS_03 | 0.581 | | | |
| | OHS_04 | 0.464 | | | |
| | OHS_05 | 0.824 | | | |
| | OHS_06 | 0.786 | | | |
| | OHS_07 | 0.784 | | | |
| Community development | CD_01 | 0.789 | 0.935 | 0.937 | 0.585 |
| | CD_02 | 0.787 | | | |
| | CD_03 | 0.738 | | | |
| | CD_04 | 0.735 | | | |
| | CD_05 | 0.802 | | | |
| | CD_06 | 0.727 | | | |
| | CD_07 | 0.724 | | | |
| | ES_08 | 0.785 | | | |

The Fornell-Larcker criterion was used to examine whether constructs have discriminant validity and are dissimilar to each other. The results in Table 5 suggest discriminant validity because the correlation between constructs is less than the square root of the construct's AVE.

The HTMT results indicate that all inter-construct values are well below the conservative threshold of 0.85, confirming adequate discriminant validity among Community Development (CD), Green Purchasing (GP), Internal Environmental Management (IEM), Investment Recovery (IR), and Occupational Health and Safety (OHS) (Table 6). This suggests that each construct captures a distinct conceptual domain, and multicollinearity or conceptual overlap among the latent variables is unlikely to bias the structural model estimations.

**Structural Model and Hypothesis Results of IEM, GP, IR, OHS & CD**

Structural model analysis shows the results of hypothesis testing and the significance of the relationships between latent constructs. Bootstrapping with 10,000 samples was used in PLS-SEM to assess the stability and significance of parameter estimates, which can increase the robustness of the findings. As shown in Figure 2, the r-squared value indicates that the three GrSCM practices explain 16.2% of the variation in OHS and 64.0% of the variation in community practices on the SDGs.

The findings demonstrate that the three GrSCM practices have positive and statistically significant direct effects on the SDGs focus of the IEM community ($\beta = 0.462$, $p = 0.000$), as well as on GP ($\beta = 0.153$, $p = 0.026$) and IR ($\beta = 0.221$, $p = 0.000$). Meanwhile, the direct effects of the three GrSCM practices on OHS implementation, only IEM ($\beta = 0.316$, $p = 0.018$) has a positive and significant impact (Table 7). According to Nitzl et al. (2016), if the direct effect is not significant and the indirect effect is significant, then full mediation has occurred; if both direct and indirect effects are significant, then partial mediation has occurred. However, as shown in Table 6, research shows that the indirect effects of IEM, GP and IR on community focus are not significant.

**Model Fit Analysis**

The necessity of model fit assessment is determined by the purpose of the statistical modeling, with explanatory modeling requiring more rigorous fit assessment than predictive modeling (Schuberth et al. 2023). The PLS-SEM model has a satisfactory overall fit, according to the model fit findings. A good approximation between the observed and model-implied correlation matrices is suggested by the SRMR value of 0.079 for both the saturated and estimated models, which is below the suggested threshold of 0.08. Both models have the same d_ULS (2.218) and d_G (0.918) values, which show that there is no significant misspecification and that the model is stable. The NFI value of 0.728 is regarded as acceptable in PLS-SEM, especially for exploratory or prediction-oriented research, even if it is below the standard cutoff of 0.90 frequently used in covariance-based SEM. All things considered, these findings imply that the suggested structural model shows a sufficient fit and is appropriate for hypothesis testing.

Table 5. Fornell-Larcker Criterion Results of IEM, GP, IR, OHS & CD

| | CD | GP | IEM | IR | OHS |
|---|---|---|---|---|---|
| Community Development (CD) | 0.761 | | | | |
| Green Purchasing (GP) | 0.601 | 0.832 | | | |
| Internal Environmental Management (IEM) | 0.726 | 0.708 | 0.784 | | |
| Investment Recovery (IR) | 0.536 | 0.362 | 0.427 | 0.821 | |
| Occupational Health and Safety (OHS) | 0.453 | 0.238 | 0.343 | 0.291 | 0.689 |

Table 6. HTMT Results of IEM. GP. IR. OHS & CD

| | CD | GP | IEM | IR | OHS |
|---|---|---|---|---|---|
| Community Development (CD) | | | | | |
| Green Purchasing (GP) | 0.665 | | | | |
| Internal Environmental Management (IEM) | 0.812 | 0.771 | | | |
| Investment Recovery (IR) | 0.630 | 0.405 | 0.502 | | |
| Occupational Health and Safety (OHS) | 0.486 | 0.253 | 0.385 | 0.333 | |

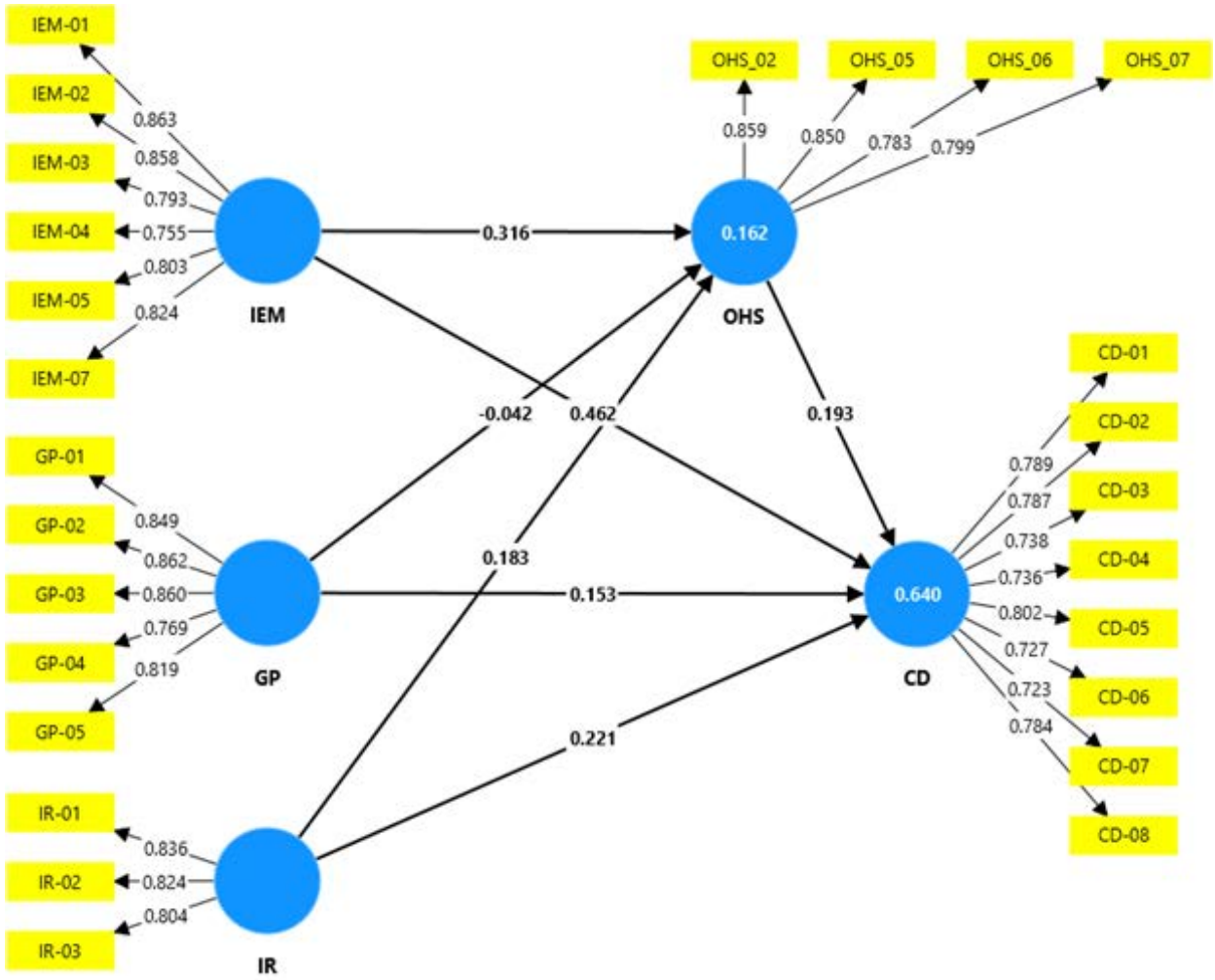


Figure 2. Structural Equation Modelling results (IEM = Internal environmental management, GP = Green purchasing, IR = Investment recovery, CD = Community Development, OHS = Occupational Health and Safety)

**Effect Size (f2)**

The $f^2$ effect size results indicate the relative contribution of each exogenous construct to the explained variance of the endogenous variable. Following Cohen's (1988) guidelines, values of 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. The findings show that Internal Environmental Management (IEM) exhibits a small-to-moderate effect on Community Development ($f^2$ = 0.27), suggesting a substantive contribution to the model (Table 8). In contrast, Green Purchasing (GP), Investment Recovery (IR), and Occupational Health and Safety (OHS) demonstrate small effect sizes ($f^2$ < 0.15), indicating that their influences on community development are incremental rather than dominant. Overall, these results imply that community development outcomes in mining are shaped by the combined and complementary effects of multiple sustainability practices rather than by a single primary driver.

**Relevancy Predictive ($Q^2$)**

$Q^2$ values greater than zero show that most indicators have positive predictive relevance, according to the $Q^2$_predict results (Table 9). This is especially true for the Community Development (CD) items, which have moderate out-of-sample predictive power. This implies that unseen data for the fundamental endogenous construct can be meaningfully predicted by the PLS-SEM model. However, a number of Occupational Health and Safety (OHS) indicators show extremely low or negative $Q^2$ values, demonstrating that the model's predictive ability for OHS is relatively weaker and indicating limited predictive significance at the indicator level. Overall, the results suggest that the model has sufficient predictive value for community development outcomes, but they also point to areas where OHS measurement or structure definition might be improved.

Table 7. Path coefficients and hypothesis testing of IEM, GP, IR, OHS & CD

| Relationship | Path Coeficient | Sample mean (M) | P values | Results |
|---|---|---|---|---|
| **Direct Effects** | | | | |
| Internal Environmental Management (IEM) → Community Development (CD) | 0.462 | 0.451 | 0.000 | Supported |
| Internal Environmental Management (IEM) → Occupational Health and Safety (OHS) | 0.316 | 0.322 | 0.018 | Supported |
| Green Purchasing (GP) → Community Development (CD) | 0.153 | 0.155 | 0.026 | Supported |
| Green Purchasing (GP) → Occupational Health and Safety (OHS) | -0.042 | -0.046 | 0.670 | Rejected |
| Investment Recovery (IR) → Community Development (CD) | 0.221 | 0.228 | 0.000 | Supported |
| Investment Recovery (IR) → Occupational Health and Safety (OHS) | 0.183 | 0.191 | 0.123 | Rejected |
| Occupational Health and Safety (OHS) → Community Development (CD) | 0.193 | 0.197 | 0.012 | Supported |
| **Indirect Effects** | | | | |
| Green Purchasing (GP) → Occupational Health and Safety (OHS) → Community Development (CD) | -0.008 | -0.008 | 0.697 | Rejected |
| IEM → Occupational Health and Safety (OHS) → Community Development (CD) | 0.061 | 0.068 | 0.156 | Rejected |
| Investment Recovery (IR) → Occupational Health and Safety (OHS) → Community Development (CD) | 0.035 | 0.033 | 0.111 | Rejected |

Table 8. Effect Size $f^2$ of IEM, GP, IR, OHS & CD

| | f-Square |
|---|---|
| Green Purchasing (GP) → Community Development (CD) | 0.033 |
| Green Purchasing (GP) → Occupational Health and Safety (OHS) | 0.001 |
| Internal Environmental Management (IEM) → Community Development (CD) | 0.27 |
| Internal Environmental Management (IEM)→ Occupational Health and Safety (OHS) | 0.057 |
| Investment Recovery (IR) → Community Development (CD) | 0.106 |
| Investment Recovery (IR) → Occupational Health and Safety (OHS) | 0.032 |
| Occupational Health and Safety (OHS) → Community Development (CD) | 0.087 |

Table 9. Relevancy predictive ($Q^2$) of IEM, GP, IR, OHS & CD

| | $Q^2$ Predict | PLS-SEM_ RMSE | PLS-SEM_ MAE | LM_RMSE | LM_MAE | IA_RMSE | IA_MAE |
|---|---|---|---|---|---|---|---|
| CD-01 | 0.445 | 0.665 | 0.493 | 0.718 | 0.527 | 0.893 | 0.714 |
| CD-02 | 0.387 | 0.688 | 0.495 | 0.757 | 0.553 | 0.878 | 0.711 |
| CD-03 | 0.37 | 0.686 | 0.516 | 0.711 | 0.537 | 0.864 | 0.711 |
| CD-04 | 0.299 | 0.633 | 0.487 | 0.687 | 0.514 | 0.757 | 0.541 |
| CD-05 | 0.341 | 0.613 | 0.482 | 0.662 | 0.514 | 0.756 | 0.628 |
| CD-06 | 0.274 | 0.719 | 0.552 | 0.748 | 0.566 | 0.844 | 0.6 |
| CD-07 | 0.242 | 0.656 | 0.504 | 0.714 | 0.546 | 0.753 | 0.579 |
| CD-08 | 0.314 | 0.636 | 0.492 | 0.68 | 0.516 | 0.768 | 0.557 |
| OHS_02 | 0.145 | 0.745 | 0.572 | 0.796 | 0.606 | 0.806 | 0.59 |
| OHS_05 | 0.034 | 0.846 | 0.657 | 0.904 | 0.713 | 0.861 | 0.651 |
| OHS_06 | 0.028 | 0.779 | 0.604 | 0.832 | 0.636 | 0.79 | 0.586 |
| OHS_07 | -0.01 | 0.836 | 0.658 | 0.914 | 0.714 | 0.832 | 0.613 |

**Managerial Implication**

This study aims to examine the influence of three GrSCM practices on the community aspect of the SDGs, with OHS implementation as a mediator. Previous research also examined the relationship between GrSCM and the SDGs (Ilyas et al. 2020; Jum'a, 2023) no attempt has been made to investigate the influence of GSCM practices on SDGs, particularly in the mining sector of a developing country like Jordan. As a result, the primary goal of this research is to examine the influence of five main GSCM practices on SDGs related to the environment and community aspects. A structured questionnaire was used to collect primary data from Jordanian mining firms, and 362 responses were analyzed. The study model was tested using a partial least square structural equation modeling (PLS-SEM), however, it did not examine the specific relationship between GrSCM and the SDGs through OHS as a mediator. The results of the structural model analysis revealed that all three GrSCM practices, namely IEM, GP, and IR, have a positive and statistically significant influence on Community Development towards the SDGs, thus supporting hypotheses H1a to H1c. This finding is consistent with previous studies emphasizing the role of GrSCM in improving corporate environmental and social performance in extractive industries such as mining (Zhu et al. 2008; Jabbour et al. 2014). In examining the mediation pathway through OHS, only IEM showed a significant positive effect on OHS (H2a), indicating that internal environmental protocols, training, and audits contribute to a safer operational environment. However, both GP and IR (H2b and H2c) failed to show a significant relationship with OHS, indicating that their implementation may not directly improve safety outcomes in this context. This finding is in line with the view that OHS improvements are more closely related to internally regulated environmental systems than to externally oriented procurement or recovery activities (Zohar & Polachek, 2014).

The findings of this study provide important insights into the mechanisms through which Green Supply Chain Management (GrSCM) practices contribute to community development in the mining sector. The results demonstrate that Internal Environmental Management (IEM), Green Purchasing (GP), and Investment Recovery (IR) exert direct and significant effects on Community Development (CD), highlighting that operational sustainability initiatives can generate social value beyond internal efficiency gains. This finding supports the growing body of literature arguing that environmentally responsible supply chain practices enhance organizational legitimacy and strengthen relationships with local stakeholders, particularly in extractive industries where social acceptance is critical. However, the results also reveal a more nuanced role of Occupational Health and Safety (OHS). While OHS shows a significant direct effect on Community Development, it does not mediate the relationships between GrSCM practices and CD. Only IEM significantly influences OHS, whereas GP and IR do not. This pattern suggests that safety performance in Indonesian mining companies is primarily driven by internally governed environmental systems such as policies, audits, and managerial commitment rather than externally oriented supply chain practices. These findings challenge the common assumption that improvements in environmental supply chain practices automatically translate into safety-driven social outcomes.

Therefore, this study reveals that GrSCM practices are equally important in achieving community-focused SDG programs, but not all GrSCM practices are equally important in achieving safety programs. Only internal environmental management positively contributes to occupational safety and health performance. In contrast, the relationship between green purchasing practices and investment recovery on OHS was not evident in this context. This could be due to weak policy implementation or the separation of functions within the organization. On the other hand, OHS implementation supports the belief that perceptions of workplace safety strengthen community trust and foster social development. Figure 2 shows that of the three GrSCMs, the most significant indicator that improves community practices in the SDGs in the mining sector is internal environmental management practices ($\beta$ = 0.462). Commitment of GrSCM from senior managers (IEM_01 = 0.863) and Support for GrSCM from mid-level managers (IEM_02 = 0.858) are the most dominant indicators describing GrSCM practices in the mining sector. Meanwhile, green purchasing practices have the weakest impact ($\beta$ = 0.153) with ISO 14000 certification for suppliers as the weakest indicator.

Despite the theoretical rationale for the mediating role of K3, the findings revealed that all three indirect pathways, namely, IEM → K3 → CD, GP → K3 → CD, and IR → K3 → CD, were statistically

insignificant. These results suggest that, although K3 exerts a direct positive influence on CD, it does not serve as a significant channel that transmits the impact of GrSCM practices to community-level outcomes. The nature of OHS procedures in Indonesia's mining industry, where safety systems could be structurally separate from procurement or environmental agencies, is one explanation. The lack of a strong link from GP and IR to OHS suggests that these functions are not fully integrated, despite the fact that IEM has been demonstrated to considerably improve OHS results. Concerns expressed in Jabboura et al. (2014) regarding disjointed environmental and safety governance structures in industrial contexts are echoed by this operational gap, which may compromise OHS's ability to operate as a comprehensive conduit for sustainable practices. Zhou et al. (2024) argues that community development in the mining context is often mediated through visible programmatic interventions, rather than embedded operational practices. In this case, the implied operational benefits of GP and IR may not translate into perceived benefits for local communities unless explicitly communicated or externalized. Moreover, from a methodological perspective, Yu et al. (2024) this paper introduces the Mining Area Sustainability Index (MASI caution that significant direct effects paired with non-significant indirect effects as observed for IEM and IR in this study suggest no mediation rather than partial or full mediation. This distinction is important, as it implies that GrSCM practices may influence CD directly without the need for an intervening safety-related mechanism. This challenges traditional assumptions in sustainability literature and supports a more nuanced view of how firms generate social value.

Contrasting evidence is also found in the study by (Fonseca & Carvalho, 2019), who reported that in contexts with strong institutional pressure or stakeholder scrutiny, OHS systems can act as key intermediaries for delivering social outcomes. The fact that the present study found no such mediation may reflect lower external accountability or weaker public awareness of safety systems in the Indonesian mining industry. Thus, the effectiveness of OHS as a mediating mechanism may be highly contingent on contextual factors such as regulatory enforcement, stakeholder salience, and organizational culture. In summary, while OHS remains a valuable predictor of community development, its role as a mediator in the GrSCM–CD relationship is not supported by the data in this study. This indicates the need for more integrative strategies that connect safety performance with broader sustainability initiatives and community engagement frameworks. The mediating function of Occupational Health and Safety (OHS) in tying Green Supply Chain Management (GrSCM) practices to Community Development (CD) was one of the main goals of this study. However, as all three indirect paths through OHS were determined to be statistically insignificant, the results did not support this theory. According to these results, OHS does not significantly act as a bridge between environmental practices and community involvement in the setting under study, even while it alone improves community outcomes.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The research was conducted through a survey of 144 mining company respondents in Indonesia from January to March 2025. The research results indicate that the GrSCM practices implemented through the IEM, GP, and IR variables directly have a significant influence on CD. While OHS directly affects CD, it does not mediate GrSCM with CD. Among the GrSCM variables, only IEM has an influence on OHS, but GP and IR do not. The findings support the direction of the literature emphasising that GrSCM practices improve environmental and social performance, particularly in extractive industries (the author links this to studies such as Zhu et al. 2004 and Jabbour et al. 2014), while also aligning with the view that improvements in occupational safety are more strongly supported by organised internal systems (policies, audits, training) than by more external activities such as procurement or recovery (the author connects this to Zohar & Polachek, 2005). However, these results "without OHS mediation" do not support some evidence suggesting that OHS can be a primary mediator of social impact when institutional pressure/stakeholder oversight is very strong; the authors interpret this difference as potentially influenced by context (external accountability, regulatory enforcement, stakeholder salience, and organisational culture), and emphasise the need for more deliberate strategies to integrate OHS agendas with community programs through stakeholder communication, participatory planning, and cross-functional coordination so that operational benefits are "seen" as social value by the surrounding community.

**Recommendations**

Based on insights from this research, it is suggested that companies may need to adopt more deliberate strategies to integrate their safety initiatives with community development agendas, possibly through enhanced stakeholder communication, participatory planning, or multi-functional coordination.

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