Environmental Management Assessment Scheme (EMAS): Addressing the challenges of environmental, social, and economic performance assessment for industry in Indonesia and its opportunities to become a novel standard in ASEAN and Australia

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Abstract. Amidst the escalating global climate crisis, the coal mining sector in the Asia-Pacific region faces critical scrutiny. As the world strives for rapid decarbonization, the industry must demonstrate not only environmental compliance but also a tangible contribution to community resilience and economic sustainability. Although national compliance instruments like PROPER in Indonesia exist, they often fail to address the holistic challenges of a just energy transition, lacking a cohesive framework that integrates community empowerment with fundamental business strategy. The primary objective of this study is to propose and validate the Environmental Management Assessment Scheme (EMAS), an innovative framework comprising 10 criteria designed to comprehensively evaluate corporate sustainability performance beyond basic compliance. Using a qualitative comparative case study methodology, this research employs EMAS to assess the Community Empowerment Programs (CEP) of three major coal mining corporations from 2020–2025: PT Bukit Asam Tbk (Indonesia), Sarawak Energy Berhad (Malaysia), and BHP Group Limited (Australia). The assessment utilizes key indicators such as Environmental Impact, Social Return on Investment (SROI), and Creating Shared Value (CSV). The findings reveal distinct maturity levels: Indonesian programs excel in local economic engagement but struggle with biodiversity integration; Malaysian initiatives emphasize human capital but lack direct environmental mitigation linkage; while Australian programs demonstrate superior governance and indigenous involvement. This study concludes that EMAS offers a robust, adaptable standard for ASEAN and Australia,

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essential for guiding industries from administrative compliance toward transformative sustainable development in the era of climate change

1 Introduction

3.1 Global and Regional Background: The Dilemma of the Extractive Industries

In the third decade of the 21st century, the global energy industry landscape is undergoing a fundamental transformation. The scientific consensus on climate change, as detailed in the latest reports by the IPCC [1], underscores the physical urgency for rapid decarbonization. Driven by the Paris Agreement and the 2030 Sustainable Development Goals (SDGs) agenda, pressure on the extractive industries—particularly coal mining—to demonstrate tangible sustainability performance has never been stronger. Operations are now scrutinized not only for their local impact but also for their alignment with planetary boundaries, a concept that defines the safe operating space for humanity [2].

In the Asia-Pacific region, countries like Indonesia, Malaysia, and Australia are at the center of this vortex. These three countries have a significant economic dependence on natural resource exports, but simultaneously face domestic and international demands for a just energy transition. For mining companies operating in this region, the main challenge is no longer simply technical compliance with physical environmental regulations, but how to maintain a "social license to operate" amidst ever-increasing public expectations [3]. Global investors are now increasingly strict in applying Environmental, Social, and Governance (ESG) criteria. As noted by Jenkins and Yakovleva [4], the trend in social and environmental disclosure reflects a growing demand for transparency regarding long-term impacts. Failure to manage these impacts can lead to operational risks, investment withdrawal, and even revocation of concession permits.

In Indonesia, efforts to standardize the management of industrial impacts have been undertaken thru various regulatory instruments. Environmental Impact Analysis (EIA) serves as an ex-ante (pre-operation) filter, while the Company Performance Rating Program in Environmental Management (PROPER), managed by the Ministry of Environment and Forestry, functions as an ex-post (post-operation) monitoring tool [5]. PROPER, in particular, has successfully driven corporate compliance beyond the minimum threshold (status "Beyond Compliance") through Green and Gold ratings. However, there are critical gaps in the currently available instruments. The evaluations conducted are often fragmented (siloed). Physical environmental aspects (such as wastewater management and emissions) are often assessed separately from social aspects (such as conflict resolution and economic empowerment). As a result, many companies are trapped in an administrative compliance mindset. Community empowerment programs are often designed solely to fulfill regulatory obligations or respond to immediate social pressure, without a clear sustainability strategy. As identified in early literature on EMAS, the implementation of community empowerment programs in Indonesia has often not fully addressed the pressing social and environmental needs around the company's operational areas. Furthermore, without an assessment framework that simultaneously integrates economic and social impacts, these programs often end up being "cost centers" that burden the company's finances without providing any real, measurable benefits to society or the company's own business sustainability.

3.2 The Urgency of a Holistic Approach: Moving Beyond Compliance Toward Value Creation

The limitations of these conventional instruments necessitate a new paradigm in industrial performance evaluation. The industry needs a comprehensive, practical, and relevant method to holistically assess environmental, social, and economic performance within a single integrated framework. This approach should be able to shift the company's focus from simply "managing negative impacts" (risk mitigation) to "creating positive impacts" (value creation). In the context of ASEAN and Australia, the need for these new standards is also driven by unique demographic and geographic characteristics. Mining operations in this region often directly intersect with indigenous communities and local people who have a strong connection to the land. Therefore, success indicators cannot be measured solely by how many tons of carbon are reduced or how much CSR funding is distributed. The assessment must delve into a more subtle yet crucial realm: how much social capital has been built? How effectively is social cohesion maintained? And does the company's investment lead to economic independence for the community after mining?

The limitations of these conventional instruments necessitate a new paradigm in industrial performance evaluation. The industry needs a method to holistically assess environmental, social, and economic performance within a single integrated framework to ensure a Just Transition. This is where the Environmental Management Assessment Scheme (EMAS) serves as a critical bridge [6].

Unlike traditional environmental audit schemes, EMAS is developed based on a holistic framework that simultaneously assesses not only the physical environmental impact, but also the economic, social, and human well-being dimensions. The theoretical foundation of EMAS is rooted in recognized global sustainability principles, including the ISO 26000 social responsibility guidelines, the ESG framework, and the Sustainable Development Goals (SDGs). The main advantage of EMAS lies in its structure, which consists of 10 core criteria designed to provide a comprehensive diagnosis of a company's sustainability program maturity: 1) Environmental Impact: Focus on the program's consequences for the natural environment. 2) Economic Impact: Evaluate job creation and local economic growth. 3) Social Impact: Assessment of social cohesion and conflict reduction. 4) Wellbeing Impact: Focuses on health, education, and life satisfaction. 5) Social Return on Investment (SROI): Measuring the monetary value of the social and environmental impact generated. 6) Creating Shared Value (CSV): Assessing the integration between business success and social progress. 7) Biodiversity Contribution: Evaluation of ecosystem protection. 8) Stakeholder Engagement: Quality of interaction and participation. 9) Spatial Proximity: Focus on the direct impact on the affected local community. 10) Governance: The accountability and transparency structure of the program. With these ten indicators, EMAS not only serves as an external evaluation tool but also as an internal (ex-ante) planning instrument that can be integrated with the Logical Framework Approach (LFA) to design more effective interventions.

EMAS employs a quantitative scoring scale ranging from 0 to 100, divided into three performance tiers: Low (0-60), Medium (61-80), and High (81-100). This classification serves not merely as a designation, but as a diagnostic instrument. A "Low" score signifies a necessity for fundamental alterations in strategy or resource distribution. A "Medium" score indicates commendable practices that have not yet been completely assimilated. A "High" score denotes exemplary leadership and innovation that can act as a standard.

This study proposes EMAS not merely as an audit tool, but as a strategic framework to answer the gaps left by traditional assessments. Unlike PROPER or standard audits which may overlook the intersectionality of climate impact, EMAS integrates 10 core criteria—ranging from Biodiversity Contribution to Creating Shared Value (CSV)—to diagnose a company's true sustainability maturity. By linking environmental mitigation directly with

community economic resilience, EMAS offers a pathway to assess whether companies are genuinely contributing to sustainable development in the face of climate change, or merely ticking administrative boxes.

3.3 Study Focus: Cross-Country Comparison (Indonesia, Malaysia, Australia)

This article aims to objectively diagnose the strategic maturity of sustainability practices by applying EMAS to three leading coal mining entities in the Asia-Pacific region during the 2020–2025 period: PT Bukit Asam Tbk (Indonesia), Sarawak Energy Berhad (Malaysia), and BHP Group Limited (Australia). The selection of these jurisdictions is not arbitrary but is driven by the necessity to benchmark distinct regulatory paradigms against a unified performance standard.

The rationale for this comparative analysis is threefold. First, it addresses the implementation gap in developing economies. In Indonesia, while CSR is mandatory, scholars like Waagstein [7] have long argued that the legal obligation often leads to procedural compliance rather than substantial impact, necessitating a tool that measures actual value creation. Similarly, in Malaysia, Siwar and Harizan [8] note that while CSR practices are evolving, they often lack a comprehensive framework for measuring environmental integration. Second, it serves to benchmark these emerging frameworks against mature governance models. Australia provides a critical counterpoint where the "social license to operate" is not just a regulatory hurdle but a core determinant of business viability [3].

Third, the comparison is essential to evaluate the efficacy of community development initiatives using a holistic lens. As Esteves and Barclay [9] emphasize, the mining industry requires new approaches to evaluate performance that go beyond traditional outputs. By juxtaposing these diverse contexts, this study utilizes EMAS to identify structural weaknesses in current regional practices—such as the "siloed" treatment of social and environmental issues—and explores the potential of EMAS to serve as a standardized "common language" for sustainability assessment across ASEAN and Australia [6].

2 Methodology

2.1 Research Design

This study adopts a descriptive qualitative approach with a multi-case study design. This approach was chosen because of its ability to explore complex contemporary phenomena—in this case, the implementation of community empowerment programs—within the context of real life where the boundaries between the phenomenon and its context are not clearly visible. Comparative studies are used to draw cross-border learning by comparing best practices and performance gaps between three industrial entities operating under different regulatory regimes and socio-cultural contexts in the Asia-Pacific region.

2.2 Selection of Study Subject

The cases were selected using the purposive sampling method, with the criteria being companies that are market leaders in their respective countries and have sustainability reports that are transparently published. The three entities that are the focus of the analysis are PT Bukit Asam Tbk (Indonesia): Representing the context of State-Owned Enterprises (SOEs) in developing countries, with a focus on post-mining transformation programs in Tanjung Enim; Sarawak Energy Berhad (Malaysia): Representing an integrated energy company in an ASEAN country that is balancing its coal and renewable energy portfolio, with a focus on

programs in the Balingian and Mukah regions and BHP Group Limited (Australia): Represents a global mining company in a developed country with highly mature governance standards, particularly in the context of Reconciliation with Indigenous Peoples (RAP).

2.3 Data Collection Techniques

The data used in this study is secondary data collected thru the technique of document analysis. The primary data sources include Sustainability Reports, Integrated Reports, and official publications related to CSR/PPM programs issued by the three companies between 2020 and 2025. This time period was chosen to capture the latest dynamics of the mining industry in responding to the global pandemic and the acceleration of the energy transition. Additionally, policy documents related to environmental regulations in each country were reviewed to provide context for the analysis.

2.4 Data Analysis: Core EMAS Instrument

The core of this research methodology is the application of the Environmental Management Assessment Scheme (EMAS) as an analysis instrument. Qualitative data extracted from company reports were mapped and evaluated using 10 EMAS indicator criteria: Environmental Impact, Economic Impact, Social Impact, Welfare Impact, SROI, Creating Shared Value (CSV), Biodiversity Contribution, Stakeholder Engagement, Regional Proximity, and Governance.

To ensure objectivity and comparability, the assessment was conducted by converting qualitative data into a tiered performance rating scale (grading system) according to EMAS standards:

High Level (Score 81-100): Awarded to programs that demonstrate outstanding performance, go beyond regulatory compliance, implement innovations, and have a significant and measurable positive impact across various dimensions of sustainability.

Moderate Level (Score 61-80): Awarded to programs that demonstrate good performance and have implemented effective practices, but still have room for improvement or face challenges in cross-dimensional integration.

Low Level (Score 0-60): Awarded to programs whose performance is not yet satisfactory, is reactive, or faces significant constraints such as lack of resources, inadequate capacity, or weak commitment.

The analysis process involved triangulating data across documents to verify company performance claims, followed by a comparative synthesis to identify patterns, strengths, and relative weaknesses of each CSR approach model in the three countries.

3 Result & Discussion

This section provides a comprehensive comparative analysis of the implementation of community empowerment programs at three prominent coal mining companies in the Asia-Pacific region from 2020 to 2025: PT Bukit Asam Tbk (Indonesia), Sarawak Energy Berhad (Malaysia), and BHP Group Limited (Australia). The evaluation was performed utilizing the 10 fundamental criteria of the Environmental Management Assessment Scheme (EMAS) as proposed by Widhagdha [15]. This assessment evaluates both compliance and the strategic integration of environmental, social, and economic dimensions to diagnose sustainability maturity. This assessment, as outlined in the methodological framework, evaluates both compliance and the strategic integration of environmental, social, and economic dimensions. Each indicator was qualitatively evaluated and classified into performance tiers: High (81-

100), Medium (61-80), or Low (0-60) according to empirical data from each company's sustainability reports.

3.1 Concise Overview of the Flagship Program (2020-2025)

Prior to examining each indicator, it is essential to comprehend the context of the flagship program under analysis, 1) PT Bukit Asam Tbk (Indonesia): The primary emphasis is on post-mining transformation through the "Tanjung Enim Tourist City" initiative and the establishment of the Bukit Asam Industrial Center (SIBA). This strategy seeks to establish a circular economy and foster local economic autonomy in anticipation of coal reserve depletion. 2) Sarawak Energy Berhad (Malaysia): Concentrate on corporate social responsibility initiatives pertaining to the Balingian and Mukah coal assets, prioritizing the Education Fund and Community Infrastructure. This strategy aligns closely with the Sarawak state government's development agenda aimed at enhancing human capital. 3) BHP Group Limited (Australia): Emphasis on the Reconciliation Action Plan (RAP) with Indigenous communities (First Nations). This program emphasizes the acquisition of goods and services from indigenous enterprises and collaborative land management.

3.2 Case Study 1: PT Bukit Asam Tbk (Indonesia)

The EMAS assessment of PT Bukit Asam Tbk's (PTBA) initiatives in Tanjung Enim, South Sumatra, reveals a sustainability profile characterized by robust local socio-economic engagement, yet challenged by a lack of systemic ecological integration. The company's flagship program, the transformation of the mine site into "Tanjung Enim Tourism City" alongside the development of the Bukit Asam Industrial Centers (SIBA), represents an adaptive strategy designed to mitigate post-mining economic anxiety [13].

Regarding Economic Impact, the program achieved a High level (Score: 8). This performance is driven by the successful implementation of the Micro, Small, and Medium Enterprises (MSME) cluster model through SIBA—specifically the Coffee, Batik, and Rosella clusters. Unlike traditional cash-based philanthropy, PTBA has established a business ecosystem that effectively decouples community livelihoods from direct dependence on mining operations, thereby creating tangible economic resilience at the grassroots level. This success permeates the Social Impact and Wellbeing Impact indicators, both of which also secured a High level (Score: 8). The "Tourism City" initiative functions as a potent mechanism for social cohesion, unifying diverse community elements under a shared developmental vision. Consequently, this approach has been effective in maintaining social stability and mitigating potential conflicts within the operational 'Ring 1' area. Furthermore, the company's substantial contribution to basic infrastructure, including clean water facilities and school renovations, has directly elevated the local Human Development Index (HDI) and quality of life.

However, the assessment of Environmental Impact indicates a Medium level (Score: 7). While PTBA has demonstrated progressive innovation by utilizing Fly Ash and Bottom Ash (FABA) waste for village road infrastructure—a commendable circular economy practice — the community empowerment programs often operate in silos, detached from the mitigation of massive operational impacts such as open-pit voids and dust pollution. As noted in regional environmental reviews, the disparity between social development programs and the reality of physical environmental degradation remains a critical challenge. This fragmentation is further highlighted by the Low/Medium level (Score: 5) assigned to the Biodiversity Contribution indicator. Unlike global best practices, PTBA's agricultural and tourism initiatives have not yet positioned biodiversity conservation as a central pillar of community empowerment, treating it instead as a peripheral technical activity.

Strategically, PTBA demonstrates a High level (9) in Creating Shared Value (CSV) and Proximity. The utilization of FABA serves as a quintessential example of CSV as defined by Porter and Kramer (2011), wherein the company reduces disposal costs while the community gains essential infrastructure. The program is also hyper-local, ensuring benefits are concentrated on the immediate impact zones. Nevertheless, regarding impact accountability, the Social Return on Investment (SROI) indicator remains at a Medium level (7). While the qualitative benefits are evident, impact reporting often relies on project narratives rather than rigorous monetary ratio calculations aligned with global standards. Finally, the Governance aspect scored at a Medium level (7), reflecting strong compliance with State-Owned Enterprise (SOE) regulations and PROPER standards, yet constrained by rigid bureaucratic structures compared to the flexibility observed in the private sector.
Program Focus: Transformation of Tanjung Enim into a Tourism City & Circular Economy Agriculture.

Table 1. EMAS Score Community Development Program PT Bukit Asam Tbk (Indonesia)

EMAS Indicator	Assessment & Description	Level
1. Environmental Impact	Medium. The program promotes organic agriculture and utilizes FABA (Fly Ash Bottom Ash) for infrastructure. However, the scale of positive environmental impact is often localized compared to the massive footprint of open-pit mining.	7
2. Economic Impact	High. The program successfully creates alternative livelihoods for communities dependent on the mine. The development of tourism MSMEs and agricultural clusters provides tangible income diversification.	8
3. Social Impact	High. Strong focus on reducing social conflict by integrating the community into the company's supply chain. It strengthens social cohesion through "Sentra Industri Bukit Asam" (SIBA).	8
4. Wellbeing Impact	High. Direct contributions to local health facilities and schools are substantial. The transition to a "Tourism City" aims to improve the overall livability of the mining town.	8
5. SROI	Medium. While benefits are visible, the calculation of SROI is often project-based rather than comprehensive. The multiplier effect is recognized but not always rigorously quantified in monetary terms.	7
6. Shared Value (CSV)	High. Excellent example of CSV. The company utilizes waste (FABA) for community roads (cost reduction) while the community gains infrastructure (value creation).	9
7. Biodiversity Contribution	Low/Medium. While there are reclamation parks, the core empowerment programs (agriculture/tourism) often lack a specific, high-level biodiversity conservation strategy compared to global standards.	5
8. Stakeholder Engagement	High. The "Tanjung Enim Kota Wisata" committee involves local government and community leaders extensively, adhering to the Proximity principle.	8
9. Proximity	High. The program is hyper-local, specifically targeting Ring 1 villages around the Tanjung Enim mine site.	9
10. Governance	Medium. Governance is strong under SOE (BUMN) regulations, but community-led governance in the post-mining planning phase is still developing.	7

3.3 Case Study 2: Sarawak Energy Berhad (Malaysia)

The EMAS profile for Sarawak Energy Berhad (SEB), specifically regarding its coal operations in Balingian and Mukah, illustrates a "Human Capital Development" model that

is highly focused yet environmentally fragmented [10]. The company's CSR strategy is intrinsically aligned with the state-developmentalist vision of the Sarawak State Government, prioritizing the enhancement of human resource quality to support the broader energy corridor.

The primary strengths of SEB's program are evident in Wellbeing Impact and Social Impact, both achieving a High level (Score: 8). Through initiatives such as the Balingian Education Fund, the company channels massive investment into scholarships and technical training for local youth. This strategy directly ameliorates access to tertiary education for previously marginalized rural communities, aligning perfectly with the developmental agenda of the Sarawak Corridor of Renewable Energy (SCORE). Furthermore, the company's acute sensitivity to Sarawak's multicultural context is demonstrated through consistent support for local cultural festivals and religious institutions. This approach has successfully fortified social capital and communal harmony within a diverse operational region.

Conversely, the EMAS analysis underscores significant structural weaknesses within the environmental dimension of their coal-related CSR. The indicators for Environmental Impact and Biodiversity Contribution both registered a Low level (Score: 5). In stark contrast to the robust watershed conservation initiatives associated with their hydropower assets, community empowerment programs surrounding the Mukah coal mines are almost exclusively social-philanthropic in nature. There exists a palpable disconnect between the landscape-altering mining operations and the CSR focus on education and religion. Communities are not actively engaged in environmental monitoring or land rehabilitation as part of the empowerment scheme. This suggests that within the coal sector, environmental responsibility is still perceived as an internal technical mandate rather than an opportunity for community engagement.

Regarding Economic Impact, SEB achieved a Medium level (Score: 7). While investments in education enhance long-term employability, the program generates fewer direct job creation opportunities or independent entrepreneurship pathways for the general community outside of corporate recruitment, particularly when compared to the MSME models observed in Indonesia. In terms of Creating Shared Value (CSV), the Medium score (7) reflects that the value created is predominantly indirect: the company secures a future supply of educated labor, but local supply chain integration remains less intensive than global best practices.

Positive performance is also noted in Governance and Stakeholder Engagement, scoring High (9 and 8) respectively. As a state-owned entity, SEB maintains a highly disciplined, consistent, and transparent reporting structure. Consultation mechanisms with indigenous leaders and district officials are institutionalized, ensuring that executed programs possess strong political and social legitimacy. Overall, SEB demonstrates high maturity in social-governance aspects but requires a fundamental transformation to integrate ecological dimensions into its community empowerment strategy to meet the holistic standards of EMAS.

Program Focus: "Balingian/Mukah Education Fund" and Community Infrastructure for Coal-Impacted Areas.

Table 2. EMAS Score Community Development Program Serawak Energy Berhad (Malaysia)

EMAS Indicator	Assessment & Description	Level
1. Environmental Impact	Low. The CSR focus in the coal belt (Mukah) is predominantly social (education/religion). There is a disconnect between the CSR programs and the mitigation of the coal plant's environmental footprint.	5
2. Economic Impact	Medium. Provides scholarships which boost long-term economic potential (Human Capital), but lacks immediate, large-scale job creation programs for the general community outside of direct employment.	7
3. Social Impact	High. Very strong in preserving local Melanau heritage and supporting religious/cultural harmony. This builds significant social capital in a diverse region.	8
4. Wellbeing Impact	High. The focus on education (bursaries for youth) and rural electrification directly improves the Human Development Index (HDI) of the target area.	8
5. SROI	Medium. The investment in education has a high theoretical return, but the specific SROI data tracking for these community investments is less transparent than in the Australian case.	7
6. Shared Value (CSV)	Medium. Creates a future skilled workforce for the state (value to company), but the direct operational link between the coal mine and the community program is less "integrated" than the CSV ideal.	7
7. Biodiversity Contribution	Low. Similar to the Indonesian case, the community empowerment programs in the coal sector are distinct from the company's conservation efforts (which are focused more on their hydropower assets).	5
8. Stakeholder Engagement	High. Engagement is formalized through community leaders and state education boards.	8
9. Proximity	High. Programs are strictly geo-fenced to the Mukah and Balingian districts where the coal assets are located.	9
10. Governance	High. As a state-owned entity, reporting is structured, consistent, and aligned with state development goals (Sarawak Corridor of Renewable Energy).	9

3.4 Case Study 3: BHP Group Limited (Australia)

BHP Group Limited establishes a regional benchmark with an EMAS assessment profile that is consistently high across nearly all indicators. Through its Reconciliation Action Plan (RAP), BHP demonstrates an "Integrated Sustainability" model where the boundaries between core business operations, social responsibility, and environmental management are effectively dissolved [11–13].

The most prominent strengths are observed in Economic Impact and Governance, both achieving near-perfect or perfect scores (High level: 9). Through its Indigenous Procurement Policy, BHP goes beyond mere aid; it integrates indigenous businesses into the company's core supply chain with transaction values reaching billions of dollars. This strategy engenders systemic economic change and financial independence that far exceeds the impact of traditional aid programs. The governance of this program is supported by radical transparency, where targets and achievements are publicly audited, reflecting the highest global accountability standards.

In the environmental dimension, BHP successfully merges conservation with empowerment, resulting in a High level (Score: 8) for both Environmental Impact and Biodiversity Contribution. The Indigenous Rangers program represents a key innovation

where indigenous peoples are employed to manage land, restore habitats, and monitor species using Traditional Ecological Knowledge (TEK) combined with modern science. This approach transforms conservation from a regulatory obligation into a dignified and culturally relevant livelihood. This aligns with broader research suggesting that stakeholder involvement is crucial for managing biodiversity.

The Social Impact and Stakeholder Engagement indicators also received High scores (8 and 9). BHP's RAP is designed to address historical social grievances by recognizing indigenous rights and involving elders in strategic decision-making. By applying the principle of Free, Prior, and Informed Consent (FPIC), community participation has shifted from mere "consultation" to "co-creation," providing a robust social license for operations.

Furthermore, BHP exhibits exceptional maturity in Social Return on Investment (SROI) with a High score (9). The company utilizes sophisticated economic impact reporting frameworks, detailing the value-add of every dollar of community investment, thereby validating the effectiveness of their strategy to shareholders and the public. This serves as a prime example of Creating Shared Value (CSV) (High level: 8), where the success of the mining business and the welfare of traditional landowners become interdependent and mutually reinforcing. Overall, the BHP case study validates that EMAS can effectively identify transformative sustainability practices, where social and environmental issues are no longer cost burdens but drivers of strategic corporate value.

Program Focus: Indigenous Reconciliation Action Plan (RAP) & Closure Planning.

Table 3. EMAS Score Community Development Program BHP Group Limited (Australia)

EMAS Indicator	Assessment & Description	Level
1. Environmental Impact	High. The program engages Indigenous rangers for land management. Rehabilitation planning involves the community to restore ecological functions suited to future land use.	8
2. Economic Impact	High. Massive procurement targets ($1.5 billion) from Indigenous businesses create systemic economic change, not just project-based income.	9
3. Social Impact	High. The RAP is fundamentally about healing social divides and building respect. It addresses historical grievances, creating deep social cohesion.	8
4. Wellbeing Impact	High. Investments in culturally appropriate health and education services address systemic disadvantage.	8
5. SROI	High. BHP utilizes sophisticated metrics to track the inputs (US$70.1m) against broader economic outcomes (contribution to the economy), demonstrating a mature understanding of value creation.	9
6. Shared Value (CSV)	High. Secures a stable operating environment and diverse supply chain for BHP, while empowering Indigenous economic independence. A prime example of CSV.	8
7. Biodiversity Contribution	High. The partnership with Indigenous groups for "Caring for Country" integrates traditional ecological knowledge with modern conservation, directly enhancing biodiversity.	8
8. Stakeholder Engagement	High. Adopts the principle of Free, Prior, and Informed Consent (FPIC). Programs are "co-created," not just "consulted".	9
9. Proximity	High. Focuses on Traditional Owners of the specific lands where mining occurs.	9
10. Governance	High. The RAP is a public, audited document with clear targets and transparent reporting mechanisms.	8

3.5 Comparative Discussion: Opportunities for ASEAN and Australia

The application of the EMAS framework reveals distinct patterns across the three regions. First ol all, Integration of Biodiversity, The Australian case demonstrates that community empowerment can be effectively linked to biodiversity conservation (Indicator 7). Indonesian and Malaysian companies often treat these as separate departments. EMAS encourages the ASEAN coal industry to involve communities in biodiversity management, turning rehabilitation liabilities into community assets. Secondly, Shifting From Philanthropy to Shared Value**,** While Sarawak Energy shows strong philanthropic commitment (Education), BHP's procurement strategy (Indicator 2 & 6) shows how companies can drive systemic economic change. PT Bukit Asam is moving in this direction with its industrial centers (SIBA). EMAS pushes companies to move from "giving" to "partnering." Third, using SROI as a Standard, the lack of rigorous SROI measurement (Indicator 5) in the ASEAN examples is a key weakness. Adopting EMAS would necessitate better data collection and impact valuation, allowing ASEAN companies to better justify their ESG value to global investors. And the last is proposing EMAS as a Regional Standard, the shared challenges of the coal transition in Indonesia, Malaysia, and Australia make EMAS a viable common language. It respects local contexts (Proximity) while enforcing global standards (Governance, SROI). For ASEAN, adopting EMAS could accelerate the shift from "compliance-based" CSR (like PROPER) to "value-creation" sustainability strategies seen in top-tier Australian firms.

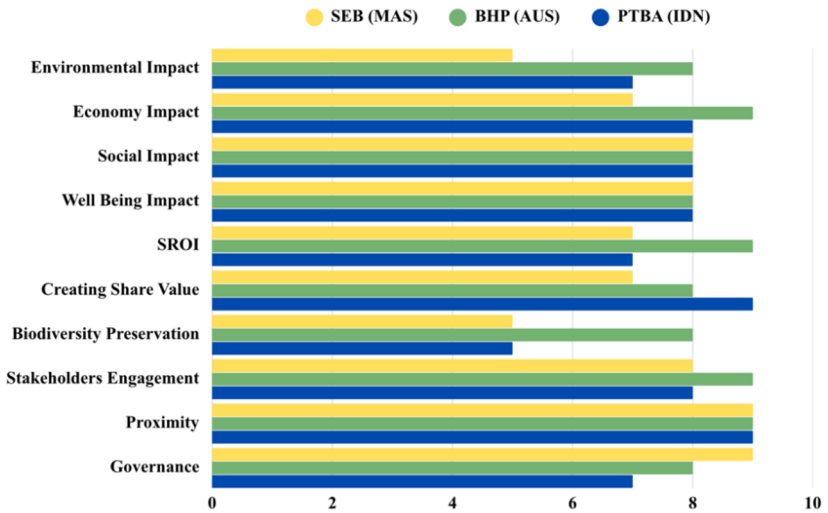

Fig. 1. Comparison of the GOLD value of the three community empowerment programs (Source: Authors, 2025)

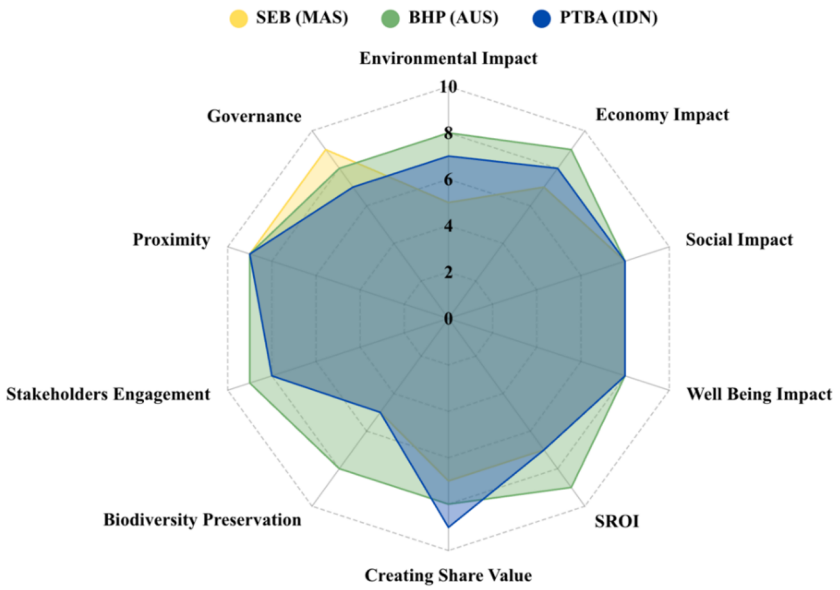

Fig. 2. comparison of the GOLD value of the three community empowerment programs in the radar chart (Source: Authors, 2025)

Analysis utilizing the aforementioned 10 EMAS indicators reveals several pivotal strategic themes to address the industry's challenges and opportunities in this region. The EMAS analysis results delineate the trajectory of CSR evolution. Malaysia (Sarawak Energy) exemplifies a robust "Strategic Philanthropy" model, wherein the company enhances social capacity (Education) in exchange for resource extraction. Indonesia (PT Bukit Asam) is currently in the "Economic Empowerment" phase, striving to establish local economic autonomy through micro, small, and medium enterprises (MSMEs) in anticipation of the post-mining era. BHP Australia has attained the "Integrated Sustainability" phase, wherein social and environmental concerns, specifically Indigenous Business and Ranger initiatives, are incorporated into the supply chain and fundamental operations. EMAS offers a framework for companies in Indonesia and Malaysia to advance towards this integrated model, especially concerning Economic Impact and CSV.

The most notable discovery is the diminished score of the Biodiversity Contribution indicator in empowerment programs in Indonesia and Malaysia relative to Australia. In ASEAN, conservation is frequently perceived as a technically exclusive field distinct from societal involvement. The BHP case study demonstrates significant potential: conservation can serve as the foundation for empowerment initiatives. By educating local communities to serve as "environmental guardians" (citizen scientists or rangers), ASEAN companies can concurrently enhance their EMAS scores on indicators 1 (Environment), 2 (Economy), and 7 (Biodiversity).

EMAS, as a novel regional benchmark, affirms the relevance of EMAS for cross-border application. The framework is sufficiently adaptable to honor local knowledge (such as the cultural practices in Sarawak or consensus-building in Indonesia), while also being stringent enough to uphold global standards (such as SROI and CSV). For ASEAN and Australia, the implementation of EMAS can establish a "common language" in sustainability, promote knowledge transfer, and elevate the performance standards of the mining sector.

In conclusion, the EMAS analysis results indicate that while all three companies demonstrate a strong commitment to societal responsibilities, there are notable discrepancies in the profundity of their strategies and the incorporation of their programs. PT Bukit Asam

excels in foundational economics, Sarawak Energy in human capital advancement, and BHP in systemic integration and governance. Through the lens of EMAS, the trajectory toward sustainable, empowerment-focused environmental management becomes more quantifiable and purposeful.

The comparative analysis reveals distinct strategic patterns. Malaysia (Sarawak Energy) exemplifies a strong "Strategic Philanthropy" model, building social capacity as reciprocity for resource extraction [8]. Indonesia (PT Bukit Asam) is in the "Economic Empowerment" phase, creating local economic autonomy to prepare for the post-mining era, though often driven by mandatory compliance [7]. Australia (BHP) has reached the "Integrated Sustainability" phase, where social and environmental issues are embedded in the core supply chain [3].

A critical finding is the gap in Biodiversity Contribution in ASEAN. While Australian programs link conservation with indigenous employment [12]. Indonesian and Malaysian programs often treat conservation as a technical domain separate from community development. Adopting EMAS would necessitate better data collection and SROI measurement for ASEAN companies to justify their ESG value to global investors [6].

4 Conclusion

This research commenced with a critical objective: to validate the Environmental Management Assessment Scheme (EMAS) as a holistic diagnostic framework capable of bridging the gap between technical regulatory compliance and transformative sustainable value creation in the Asia-Pacific coal mining sector. By applying EMAS to three major entities—PT Bukit Asam Tbk (Indonesia), Sarawak Energy Berhad (Malaysia), and BHP Group Limited (Australia)—this study has successfully mapped the varying strategic maturities of sustainability practices in the region.

The comparative analysis using the 10 EMAS indicators yields three distinct typologies of community empowerment, each with specific strengths and structural gaps. First, the Indonesian case (PT Bukit Asam) demonstrates a "Grassroots Economic Resilience" model. It excels in creating local economic autonomy through MSME clusters and circular economy initiatives like FABA utilization, yet it struggles to integrate biodiversity conservation as a systemic part of community empowerment [14]. Second, the Malaysian case (Sarawak Energy) reflects a "Human Capital Development" model. While it effectively directs resources into education and social stability aligning with state development goals, it exhibits a disconnect between social programs and the mitigation of the coal sector's environmental footprint [10]. Third, the Australian case (BHP) sets a regional benchmark for an "Integrated Sustainability" model. By embedding indigenous businesses into the core supply chain and employing communities as environmental rangers, BHP demonstrates that social, economic, and environmental objectives can be mutually reinforcing rather than siloed [3,12].

Crucially, these findings have profound implications for the broader climate crisis and sustainability transition. As the IPCC [1] underscores the urgency of decarbonization, the extractive industry faces the dual challenge of reducing emissions while ensuring a "Just Transition" for dependent communities. This study confirms that current compliance-based tools (like PROPER in Indonesia) are insufficient to navigate this complexity because they fail to measure the resilience of the community-environment nexus. EMAS fills this void by highlighting that true sustainability in a warming world requires more than just carbon management; it demands the creation of independent economic ecosystems and the restoration of biodiversity through active community stewardship [2,3].

Ultimately, this study advocates for the adoption of EMAS as a unified regional standard for ASEAN and Australia. By enforcing rigorous metrics such as Social Return on Investment (SROI) and Creating Shared Value (CSV), EMAS can guide the industry away from reactive

"social license" strategies toward proactive "value creation." This shift is essential to ensure that as the energy landscape transforms, mining operations leave behind empowered communities and restored ecosystems, rather than social and ecological liabilities [15]. Future research should expand this assessment to the critical minerals sector to ensure the booming renewable energy supply chain adheres to these same holistic standards.

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