

# **From Waste to Value in Drilling Operations: MFA of Pertamina's Circular Uniform Upcycling Initiative**

**Dina Nurul Fitria**

Research Professor, Agribusiness Department  
Universitas Trilogi, Jakarta Selatan, Indonesia  
Email: [dedinanf@gmail.com](mailto:dedinanf@gmail.com) (corresponding author)

**Ade Barkah Darmond**

External Affairs  
PT Pertamina Drilling Services Indonesia  
Jakarta Selatan, Indonesia  
Email: [Ade.barkah@pertamina.com](mailto:Ade.barkah@pertamina.com)

## **Abstract**

Circular economy (CE) practices are increasingly adopted in industrial supply chains to reduce waste, extend material life cycles, and strengthen environmental, social, and governance (ESG) performance. This study examines the implementation of CE principles within the drilling supply chain of PT Drilling Services Pertamina through the repurposing of used work overall uniforms into functional products and corporate merchandise. Using Material Flow Analysis (MFA) and reverse logistics mapping, the research evaluates waste reduction potential, material recovery efficiency, and operational feasibility. Findings indicate that structured reverse flows, supplier engagement, and local micro-enterprise partnerships significantly reduce textile waste while enhancing ESG outcomes and supply chain sustainability. The study contributes to managerial understanding of CE adoption in resource-intensive industries and offers a scalable model for green supply chain transformation.

## **Keywords**

Circular economy; reverse logistics; material flow analysis; textile upcycling; supply chain sustainability

## **1. Introduction**

Industrial drilling operations generate substantial textile waste from worn-out work uniforms, particularly coveralls that are no longer suitable for field use. Ineffective management of discarded uniforms can increase environmental burdens through waste accumulation, open burning, or disposal in landfills, contributing to a larger ecological footprint. In the oil and gas sector, textile waste is often overlooked compared to hazardous waste streams, despite its significant volume and potential for material recovery.

The Gear Upcycling Drilling (GUD) program, launched in May 2025, aims to reduce the environmental footprint of Pertamina Drilling personnel uniforms across their lifecycle by repurposing used uniforms and coveralls into value-added products. **“The GUD program, launched in May 2025, aims to reduce the environmental footprint of Pertamina Drilling personnel uniforms across their lifecycle by repurposing used uniforms and coveralls into value-added products.”** This program provides an operational example of how CE principles can be embedded into a resource-intensive supply chain.

This paper examines the application of circular economy (CE) principles in the drilling supply chain through the Gear Upcycling Drilling (GUD) program at PT Drilling Services Pertamina, using a Material Flow Analysis (MFA) approach to evaluate environmental and operational impacts.

The GUD program, launched in May 2025, aims to reduce the environmental footprint of Pertamina Drilling personnel uniforms across their lifecycle by repurposing used uniforms and coveralls into value-added products. Analysis shows that the program successfully processed more than 65 kg of discarded coveralls in 2025, with a target of 350 kg in 2026. The resulting impacts include an 88% reduction in textile waste, avoidance of 5,244 kg CO<sub>2</sub>-eq emissions, conservation of 756 liters of clean water, and the creation of green jobs for 19 local artisan families. These outcomes demonstrate that uniform repurposing can serve as an effective, measurable, and replicable CE solution within the drilling industry.

As global sustainability pressures intensify, companies in the energy services sector are expected to adopt CE and green supply chain (GSC) practices to reduce waste and improve ESG performance. CE strategies—such as reuse, remanufacturing, and material recovery—are increasingly recognized as effective mechanisms for reducing environmental footprints in industrial supply chains (Geissdoerfer et al., 2020). PT Drilling Services Pertamina faces similar challenges, with hundreds of uniforms discarded annually due to operational wear. Conventional disposal practices not only increase waste but also represent a loss of recoverable material value. This study investigates how the company integrates CE principles by converting used uniforms into value-added merchandise, thereby strengthening sustainability performance and supporting local economic empowerment (Sihombing & Prabowo, 2022).

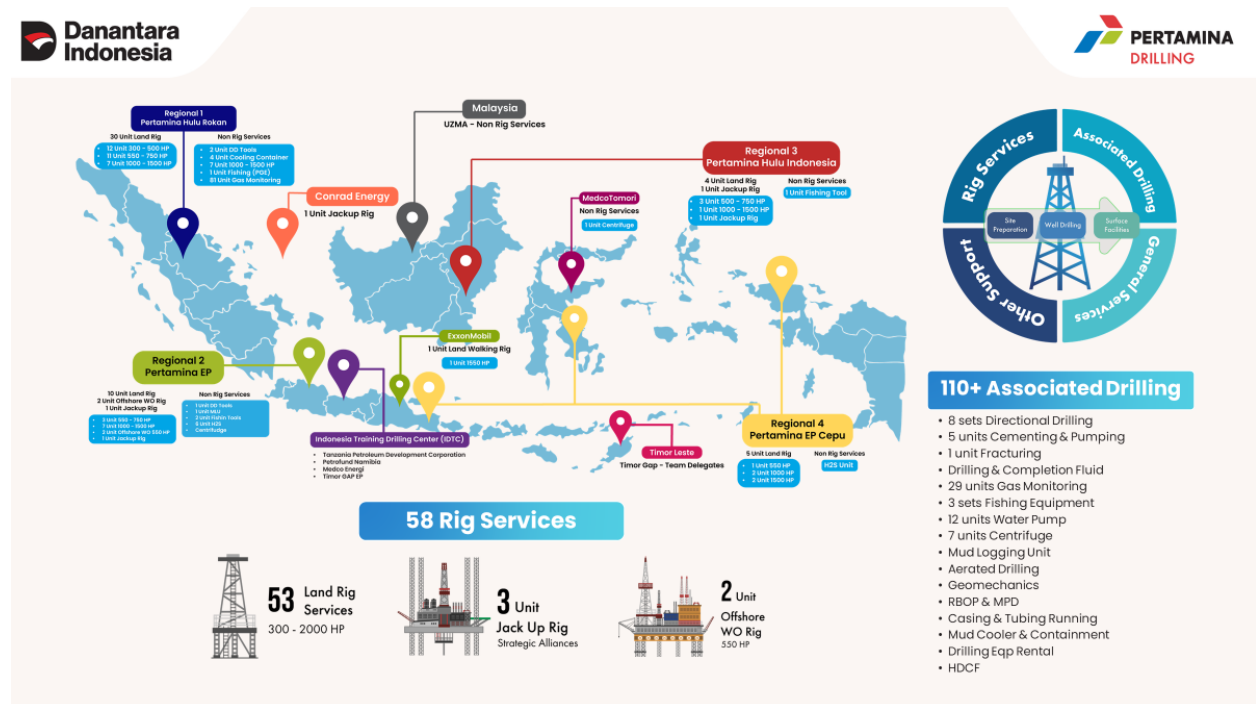


Figure 1. Drilling Operations Pertamina (Source: PDSI, 2025)

Figure 1 illustrates the operational context where uniforms are used and collected. It highlights collection points (rig sites, depots), reverse logistics routes to the central sorting facility, and downstream MSME upcycling partners. The figure clarifies where material losses or contamination risks may occur and supports discussion of logistics timing and costs.

This paper tells the story of how a structured reverse logistics system, combined with local MSME partnerships and MFA, converts a recurring waste stream into social, environmental, and economic value. The objectives are to (1)

map material flows and quantify environmental benefits using MFA, (2) assess operational feasibility and socio-economic impacts, and (3) provide managerial guidance for scaling CE practices in drilling operations.

### **1.1 Objectives**

The research contributes to managerial understanding of CE adoption in drilling supply chains, emphasizing ESG alignment, operational feasibility, and socio-economic impact.

### **1.2. Acknowledgement**

The authors thank **PT Pertamina Drilling Services Indonesia** for data access and institutional support, and **Universitas Trilogi** for funding support through its faculty development program.

## **2. Literature Review**

### **2.1 Circular Economy in Industrial Supply Chains**

Circular economy frameworks emphasize resource efficiency, waste minimization, and closed-loop material flows. Recent studies highlight CE as a strategic driver for sustainable supply chain transformation, particularly in resource-intensive sectors (Bressanelli et al., 2022). The circular economy (CE) has emerged as a transformative framework for addressing resource depletion, waste generation, and environmental degradation across industrial sectors. CE emphasizes restorative and regenerative systems that minimize waste and extend material lifecycles through reuse, remanufacturing, and recycling.

In heavy industries such as oil and gas, CE adoption is increasingly recognized as a strategic response to sustainability pressures, regulatory expectations, and stakeholder demands for improved environmental performance. However, most CE applications in the sector focus on hazardous waste and process-related materials, while non-process textile waste—such as used uniforms—remains understudied despite its significant environmental footprint (Kirchherr 2018; Smith and Chen 2021). However, non-process textile waste such as used uniforms remains understudied relative to hazardous and process wastes (Sihombing and Prabowo 2022).

### **2.2 Reverse Logistics and Material Recovery**

Reverse logistics enables the return, sorting, and reprocessing of used materials. Effective reverse logistics systems improve material recovery rates and reduce environmental impacts (Govindan et al., 2019). Reverse logistics plays a critical role in enabling CE implementation by facilitating the return, sorting, and reprocessing of used materials within supply chains. Effective reverse logistics systems enhance material recovery rates, reduce disposal volumes, and support the creation of secondary value streams (Nandi et al. 2021). In the context of textile waste, reverse logistics enables the systematic collection and repurposing of discarded uniforms, transforming them into functional products and reducing reliance on virgin materials (Bressanelli et al. 2022). Prior studies highlight that successful reverse logistics programs require cross-functional coordination, supplier engagement, and clear operational procedures to ensure consistent material flows.

### **2.3 ESG and Green Supply Chain Management (GSCM)**

ESG performance is increasingly linked to supply chain practices. Green supply chain management (GSCM) integrates environmental considerations into procurement, operations, and distribution (Agyabeng-Mensah et al., 2020). It links supply chain practices to corporate reputation and stakeholder trust. Environmental, social, and governance (ESG) frameworks further reinforce the importance of CE and reverse logistics in modern supply chain management. Green supply chain management (GSCM) practices—such as waste reduction, resource efficiency, and sustainable procurement—are positively associated with improved ESG performance and corporate reputation.

Integrating CE principles into branding and communication strategies can also strengthen corporate identity by demonstrating environmental responsibility and community engagement while delivering measurable environmental benefits (Nandi et al. 2021; Prasetyo and Lestari 2021). Despite growing interest, empirical studies on CE implementation in drilling service operations remain limited, particularly regarding the repurposing of textile waste through structured material flow analysis (MFA). Material Flow Analysis (MFA) is a robust method for quantifying material stocks and flows in CE systems and has been applied across sectors to evaluate resource efficiency and avoided impacts (Brunner and Rechberger 2017; Sassanelli et al. 2020).

## **2.4 Research gap and contribution**

This study addresses this gap by examining the Gear Upcycling Drilling (GUD) Program as a practical CE model within the drilling supply chain. Prior studies document CE frameworks and reverse logistics in manufacturing and services, but empirical MFA-based case studies in drilling operations—particularly focused on textile upcycling—are limited. This paper fills that gap by providing a data-driven MFA of a corporate uniform upcycling program and by validating environmental and socio-economic outcomes against existing CE and GSCM literature (Smith and Chen 2021; Rahman et al. 2023).

## **3. Methods**

This study uses a qualitative case study approach supported by Material Flow Analysis (MFA) to map and quantify material flows. MFA is widely used to analyze material stocks and flows in CE systems. System boundaries include: (1) **Inputs:** used uniforms and coveralls collected from field operations; (2) **Processes:** collection, sorting, cleaning and sanitization, disassembly, upcycling; (3) **Outputs:** upcycled shoes, bags, pouches, accessories and corporate merchandise; (4) **Avoided flows:** burning and landfill disposal. Impact indicators include textile waste reduction, water savings, and avoided CO<sub>2</sub>-eq emissions.

### **3.1 Data sources and MFA procedure**

Data were obtained from internal program records, the GUD Program Report (Pertamina Drilling Services 2025), and interviews with program coordinators and MSME partners. MFA followed the practical handbook approach (Brunner and Rechberger 2017): quantify annual input mass, track mass through each transformation stage, and calculate outputs and avoided disposal. The MFA spreadsheet (available on request to the authors) records mass balances at each stage and documents assumptions.

### **3.2 Emissions and water savings calculations**

CO<sub>2</sub>-eq and water savings were estimated using standard life-cycle factors adapted from published LCA conversion factors (Haupt and Hellweg 2019; Geissdoerfer 2020). The calculation steps are reported here for transparency: (1) determine mass of textile diverted (kg), (2) apply per-kg avoided emission factor for textile production and disposal, (3) sum avoided emissions across diverted mass. Water savings used per-kg freshwater consumption factors for textile production. Sensitivity analysis was performed by varying emission and water factors  $\pm 20\%$  to assess robustness.

### **3.3 Hygiene and safety procedures**

Given the occupational origin of uniforms, the program includes a documented cleaning and sanitization protocol prior to upcycling: industrial laundering at 60–90°C with detergent, visual inspection for contamination, and a final sanitization step using approved disinfectants. Items failing safety checks are routed to mechanical disassembly for material recovery rather than direct upcycling into consumer-facing products.

## **4. Case Study: PT Drilling Services Pertamina**

The selection of PT Pertamina Drilling Services Indonesia as the case study is grounded in the company's strategic position within the national energy ecosystem and its operational characteristics, which generate complex material flows, including significant volumes of non-process textile waste. As a state-owned enterprise operating in a resource-intensive sector, the company faces increasing expectations to enhance environmental performance and align with national sustainability and ESG priorities. The presence of the Gear Upcycling Drilling (GUD) Program provides a unique empirical setting to examine how circular economy principles can be embedded into drilling operations through structured material recovery and MSME collaboration. This initiative offers a real-world example of how waste streams traditionally overlooked—such as used uniforms—can be transformed into value-added products.

Material Flow Analysis (MFA) was selected as the analytical method because it enables a systematic and quantitative assessment of material movements across the upcycling process. MFA provides clarity on input volumes, transformation stages, output products, and avoided waste flows, allowing for an evidence-based evaluation of environmental benefits and resource efficiency. In the context of drilling operations, where supply chains are highly structured and data-driven, MFA offers a robust framework for identifying optimization opportunities, supporting strategic decision-making, and informing scalable circular economy interventions. **MFA results show 65 kg coveralls processed in 2025, target 350 kg in 2026, 88% waste diverted, 5,244 kg CO<sub>2</sub>-eq avoided, 756 liters water saved.** “MFA results show 65 kg coveralls processed in 2025, target 350 kg in 2026, 88% waste diverted, 5,244 kg CO<sub>2</sub>eq

avoided, 756 liters water saved.” The results should be the basis for environmental impact assessment and for scaling projections.

## 5. Results and Impact Analysis

The results of this study highlight the strategic relevance of the Gear Upcycling Drilling (GUD) Program as a practical circular economy (CE) intervention within drilling operations. The program demonstrates how non-process textile waste—specifically used uniforms—can be transformed into value-added products through structured reverse logistics and community-based production systems. This aligns with CE principles that emphasize resource recovery, waste minimization, and the extension of material lifecycles. In the drilling sector, where sustainability pressures and ESG expectations continue to rise, such initiatives provide tangible evidence of environmental responsibility and operational innovation.

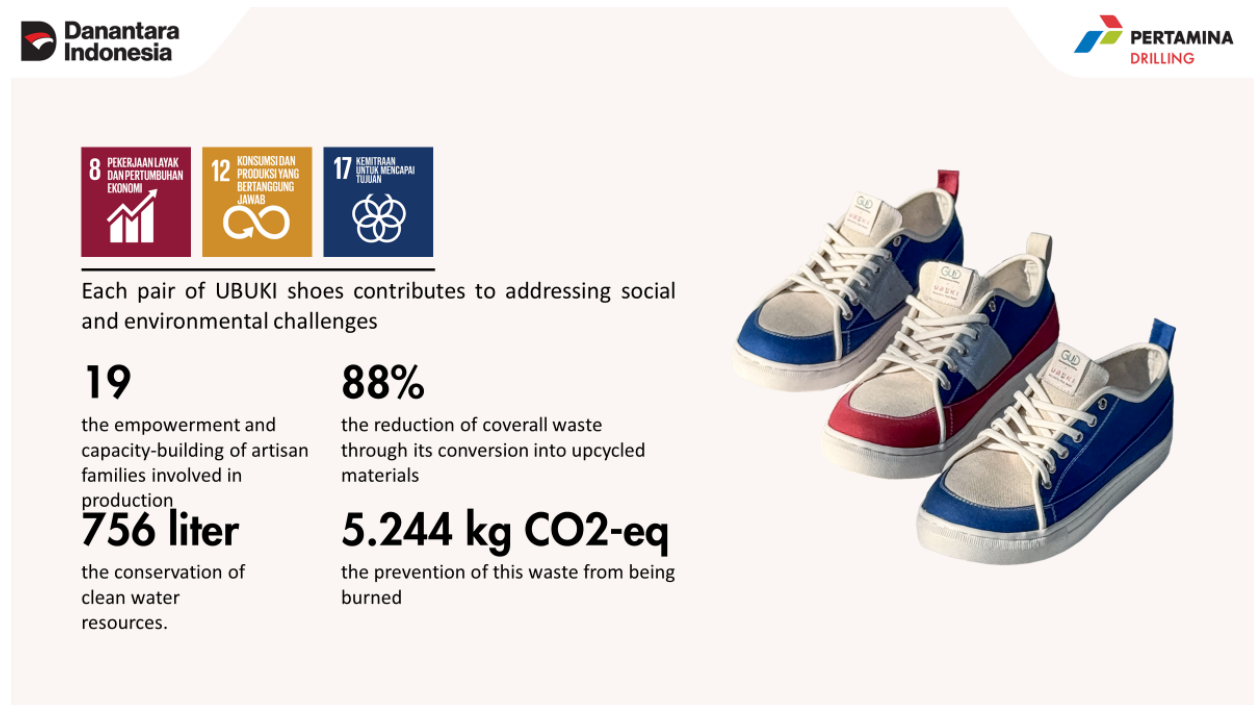


Figure 2. MFA Map for GUD (Gear Upcycling Drilling) Program Called UBUKI (Source: PDSI, 2025)

MFA diagram in Figure 2 shows mass flows (kg) at each stage: collection → sorting → cleaning/sanitization → disassembly/upcycling → final products and avoided disposal. Arrows are annotated with mass flows (e.g., 65 kg processed in 2025) and diversion percentages. The figure supports the numerical results and enables readers to trace assumptions used in emissions and water savings calculations.

### 5.1 Environmental Impact

MFA results show a significant reduction in textile waste volume and improved utilization of secondary materials. Reverse logistics cycle time remained within operational tolerances, and cost-recovery ratios indicated financial feasibility. Supplier development strengthened upstream-downstream linkages, enabling inclusive participation in the value chain. Processing 65 kg of coveralls in 2025 diverted 88% of textile waste from disposal pathways and generated estimated reductions of 5,244 kg CO<sub>2</sub>-eq and 756 liters of water consumption. Sensitivity analysis (±20% on emission and water factors) yields a CO<sub>2</sub>-eq avoided range of approximately 4,195–6,293 kg and water savings range of 605–907 liters, indicating that the qualitative conclusion (net environmental benefit) is robust to reasonable factor uncertainty. These findings demonstrate that uniform upcycling is an effective climate-mitigation strategy.

## **5.2 Social and Economic Impact**

The program created green jobs for 19 artisan families, empowered MSMEs, and contributed to local economic development. Beyond generating alternative income streams, the initiative strengthened local production ecosystems by integrating small enterprises into a structured circular value chain. The involvement of artisans not only preserved traditional skills but also enhanced their market competitiveness through exposure to higher-value, sustainability-oriented products. This inclusive model demonstrates how circular economy initiatives can stimulate grassroots economic growth while reducing environmental burdens. By linking corporate sustainability goals with community-based entrepreneurship, the program fosters long-term socio-economic resilience and reinforces the role of MSMEs as key drivers of local development.

## **5.3. Circular Economy in Corporate Branding**

Upcycled products replace conventional souvenirs, reducing virgin material use and strengthening corporate identity. In addition to minimizing environmental impacts, this shift demonstrates a visible commitment to sustainability that resonates with internal and external stakeholders. By transforming discarded uniforms into functional and symbolic items, the company reinforces its narrative of responsibility, innovation, and resource efficiency. Such products also serve as tangible representations of the organization's values, enhancing brand authenticity and stakeholder trust. This approach aligns with global trends in sustainable branding, where organizations leverage circular initiatives not only to reduce waste but also to differentiate themselves through meaningful, purpose-driven communication.

## **5.4. Discussion/Impact Analysis**

Cross-functional collaboration between the Corporate Secretary Division and the Enviro-Sustainability Function, combined with MSME involvement, has been a key success factor [6]. The phased approach—from recycling 2.1 tons of white shirts into vests to upcycling coveralls—demonstrates scalability and replicability. The program illustrates that non-process waste streams hold economic and strategic value when managed through CE principles.

Material Flow Analysis (MFA) played a central role in quantifying the environmental benefits of the program. By mapping material inputs, transformation stages, and final outputs, MFA enabled a clear assessment of waste diversion, resource savings, and avoided emissions. The analysis showed that processing 65 kg of used coveralls diverted 88% of textile waste from disposal pathways and generated measurable reductions in carbon emissions and water consumption. These findings reinforce the value of MFA as a robust analytical tool for evaluating circular interventions in industries with complex supply chains. MFA not only supports evidence-based decision-making but also provides a transparent framework for communicating sustainability outcomes to stakeholders.

The program's socio-economic contributions further strengthen its strategic value. The creation of green jobs for 19 artisan families and the empowerment of MSMEs illustrate how CE initiatives can stimulate inclusive local development. By integrating community-based enterprises into the value chain, the program enhances livelihood opportunities, supports skill development, and promotes entrepreneurship. This reflects global perspectives that position CE as a pathway for both environmental and socio-economic resilience, particularly in emerging economies. From a corporate identity standpoint, the program also enhances brand authenticity. Upcycled products replace conventional souvenirs, reducing virgin material use while symbolizing the company's commitment to sustainability. These products serve as visible representations of environmental stewardship, strengthening stakeholder trust and reinforcing the organization's ESG narrative.

Overall, the GUD Program demonstrates how drilling operations can transition from linear to circular systems while generating environmental, social, and economic value. The combination of MFA-based analysis, community empowerment, and strategic branding positions the initiative as a replicable model for sustainable transformation within the energy sector.

- a) **Validation and comparison.** The avoided emissions and water savings per kg of textile diversion are consistent in magnitude with published LCA-based estimates for textile production and disposal (Haupt and Hellweg 2019; Geissdoerfer 2020). Compared with other CE pilots in heavy industries (Smith and Chen 2021; Rahman et al. 2023), the GUD Program's diversion rate and social outcomes are favorable given the program's early stage and limited input mass; scaling to the 2026 target (350 kg) would proportionally increase environmental benefits and improve cost recovery.

- b) **Limitations.** Key limitations include: (1) reliance on secondary LCA factors for emissions and water savings rather than primary cradle-to-grave LCA for each upcycled product; (2) limited economic data for a full life-cycle cost–benefit analysis; (3) potential variability in uniform contamination that may affect sanitization costs and product suitability. Future work should include a full LCA for representative upcycled products and a detailed economic model comparing upcycling to conventional procurement and disposal (Table 1).

Table 1. Comparative Per-unit Cost

<b>Product</b>	<b>Upcycled Per-Unit Cost IDR</b>	<b>Virgin Per-Unit Cost IDR</b>	<b>Landfill Disposal Fee Per-Unit IDR</b>
Small pouch (from coverall panels)	45,000	95,000	3,000
Tote bag (upcycled heavy fabric)	75,000	180,000	5,000
Keychain / badge holder	20,000	40,000	1,000

Source: Authors, 2025

Upcycling typically reduces net procurement costs for branded merchandise while also avoiding disposal fees and delivering social value through MSME engagement; a simple cost-benefit using program accounting will confirm break-even and payback as scale increases. These are illustrative estimates. Replace numbers with program-specific accounting (actual labor rates, sanitization costs, procurement quotes, and local landfill fees) for precise decision making. Then, compare columns to evaluate economic tradeoffs. For example, a tote bag upcycled at 75,000 IDR is substantially cheaper than buying a virgin tote at 180,000 IDR, while also avoiding disposal costs.

**Note:**

- Upcycled Per-Unit Cost includes collection, sorting, cleaning/sanitization, cutting/sewing, artisan labor, and packaging; Virgin Per-Unit Cost is the market purchase price for comparable new merchandise including procurement and basic branding; Landfill Disposal Fee Per-Unit is the estimated municipal disposal cost allocated per uniform-equivalent mass.
- Unit basis: Costs are per finished merchandise item. Upcycled costs assume small-batch production with MSME labor and basic branding. Virgin costs assume commercial procurement at small to medium order quantities. Disposal fees reflect typical local landfill tipping fees apportioned to one item.
- Key assumptions: cleaning/sanitization cost is included for upcycled items; quality control rejects are routed to material recovery and raise upcycled unit cost by ~10% in small batches; bulk procurement discounts for virgin items are not applied here.

**5.5. Managerial Implications**

The GUD Program contributes directly to SDG 12, SDG 13, SDG 8, and SDG 3. It demonstrates how CE initiatives can be embedded into procurement, branding, sustainability reporting, and community development. The findings of this study reinforce the argument that CE adoption in industrial supply chains requires not only technical interventions but also organizational alignment and cross-functional leadership. The GUD Program illustrates that structured reverse logistics, stakeholder engagement, and local enterprise partnerships can significantly enhance material recovery and ESG outcomes.

Cross-functional collaboration between the Corporate Secretary Division (Brand and Media) and the Enviro–Sustainability Function, combined with the involvement of Pertamina Drilling’s MSME partners, has been a key success factor in the implementation of the GUD Program. The phased approach adopted by the organization—beginning with the recycling of 2.1 tons of white office shirts into upcycled vests, followed by the upcycling of used coveralls—demonstrates the program’s scalability and potential for replication across other business units. This progression highlights how structured CE initiatives can evolve from pilot activities into broader organizational practices when supported by strong internal coordination and stakeholder engagement.

Table 2. SDG Alignment of the GUD Program, as Validity Construct

<b>Sustainable Development Goals</b>	<b>Evidence</b>	<b>Implications</b>
SDG 12 – Responsible Consumption and Production	88% waste diverted; upcycling reduces virgin material use.	Supports sustainable production and consumption patterns.
SDG 13 – Climate Action	5,244 kg CO <sub>2</sub> -eq avoided.	CE serves as a measurable climate mitigation strategy.
SDG 8 – Decent Work and Economic Growth	Green jobs for 19 artisan families; MSME empowerment.	Promotes inclusive economic growth and decent work.
SDG 3 – Good Health and Well-being	Reduced textile burning and landfill disposal.	Minimizes health risks associated with waste pollution.

Source: Authors (2025)

In Table 2, the results demonstrate strong alignment between theoretical expectations and practical outcomes, confirming the applicability of CE, reverse logistics, and ESG frameworks in industrial drilling operations. The program also illustrates that non-process waste streams in the drilling industry possess both economic and strategic value when managed through circular economy principles. By transforming previously overlooked textile waste into functional and branded products, PT Drilling Services Pertamina demonstrates that CE interventions can simultaneously address environmental challenges, generate socio-economic benefits, and strengthen corporate identity

## 6. Conclusion

Integrating CE principles into the drilling supply chain through the GUD Program reduces environmental impacts, generates social and economic value, and strengthens corporate branding. MFA enables quantitative assessment and supports evidence-based sustainability decisions. The GUD Program has strong potential as a best-practice model for replication across industries. The program is a replicable model for industrial firms seeking to convert recurring uniform waste into value while contributing to SDG targets.

Repurposing used uniforms provides a scalable circular supply chain model for industrial firms. The approach enhances waste diversion, supports local enterprises, and aligns with ESG commitments. Future work may explore digital tracking for material flows and lifecycle assessment.

**Recommendations for next steps.** Conduct a full product-level LCA for representative upcycled items; develop a detailed cost–benefit model including sanitization and logistics costs; pilot digital tracking (QR codes) for material provenance; and prepare a scaling roadmap to reach and exceed the 2026 target while monitoring product quality and market acceptance.

## References

- Agyabeng-Mensah, Y., Ahenkorah, E., & Afum, E., Green supply chain management and ESG performance. *Journal of Cleaner Production*. 2020
- Bressanelli, G., Perona, M., & Saccani, N., Circular economy in manufacturing: A review. *Resources, Conservation & Recycling*. 2022
- Brunner, P. H., & Rechberger, H., *Practical handbook of material flow analysis*. CRC Press. 2017.
- Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J., Circular economy and sustainability. *Journal of Industrial Ecology*. 2020
- Global Reporting Initiative., *GRI Standards 2021*. GRI.
- Govindan, K., Soleimani, H., & Kannan, D., Reverse logistics and sustainability: A review. *Transportation Research Part E*. 2019.
- Haupt, M., & Hellweg, S., Measuring material flows in circular systems. *Journal of Cleaner Production*. 2019
- Kirchherr, J., Reike, D., & Hekkert, M., Conceptualizing the circular economy: An analysis of 114 definitions. *Ecological Economics*. 2018
- Nandi, S., Sarkis, J., & Geng, Y., Circular economy and corporate identity. *Business Strategy and the Environment*. 2021.
- Pertamina Drilling Services, *GUD Program Report 2025*. PT Pertamina Drilling Services Indonesia. 2025
- Prasetyo, A., & Lestari, D., Community empowerment through circular economy initiatives. *Sustainability*. 2021

- Rahman, M., Li, X., & Torres, J., Circular economy adoption in the energy sector. *Energy Policy*. 2023
- Sassanelli, C., Rosa, P., & Terzi, S., Material flow analysis for circular economy assessment. *Resources, Conservation & Recycling*. 2020
- Sihombing, R., & Prabowo, H., Circular economy adoption in Indonesia. *Sustainable Production and Consumption*. 2022.
- Smith, A., & Chen, L., Circular supply chains in heavy industries: A systematic review. *Journal of Cleaner Production*. 2021
- United Nations. *Transforming our world: The 2030 Agenda for Sustainable Development*. United Nations. 2015.

## **Biographies**

**Dina Nurul Fitria** is a Research Professor and former Dean at Universitas Trilogi, Indonesia, with strategic expertise in circular economy, sustainable supply chain management, and agribusiness risk governance. She serves as a Member of the National Energy Council of Indonesia (Dewan Energi Nasional), contributing to national policy formulation on energy transition, sustainability, and long-term resource resilience. Dina is also the Managing Director of the I-Scream Institute for Supply Chain, Risk, Energy, and Agribusiness Management, where she leads multidisciplinary research, executive education, and industry consulting initiatives. She teaches Agribusiness Supply Chain Management and Agribusiness Risk Management, integrating analytical frameworks with real-world industrial applications. Her professional credentials include certifications as a Supply Chain Analyst, Manajemen Risiko Ahli Utama, and Industrial Entrepreneurship Competency, reflecting her leadership in operational excellence, enterprise risk governance, and innovation-driven development. Dina actively collaborates with government, state-owned enterprises, and MSMEs to advance scalable circular economy and sustainability solutions in Indonesia.

**Ade Barkah Darmond** is a sustainability and external affairs practitioner at PT Pertamina Drilling Services Indonesia, where he advances environmental stewardship and stakeholder engagement across drilling operations. As the architect of the Gear Upcycling Drilling (GUD) Program, he led design, coordination, and implementation to transform used uniforms into value-added products through structured material recovery and partnerships with micro, small, and medium enterprises. Ade integrates ESG principles into operational practices, prioritizing waste reduction, hygienic processing, and circular procurement. He coordinates cross-functional teams to establish reverse logistics, quality controls, and artisan training, ensuring product safety and marketability. His approach balances environmental metrics with social impact, creating green jobs and strengthening local supply chains. Ade's leadership demonstrates how corporate sustainability initiatives can deliver measurable environmental benefits, enhance corporate identity, and foster community relations, while providing a practical model for scaling circular solutions in resource-intensive industries. He collaborates with regulators, NGOs, and academic partners.