

Measuring the Social Value of an Integrated Circular-Economy Community Empowerment Program: A Social Return on Investment Study of SIKOK SELINGKAR in Prabumulih

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Abstract. Corporate social investment is increasingly required to demonstrate more than program outputs, with greater emphasis placed on measurable social, economic, environmental, and well-being impacts. This study examines the SIKOK SELINGKAR (Sistem Komunitas Karet Organik dalam Satu Rantai Daur Ulang) social innovation program implemented by PT Pertamina EP Prabumulih Field in Prabumulih City, South Sumatra, Indonesia. The initiative brings together three community-based subprograms MUDA BERSAMA, RINDU RESIK, and MOKUSAKU that collectively connect household organic waste management, residual plastic recycling, rubber-farming innovation, biomass utilization, women's empowerment, and local livelihood development. The study employed a mixed-method Social Return on Investment (SROI) framework. Fieldwork was conducted in September 2025 in Patih Galung, Muara Dua, and Sungai Medang. Primary data was obtained direct field observations as well as in-depth and semi-structured interviews with purposively selected community stakeholders. Secondary information was drawn from corporate implementation reports, social innovation documentation, community profiles, and program financial records. The analysis used an impact-map sequence from inputs to outputs, outcomes, impact fixation, monetization, and SROI calculation. To reduce the risk of overstating program impacts, the analysis incorporated deadweight, attribution, drop-off, and displacement adjustments. During 2022–2025, the program recorded a nominal social investment of IDR 1.6897 billion. Following adjustment to 2025 value, the investment was estimated at IDR 1.7775 billion, while the corresponding adjusted benefits reached IDR 2.8089 billion, resulting in an overall SROI ratio of 1.58. Among the three subprograms, RINDU RESIK contributed the largest share of monetized outcomes at 64.87%, followed by MUDA BERSAMA at 30.47% and MOKUSAKU at 4.65%. Preliminary sensitivity analysis using the reported figures further indicates that the SROI ratio remains above 1 when alternative adjustment conventions and moderate decreases in benefit values are applied. In addition to the outcomes that could be expressed in monetary terms, the program contributed to a range of intangible changes, including improvements in technical skills, institutional capacity, self-confidence, social cohesion, environmental awareness, and collaborative governance. These findings indicate that an integrated circular-economy approach can generate social value when material recovery, local production, livelihood diversification, and community institutions are brought together under a coherent theory of change. The study further emphasizes that conservative valuation practices, transparent assumptions, and sustained longitudinal monitoring are essential for enhancing the reliability and credibility of SROI-based evaluations of corporate social responsibility initiatives.

Keywords: Social Return on Investment, Social Innovation, Circular Economy, Community Empowerment, Corporate Social Responsibility, Rubber Farming, Waste Management.

A. INTRODUCTION

The evaluation of corporate social responsibility (CSR) and social investment is increasingly moving beyond conventional measures such as the amount of funding allocated or the number of activities implemented. Greater attention is now given to the actual changes

and impacts generated by these initiatives. This development is particularly significant in extractive industries, where corporate activities operate within interconnected social and ecological contexts, and community development initiatives are expected to respond to immediate vulnerabilities while contributing to long-term sustainability (Kemp & Owen, 2013). This transition is also consistent with the broader development of CSR, which has gradually moved from a predominantly philanthropic and voluntary orientation toward greater accountability and the pursuit of shared value (Carroll, 1991; Porter & Kramer, 2011). Within this context, Social Return on Investment (SROI) has emerged as a framework for assessing the value generated by social interventions. SROI integrates stakeholder perspectives, theory of change, financial proxies, and impact adjustments to estimate selected forms of social value in monetary terms. The foundations of the approach can be traced to the work of Emerson et al. (2000) and was later formalized into a principles-based framework (Nicholls et al., 2012; Social Value International, 2021). Previous systematic and critical reviews indicate that SROI can contribute to value-for-money assessments in areas such as public programs and social enterprises (Banke-Thomas et al., 2015; Millar & Hall, 2013). Nevertheless, the method must be applied carefully because decisions concerning monetization and aggregation choices may substantially affect the results (Arvidson et al., 2013). In contrast to conventional financial return metrics, SROI seeks to account for value as experienced by stakeholders, including forms of social value that are generally absent from conventional market-based transactions.

In Indonesia, this evaluative orientation is increasingly associated with developments in corporate environmental and social governance. Companies operating in natural-resource sectors are required under Indonesian law to fulfill social and environmental responsibilities (Republik Indonesia, 2007, Pasal 74). At the same time, community development programs are increasingly expected to demonstrate measurable and accountable results, involve relevant stakeholders, and contribute to the achievement of the Sustainable Development Goals (United Nations, 2015). For programs implemented in communities surrounding oil and gas operations, these expectations present a dual challenge. Programs must address locally specific social and environmental concerns while also providing credible evidence that the changes observed can reasonably be linked to the intervention. SROI offers a relevant framework for addressing this challenge because its methodology requires evaluators to identify relevant stakeholders, systematically map outcomes, assign value to material changes, and account for counterfactual conditions and contributions from external factors (Aditya & Widhagdha, 2021; Nicholls et al., 2012). In addition, the approach complements social impact assessment traditions that emphasize participation and the management of project-related social change (Vanclay, 2003; Vanclay et al., 2015).

Prabumulih City, South Sumatra provides a relevant context for examining these issues. According to the program report, the local community faces a combination of interconnected challenges, including increasing waste generation, limited capacity to process residual materials, declining rubber productivity, underused land resources, and economic vulnerability among small-scale farmers, waste workers, and women involved in informal or household-based activities. These challenges are closely related rather than occurring in isolation. Inadequate waste management may increase environmental pressure, while fluctuating agricultural productivity and restricted livelihood opportunities can further deepen household vulnerability. The waste-related challenges also form part of a broader national and global concern. Global plastic production and poorly managed waste have increased substantially (Geyer et al., 2017), with Indonesia identified as one of the major contributors of mismanaged plastic waste entering the ocean (Jambeck et al., 2015). Meanwhile, solid-waste generation in low- and middle-income countries is expected to continue increasing (Kaza et al., 2018; Wilson et al., 2015). National policy responds through the Waste Management Law (Republik

Indonesia, 2008) and the national strategy for household waste management (Republik Indonesia, 2017). Such conditions call for interventions that extend beyond short-term assistance toward integrated systems capable of transforming waste into productive inputs, diversifying livelihoods, and strengthening local organizations.

In response to these challenges, PT Pertamina EP Prabumulih Field developed SIKOK SELINGKAR, an acronym for Sistem Komunitas Karet Organik dalam Satu Rantai Daur Ulang, as an integrated social innovation program. The program combines waste management, biomass utilization, organic and rubber-based agriculture, community entrepreneurship, and women's empowerment within a locally oriented circular-economy system. It comprises three main subprograms. MUDA BERSAMA focuses on women's groups, household organic-waste processing, nutrition gardens, horticulture, medicinal plants, and value-added products. RINDU RESIK establishes a community-based system for recycling residual plastic while providing productive infrastructure to support waste-processing groups. MOKUSAKU utilizes rubberwood and other biomass through pyrolysis to produce wood vinegar (mokusaku), which can be applied in rubber cultivation while also creating opportunities for community-based enterprise development.

The program's integrated structure is particularly significant from an analytical perspective because circular-economy initiatives may generate value through several mechanisms simultaneously: avoided disposal, resource recovery, reduced input costs, additional income, improved production processes, and stronger collaboration among local actors (Ellen MacArthur Foundation, 2013; Kirchherr et al., 2017). Social innovation literature similarly emphasizes that innovation extends beyond the creation of new products or technologies; it can also involve developing new forms of organization and interaction that address social needs and reshape relationships among different actors (Manzini, 2014; Moulaert et al., 2013; Mulgan, 2006; Phills et al., 2008). From an SROI perspective, the central issue is not simply whether program activities were implemented, but whether those activities produced material changes for stakeholders and whether the resulting value provides a reasonable justification for the social investment made (Nicholls et al., 2012).

This article presents the 2025 SROI assessment of SIKOK SELINGKAR as an academic analysis with three objectives. First, it investigates how an integrated community-based circular-economy initiative converts corporate social investment into economic, social, environmental, and well-being outcomes. Second, it reports the monetized social value and SROI ratio generated throughout the 2022–2025 implementation period and presents a preliminary sensitivity analysis. Third, it discusses how outcomes are distributed across the three subprograms and explores their significance, including intangible changes that are not captured within the monetized SROI ratio. Through this analysis, the study provides a practice-based case from an Indonesian oil-and-gas operating environment and contributes to wider discussions concerning impact measurement, community empowerment, and accountability in corporate social investment.

B. METHOD

1. Study design and setting

This study adopted a mixed-method evaluation design that integrated quantitative SROI estimation with qualitative analysis of stakeholders' experiences. Fieldwork was carried out in September 2025 in Patih Galung, Muara Dua, and Sungai Medang, Prabumulih City. These locations were selected because they encompass major areas where the SIKOK SELINGKAR subprograms are implemented and where beneficiary groups are active. The unit of analysis was the program ecosystem rather than a single activity. This approach reflects the integrated nature of the intervention, which was structured to connect community organizations,

production activities, waste flows, agricultural practices, and institutional partners within a single system.

The mixed-method approach was selected because SROI assessment requires both quantitative evidence and stakeholder-centered interpretation. Quantitative data were collected to establish the value of investments, production, income, savings, avoided expenditures, and other outcomes that could reasonably be expressed in monetary terms. Qualitative data, in contrast, were used to explore the processes through which change took place, stakeholders' experiences of the intervention, and outcomes that were considered meaningful but could not be reliably monetized. This combination is consistent with the principle that social value should be understood through the perspectives of people affected by an intervention rather than being represented solely through a financial ratio (Maier et al., 2015; Social Value International, 2021).

2. Data sources and participant selection

The primary data were obtained through field observations, in-depth interviews, and semi-structured interviews. Informants were purposively selected based on their involvement in, and knowledge of, program implementation and outcomes. They included leaders and members of KWT Kemuning and KWT Matoa, the head of KWT Berkah Jaya, leaders of the PDU waste-processing group, members of the waste-concern group, and the head of the Mokusaku Bersemi group. This purposive sampling strategy ensured that the selected informants had firsthand knowledge of the activities, resources, operational processes, and benefits examined in the assessment.

Secondary data included CSR implementation reports, social innovation reports, company profile documents, village/urban-community profiles, program investment tables, institutional activity records, and relevant academic literature. The quantitative and qualitative findings were subsequently compared and cross-validated across these sources to strengthen the reliability of the assessment. For outcomes considered suitable for monetization, financial values were estimated using evidence such as prevailing market prices, documented sales, cost reductions, avoided expenditures, and comparable resource values. Outcomes for which reliable monetary valuation could not be established were presented as qualitative findings rather than being assigned uncertain or speculative financial proxies. This approach follows the SROI principle of maintaining conservative valuation and minimizing the risk of overclaiming program impact (Social Value International, 2021).

3. SROI analytical framework

The analysis was conducted using the established SROI framework, consisting of several sequential stages: (1) establishing scope and identifying material stakeholders; (2) mapping inputs, activities, outputs, and outcomes; (3) identifying indicators and assigning values to material outcomes; (4) fixing the estimated impact by accounting for deadweight, attribution, drop-off, and displacement; (5) calculating present or compounded values and the SROI ratio; and (6) reporting and interpreting the results (Aditya & Widhagdhya, 2021; Nicholls et al., 2012). The impact map was grounded in a theory-of-change logic connecting program resources with observable changes, an approach that is particularly useful for interventions with multiple interacting components (Rogers, 2008). To provide a broader interpretation of program performance, the analysis also drew on the Sustainability Compass dimensions of Nature, Economy, Well-being, and Society (AtKisson, 2010). This helped ensure that the evaluation was not limited to financial outcomes alone.

Impact fixation was used to minimize the possibility of overstating the effects attributable to the program. In SROI analysis, deadweight represents the share of an outcome

that would likely have occurred in the absence of the intervention, whereas attribution refers to the contribution made by other individuals or organizations. Drop-off captures the reduction in the value of an outcome over time, while displacement examines whether a reported benefit results in a corresponding loss or shift of a problem to another stakeholder or location (Nicholls et al., 2012). These parameters were applied to individual outcomes in the original assessment. For a number of outcomes, no adjustment was applied because the available field evidence suggested that the benefits were not present prior to the intervention, no other stakeholder made a substantial contribution to the particular outcome, the benefit was considered one-time or stable throughout the assessment period, and there was no substantial evidence of displacement. This assumption is discussed later as a methodological limitation requiring continued verification.

The SROI ratio was obtained as the adjusted value of benefits divided by the adjusted value of inputs. The underlying assessment adjusted historical values to a 2025 basis using the financial proxy adopted in the report, namely Indonesian Retail Government Bond (ORI) rates. A rate of 4.9% was applied to values from 2022–2024, while 6.65% was applied to 2025 values. Accordingly, the analysis presents both nominal annual values and their adjusted 2025 equivalents. The core formula was: $SROI = \text{Total Present/Compounded Value of Benefits} \div \text{Total Present/Compounded Value of Inputs}$. A ratio greater than 1 indicates that the monetized value generated exceeds the value of investment, but the ratio should be interpreted alongside the composition, assumptions, and non-monetized outcomes rather than as a stand-alone measure of program quality (Arvidson et al., 2013; Krlev et al., 2013).

Because SROI results depend on boundary, proxy, and adjustment choices (Krlev et al., 2013; Maier et al., 2015), this manuscript incorporates a preliminary sensitivity analysis. It uses only arithmetic on the figures reported in the source assessment and tests three questions: (a) whether the ratio changes materially under alternative conventions for time adjustment; (b) how far total benefits could fall before the ratio drops to 1; and (c) how the ratio responds if the outcomes of the largest subprogram are overstated. These scenarios are intended as illustrative stress tests of the reported result and should not be interpreted as independent estimates of program impact.

4. Ethical and analytical considerations

The analysis drew upon program evaluation data and accounts provided by stakeholders for impact assessment. The manuscript does not identify individual community respondents. To preserve analytical integrity, the figures reported in Sections 3.1 to 3.6 are derived from the original SROI assessment and have not been recalculated based on additional assumptions introduced in this study. The sensitivity scenarios in Section 3.7 are presented separately and clearly identified as derived calculations. Particular attention was given to the distinction between monetized and intangible outcomes. Changes in knowledge, confidence, institutional governance, social cohesion, environmental awareness, and collaborative capacity are presented through qualitative analysis rather than monetary valuation.

C. RESULT AND DISCUSSION

1. Program design and social investment

SIKOK SELINGKAR operates as an interconnected portfolio of interventions rather than as three separate and independent projects. MUDA BERSAMA focuses on strengthening women-led productive activities, utilizing organic household waste, developing horticulture and nutrition gardens, and encouraging product innovation. RINDU RESIK supports the collection and processing of residual plastics through community recycling infrastructure and enterprise development. MOKUSAKU converts rubberwood and biomass residues into wood

vinegar through controlled pyrolysis, creating a potentially safer and locally produced input for rubber farming while reducing unmanaged biomass. This structure allows outputs from one part of the program to reinforce environmental or economic functions in another, thereby supporting a circular-economy logic (Geissdoerfer et al., 2017).

Table 1. Nominal social investment in SIKOK SELINGKAR, 2022–2025 (IDR)

Subprogram	2022	2023	2024	2025	Total
MUDA BERSAMA	95,000,000	160,000,000	102,000,000	123,000,000	480,000,000
RINDU RESIK	210,000,000	440,000,000	200,000,000	44,700,000	894,700,000
MOKUSAKU	67,000,000	47,000,000	80,000,000	121,000,000	315,000,000
Total	372,000,000	647,000,000	382,000,000	288,700,000	1,689,700,000

Source: 2025 SROI assessment.

Across the 2022–2025 implementation period, the program recorded a nominal investment of IDR 1.6897 billion. Of the three components, RINDU RESIK received the highest cumulative funding at IDR 894.7 million, followed by MUDA BERSAMA with IDR 480.0 million and MOKUSAKU with IDR 315.0 million. The investment was allocated not only to equipment and physical infrastructure but also to activities such as impact assessment, community-group establishment and legalization, technical capacity building, production trials, infrastructure enhancement, laboratory analysis, and organizational strengthening. This composition is important when interpreting the SROI results because the social value generated by the program reflects both productive assets and capacity-building processes.

2. Monetized outcomes by subprogram

The original assessment estimated total nominal outcomes of IDR 2.6637 billion. The distribution of monetized outcomes was uneven across the three subprograms. RINDU RESIK generated IDR 1.7281 billion, equivalent to 64.87% of total monetized outcomes. MUDA BERSAMA generated IDR 811.67 million (30.47%), while MOKUSAKU generated IDR 123.97 million (4.65%). The distribution reflects differences in program maturity, production scale, asset utilization, market value, and the types of outcomes that could be defensibly monetized.

Table 2. Distribution of monetized outcomes across the three subprograms

Subprogram	Monetized outcome (IDR)	Share	Principal value mechanisms
RINDU RESIK	1,728,074,800	64.87%	Recycling enterprise income, higher-value plastic processing, avoided/efficient production costs, diversified recycled products
MUDA BERSAMA	811,672,433	30.47%	Agricultural and processed-product income, household food savings, reduced production inputs, product innovations including PROTEK and SEREPAT
MOKUSAKU	123,970,000	4.65%	Wood-vinegar sales, avoided equipment/training costs, savings from partial substitution of conventional rubber coagulant

Source: 2025 SROI assessment.

3. Outcome pathways in MUDA BERSAMA

MUDA BERSAMA demonstrates how women-centered community development can integrate household resource management with opportunities for local economic activity. Monetized benefits included revenue from horticultural crops and processed products, household savings resulting from the consumption of vegetables produced by community groups, lower dependence on externally purchased agricultural inputs, and income generated through product innovations. The assessment also identified savings in electricity and water consumption associated with relevant group activities. Taken together, these findings indicate that the economic value created by MUDA BERSAMA resulted from a combination of additional income and expenditure that could be avoided at the household or production level.

Two innovations are particularly relevant to the program's circular-economy approach. PROTEK (Pelindung Tetes Getah Karet) repurposes recovered polyethylene plastic into a simple protective tool used during rubber tapping. According to the program report, approximately 200–300 grams of plastic can be incorporated into each unit. When implemented across approximately 900 rubber trees per hectare, the innovation has the potential to reuse around 180–270 kg of polyethylene per hectare. In 2025, sales of PROTEK generated approximately IDR 12.8 million in revenue for the producing group. The device was also reported to assist rubber farmers in maintaining latex quality during rainy conditions. Meanwhile, SEREPAT (Solusi Ekologis Ramah Lingkungan Perangsang Akar Tanaman) repurposes rejected shallot biomass as an organic agricultural input, transforming post-harvest residues into a resource with productive agricultural value.

The qualitative outcomes of MUDA BERSAMA are as important as the monetized values. Participation in training and hands-on production activities contributed to improvements in technical knowledge, self-confidence, group engagement, administrative practices, and the capacity to develop products. The participation of women's groups in production and distribution further established more defined roles within the local value chain. This finding is consistent with the understanding of empowerment as a process involving expanded access to resources, greater agency, and improved achievements (Kabeer, 1999). Although these outcomes were not assigned monetary values because the source assessment did not identify sufficiently reliable financial proxies, they represent important enabling factors that may support the sustainability and potential replication of the subprogram's economic benefits.

4. Outcome pathways in RINDU RESIK

RINDU RESIK contributed the largest share of monetized outcomes. Its primary mechanism was to transform residual plastic from a disposal problem into a productive input for community-based recycling. This matters because plastic that is not collected or processed is frequently dumped or openly burned in many low- and middle-income settings, with documented risks to occupational and public health (Velis & Cook, 2021). The intervention included group legalization, workspace improvement, pressing and melting equipment, equipment modification, technical training, and business-development support. These interventions helped reduce physical workloads, expand processing capacity, improve working conditions, and establish a more stable foundation for community-based enterprises.

One notable economic outcome was an increase in the selling price of plastic flakes from IDR 9,000/kg to IDR 11,500/kg, corresponding to an increase of approximately 27.8%. The assessment also identified approximately 15% electricity savings associated with plastic-melting equipment and diversification into products such as furniture and pallets. These results suggest that value creation within the subprogram was not simply a consequence of increasing the volume of collected plastic. Rather, additional value emerged through further processing,

improvements in production efficiency, and expansion into a wider range of marketable products.

The subprogram generated intangible institutional outcomes, including better understanding of operating procedures, safer equipment use, improved financial administration, stronger confidence among members, and more structured collective decision-making. RINDU RESIK therefore illustrates that circular-economy initiatives can produce more sustainable social value when material recovery is supported by organizational strengthening, market-oriented development, appropriate technology, and more equitable participation of waste workers.

5. Outcome pathways in MOKUSAKU

MOKUSAKU focuses on the utilization of rubberwood and other biomass residues through pyrolysis to produce wood vinegar, or pyroligneous acid. Previous studies have identified various agricultural applications of pyroligneous acid, including its potential to promote plant growth and to control pests and pathogens (Grewal et al., 2018; Mathew & Zakaria, 2015). The intervention addresses two interconnected challenges: unmanaged biomass residues and the dependence of rubber farmers on conventional chemical inputs. Program activities included the provision and improvement of distillation equipment, technical training, product testing, production support, and market development.

Sales volume increased from 507 liters in 2023 to 790 liters in 2024, a 55.8% increase, and then to 1,100 liters in 2025, a further 39.2% increase from the previous year. The SROI assessment further identified avoided expenditures associated with equipment and training, as well as a 20% cost saving for the tested volume in which MOKUSAKU was used to partially replace conventional rubber coagulant. Although MOKUSAKU generated the smallest proportion of the program's monetized outcomes, its broader relevance lies in its potential to create a local circular pathway for rubberwood residues while encouraging the adoption and testing of agricultural inputs with potentially lower environmental impacts.

Qualitative outcomes included increased knowledge of pyrolysis, equipment operation, occupational safety, product quality, and agricultural application. These capabilities are important for future scale-up because the economic value of a biomass-based product depends on consistent quality, appropriate application, market acceptance, and the ability of local groups to maintain equipment and production standards.

6. SROI calculation

Table 3. SROI calculation for SIKOK SELINGKAR (IDR)

Indicator	2022	2023	2024	2025	Total
Nominal benefit	551,997,300	794,687,500	481,259,000	835,773,433	2,663,717,233
Adjusted benefit, 2025 value	579,045,168	833,627,188	504,840,691	891,352,367	2,808,865,413
Nominal investment	372,000,000	647,000,000	382,000,000	288,700,000	1,689,700,000
Adjusted investment, 2025 value	390,228,000	678,703,000	400,718,000	307,898,550	1,777,547,550
Annual / overall SROI	1.48	1.23	1.26	2.89	1.58

Source: 2025 SROI assessment.

After adjusting the figures to 2025 values, the total benefits were estimated at IDR 2.8089 billion, while total investment amounted to IDR 1.7775 billion. The adjusted benefits-

to-investment calculation resulted in an overall SROI ratio of 1.58. In practical terms, this means that every IDR 1 of adjusted social investment generated approximately IDR 1.58 in monetized social value over the assessment period. The annual SROI ratios ranged from 1.23 in 2023 to 2.89 in 2025, indicating that the relationship between annual investment and monetized outcomes changed as assets, enterprises, and innovations matured.

However, the ratio should not be regarded as a comprehensive monetary representation of all program effects. The calculation mainly captures outcomes that could be supported by available evidence and translated into monetary values. The assessment also recognizes a range of intangible outcomes, such as knowledge development, environmental awareness, technical skills, confidence, workplace comfort, institutional governance, participation, social cohesion, market linkages, and readiness for replication, which could not be fully assigned financial values. Therefore, the SROI ratio is more appropriately viewed as a conservative quantified component of a broader social-value assessment and remains dependent on the validity of the assumptions underlying the calculation.

7. Preliminary sensitivity analysis

Table 4 presents stress tests derived from the figures in Tables 1 to 3. The first two rows show that the headline ratio is stable across the adjustment conventions tested: the unadjusted nominal ratio is 1.58 (1.5764), and a multi-year compounding variant, in which 2022, 2023, and 2024 values are compounded at 4.9% for three, two, and one year respectively while 2025 values retain the 6.65% factor, yields 1.57. This consistency is expected because identical adjustment factors are applied to benefits and investment within each year. As a result, the adjustment primarily affects the relative weighting of individual years rather than substantially changing the overall ratio.

The subsequent scenarios assess the robustness of the results to potential overestimation of benefits. The total benefits would have to decline by approximately 36.7% for the SROI ratio to reach 1.00. A 30% reduction in benefits would still produce a ratio of 1.11, whereas a 40% reduction would reduce the ratio to 0.95. Given that RINDU RESIK accounts for 64.87% of the total monetized outcomes, the overall result is particularly sensitive to the valuation assigned to this subprogram. A 25% reduction in RINDU RESIK outcomes would reduce the overall ratio to 1.32, while a 50% reduction would bring it down to 1.07. Finally, subprogram-level ratios computed from nominal figures (monetized outcome divided by nominal investment, Table 2 and Table 1) are about 1.93 for RINDU RESIK, 1.69 for MUDA BERSAMA, and 0.39 for MOKUSAKU. These subprogram figures are indicative only, since outcome timing and the 2025 adjustment are not allocated by subprogram in the source assessment. Nevertheless, the figures suggest that the portfolio-level return is largely supported by the two more mature subprograms, while MOKUSAKU has not yet generated sufficient monetized outcomes to recover its nominal investment.

Table 4. Sensitivity of the overall SROI ratio to alternative assumptions

Scenario	SROI ratio	Change vs. reported
Reported (adjusted to 2025 values)	1.58	—
Nominal values, no time adjustment	1.58	0.00
Multi-year compounding at 4.9%, 2025 at 6.65%	1.57	-0.01
Total benefits reduced by 10%	1.42	-0.16
Total benefits reduced by 20%	1.26	-0.32
Total benefits reduced by 30%	1.11	-0.47

Scenario	SROI ratio	Change vs. reported
Total benefits reduced by 40%	0.95	-0.63
RINDU RESIK outcomes reduced by 25%	1.32	-0.26
RINDU RESIK outcomes reduced by 50%	1.07	-0.51
Break-even (ratio = 1.00)	Benefits -36.7%	—

Source: authors' calculations based on the 2025 SROI assessment. Scenarios are illustrative stress tests applied to reported totals and are not estimates of actual impact.

D. DISCUSSION

1. Interpreting the 1.58 SROI ratio

The overall SROI ratio of 1.58 suggests that the monetized social value associated with SIKOK SELINGKAR was greater than the adjusted value of investment during the 2022–2025 assessment period. This finding is significant because the program encompasses activities that generate benefits through several distinct pathways. Agricultural production contributes through increased income and household cost savings; recycling creates revenue while reducing potential losses associated with waste; technology and equipment enhance productivity and working conditions; and biomass utilization produces new value-added products while replacing certain externally sourced inputs. Thus, the aggregate SROI ratio reflects the combined effects of multiple value-creation pathways rather than the performance of a single enterprise.

Nevertheless, SROI ratios are highly dependent on boundaries, duration, proxy selection, impact adjustments, and the quality of outcome evidence. Previous SROI research cautions against treating the ratio as a ranking tool or using it as a standalone measure of program effectiveness (Arvidson et al., 2013; Krlev et al., 2013; Maier et al., 2015; Nicholls et al., 2012). In this case, the 1.58 ratio is most useful when read together with the impact map, the outcome composition, and the sensitivity results. The substantial contribution of RINDU RESIK, for instance, indicates that monetizable economic value is currently concentrated in this subprogram. Conversely, the comparatively smaller monetized contribution of MOKUSAKU should not automatically be interpreted as evidence of lower strategic value. Its longer-term environmental, behavioral, and agricultural benefits may not yet be sufficiently reflected in measurable sales or cost savings.

The annual results also suggest a maturation effect. The SROI ratio increased to 2.89 in 2025, considerably above the ratios observed during 2022–2024. One possible programmatic explanation is that investments made during the earlier stages in infrastructure, group organization, skills development, and production systems began to generate greater returns as the enterprises and innovations became operational. However, this interpretation should not be considered evidence of a causal temporal relationship, since the assessment does not include a controlled longitudinal counterfactual. The relatively low 2025 investment (IDR 288.7 million) also mechanically raises the 2025 ratio, which is a further reason to read the annual figures cautiously.

2. Circular economy as a mechanism of social value creation

The case illustrates how circular-economy approaches can serve as mechanisms for social development when waste streams are connected to community capabilities and market opportunities. Although the circular economy remains a contested and multi-definitional concept (Geissdoerfer et al., 2017; Kirchherr et al., 2017), existing literature has also noted that its environmental and economic dimensions have often received greater attention than its social

dimensions (Murray et al., 2017). The present case contributes to this discussion by showing how resource recovery can be tied to livelihoods, group institutions, and local markets (Ghisellini et al., 2016). In MUDA BERSAMA, organic residues and recovered plastic are connected to agricultural inputs and products. In RINDU RESIK, residual plastics are processed into higher-value materials and products. In MOKUSAKU, rubberwood and biomass are transformed into wood vinegar. Through these processes, materials previously regarded as waste are redefined as productive resources.

This material transformation alone does not explain the observed social value. SIKOK SELINGKAR also supports the formation of legally recognized groups, capacity building, equipment provision, workspace development, product testing, and collaboration with government and educational institutions. This integrated approach is consistent with social innovation theory, which focuses on changes in practices and relationships rather than novelty alone (Manzini, 2014; Moulaert et al., 2013). It also reflects the limitation noted by Korhonen et al. (2018) that circular-economy strategies do not automatically deliver sustainability benefits: recycling still requires energy and has physical and economic limits, so outcomes depend on how recovery is implemented in practice. The SIKOK SELINGKAR case indicates that circular-economy initiatives may produce stronger community-level outcomes when technical innovations are supported by institutions capable of learning, maintaining equipment and assets, coordinating production, and engaging with markets.

The implementation of PROTEK and SEREPAT further illustrates how small-scale innovations can connect environmental and livelihood objectives. PROTEK combines plastic upcycling with adaptations to rubber-tapping practices during periods of rainfall, whereas SEREPAT connects post-harvest organic residues with the production of agricultural inputs. Their value lies not simply in the technologies themselves, but in their integration of locally available materials, relatively straightforward production methods, and practical relevance to users. Such characteristics can lower barriers to replication, although replication should be preceded by quality assurance, technical validation, and context-specific feasibility assessment.

3. Distribution of value and stakeholder participation

The concentration of 64.87% of monetized outcomes in RINDU RESIK highlights the importance of examining who receives value and through which mechanisms. Because SROI adopts a stakeholder-centered perspective, a high overall ratio may conceal an uneven distribution of benefits when a substantial share of value accrues to only a limited group of actors (Millar & Hall, 2013). The source assessment identifies a diverse stakeholder network that includes PT Pertamina EP Prabumulih Field, PDU Sungai Medang, waste-concern and waste-collector groups, women farmer groups, Mokusaku Bersemi, several farmer groups, rubber farmers, municipal government, environmental and agricultural agencies, subdistrict/urban-village authorities, Politeknik Negeri Sriwijaya, and agricultural extension institutions. The involvement of these stakeholders creates an institutional foundation for the joint production of outcomes and aligns with participatory approaches to social impact assessment (Vanclay et al., 2015).

Stakeholder engagement is equally relevant to assessing attribution. The program report characterizes PT Pertamina EP Prabumulih Field primarily as a facilitator and enabler within the local system rather than as the sole source of change. This perspective is compatible with SROI principles, which require a distinction between the contribution of the assessed program and the effects generated by other actors. Future assessments could be strengthened by incorporating more explicit quantitative estimates of attribution, particularly where government institutions, universities, community organizations, or market partners make significant contributions to observed outcomes. Contribution analysis provides a systematic

approach for assessing whether the intervention's theory of change is credible and for identifying the influence of other contributing factors (Mayne, 2012; Stern et al., 2012). Incorporating such estimates would improve the robustness of the net-impact assessment and minimize the possibility that the aggregate SROI ratio attributes collaborative achievements disproportionately to the focal company.

4. Intangible outcomes and the limits of monetization

A major strength of the source assessment is its decision to present several outcomes qualitatively rather than assigning monetary proxies where appropriate evidence is insufficient. Community members reported improvements in technical competencies related to composting, liquid fertilizer and local microorganism production, equipment operation, occupational safety, product development, and digital marketing. The assessment also documents gains in confidence, workplace comfort, administrative practices, financial recordkeeping, participation, social cohesion, and collective decision-making. Although these outcomes may not immediately translate into financial returns, they can play a critical role in sustaining the program over the longer term.

This challenge reflects a persistent methodological tension in SROI. While monetization enables diverse outcomes to be communicated in a form that decision makers can readily compare, assigning monetary values to complex social changes may create an impression of precision that the underlying evidence cannot support and can potentially reduce multifaceted social change to a single number (Arvidson et al., 2013; Gibbon & Dey, 2011). Social Value International (2021) therefore emphasizes valuing what matters while maintaining transparency and avoiding overclaiming. For SIKOK SELINGKAR, the qualitative evidence provides essential context for understanding why economic outcomes may persist. Skills, trust, organizational routines, and collaborative relationships are forms of social capital and capability that enable groups to use equipment, maintain quality, adapt products, and engage markets (Kabeer, 1999; Woolcock & Narayan, 2000). Omitting these elements from the assessment would risk understating the program's value, whereas assigning monetary values without sufficient evidence could lead to an overestimation.

5. Methodological limitations and implications for future evaluation

Several limitations should be considered when interpreting the findings. First, the evaluation relies on purposive stakeholder interviews and program records rather than a probabilistic sample or experimental comparison group. Although this approach is consistent with the stakeholder-oriented nature of SROI, it restricts the extent to which the findings can be statistically generalized. Second, several impact-adjustment entries assign zero values to deadweight, attribution, drop-off, and displacement. Although the assessment provides outcome-specific justifications for these assumptions, assigning zero adjustments represents a strong methodological choice that should be reassessed through longitudinal evidence, comparison data, and systematic contribution analysis (Mayne, 2012; Stern et al., 2012). The sensitivity analysis in Section 3.7 shows that the ratio would remain above 1 unless benefits were overstated by more than about one third, but it cannot replace empirical estimates of deadweight and attribution.

Third, the application of ORI rates to convert historical investment and benefit figures into 2025 values represents a context-specific financial convention adopted in the source assessment. While this approach enhances comparability across the assessment period, future evaluations should provide a clear rationale for selecting compounding, discounting, inflation adjustment, or another form of social discounting, depending on the specific evaluation objective (Krlev et al., 2013). The alternatives tested in Section 3.7 suggest that this choice has

little effect on the overall ratio in the present case, but this may not hold where benefits and costs are distributed differently over time.

Fourth, the distribution of monetized outcomes is partly shaped by the availability of measurable evidence. Established enterprise activities with identifiable prices, revenues, and sales are generally easier to assign monetary values than outcomes related to environmental quality, empowerment, social capital, or institutional resilience. Future SROI assessments should therefore establish outcome indicators before implementation, collect baseline data, maintain consistent records of beneficiary numbers, and monitor outcomes over several years. A more comprehensive sensitivity analysis should also examine how alternative financial proxies, stakeholder-specific valuations, and different impact-adjustment assumptions affect the resulting SROI ratio.

Finally, environmental outcomes require more robust biophysical measurement. The program already incorporates activities related to waste reduction, plastic reuse, biomass utilization, agricultural-input production, and lower-impact production practices. Future evaluations could strengthen both causal assessment and monetary valuation by systematically measuring indicators such as the kilograms of waste diverted from disposal, the extent of avoided open burning, energy consumption, greenhouse-gas emissions, reductions in chemical-input use, soil and plant conditions, and product life-cycle impacts. Such data would enable environmental value to be incorporated into the SROI assessment more systematically and reduce reliance on narrative evidence.

6. Implications for CSR and community-development practice

The case offers several practical implications for corporate social investment. First, integrated program design can generate more diverse value than isolated assistance because different activities can reinforce one another through shared materials, skills, markets, or institutions, which resonates with the shared-value argument that business and community outcomes can be mutually reinforcing (Porter & Kramer, 2011). Second, investments in physical infrastructure should be accompanied by organizational and technical capacity development. Equipment without governance, maintenance, and market access is unlikely to generate durable outcomes. A livelihoods perspective is useful here because it directs attention to the assets, capabilities, and institutions that people need to convert resources into sustained well-being (Scoones, 2009). Third, local innovations should be designed around concrete user problems. PROTEK addresses risks to latex quality associated with rainfall, SEREPAT responds to post-harvest organic waste, and MOKUSAKU addresses biomass residues while supporting agricultural input needs.

Fourth, exit strategies should prioritize the institutions and capacities required to maintain value after direct corporate facilitation is reduced. The source assessment recommends structured learning and mentoring for SEREPAT and PROTEK, including seasonal or crop-cycle learning plots and practical learning modules to facilitate gradual replication as part of the planned 2026 exit strategy. This focus aligns with the concept of triple-loop learning, whereby organizations move beyond solving operational problems to critically examining the assumptions and institutional arrangements that influence program performance (Tosey et al., 2012).

E. CONCLUSION

This study assessed the SIKOK SELINGKAR social innovation program through a mixed-method SROI framework. The program brings together women-led agriculture and organic-waste utilization, residual-plastic recycling, and biomass-based wood-vinegar production within a community circular-economy model. Across 2022–2025, the program

recorded a nominal social investment of IDR 1.6897 billion. Following adjustment to the 2025 basis applied in the source assessment, total investment was estimated at IDR 1.7775 billion, while monetized benefits reached IDR 2.8089 billion, resulting in an overall SROI ratio of 1.58.

RINDU RESIK accounted the largest share of monetized outcomes (64.87%), followed by MUDA BERSAMA (30.47%) and MOKUSAKU (4.65%). The results indicate that value was created through a combination of new income, improved product value, household and production savings, avoided costs, material recovery, and productive use of local waste streams. The preliminary sensitivity analysis suggests that the overall ratio remains relatively robust under alternative time-adjustment approaches and stays above 1 unless the estimated benefits are overstated by more than approximately 37%. In addition to these monetized outcomes, the program generated important non-monetized benefits, including improvements in technical capability, confidence, organizational governance, social cohesion, environmental awareness, and collaborative capacity.

Overall, the findings support the use of SROI as a structured framework for making social-investment outcomes more visible, provided that the ratio is interpreted alongside stakeholder perspectives, impact assumptions, and outcomes that cannot be readily monetized. Future evaluations could improve the credibility of the analysis by strengthening baseline data, conducting longitudinal monitoring, developing explicit attribution estimates, expanding sensitivity testing, and systematically measuring environmental outcomes. From a program-management perspective, continued attention should be given to strengthening community institutions, maintaining product quality, expanding market linkages, supporting technical learning, and establishing mechanisms for replication. These elements are essential to ensuring that the circular-economy value chain remains viable beyond the period of intensive corporate facilitation.

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