

Community Satisfaction Index as a Tool for Monitoring and Evaluating a Tin Smelter's Empowerment Program: A Case Study from Kundur Island, Indonesia

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ABSTRACT

This study aims to evaluate how satisfied the beneficiaries of PELITA PULAU KUNDUR are with the program, a community empowerment initiative of the tin smelting division of PT TIMAH Tbk on Kundur Island, Karimun Regency, by using the Community Satisfaction Index (Indeks Kepuasan Masyarakat, IKM) based on 17 items. The study employs a quantitative approach using a July 2026 survey of 47 beneficiaries. Rating counts were reconstructed from the published percentages and tested item by item against the satisfaction threshold (3.00) with Holm-adjusted t-tests and exact sign tests. The results indicate that all 17 items exceed the threshold (adjusted $p \leq 0.004$). The highest scores are found in company responsiveness (3.62) and the four facilitator items (3.55 to 3.60), and no respondent rated them below satisfied. However, the lowest scores are observed in skills gain (3.32), participation in planning (3.34), and income gain (3.36), and 17% of respondents were less than satisfied with their involvement in planning, whereas none was dissatisfied with the facilitator (exact McNemar $p = 0.008$). The reported total of 87.26 is "very satisfied" on the report's scale and grade A under the 2004 guideline, but only grade B under the 2017 guideline, and it does not differ significantly from the grade A boundary (adjusted $p = 0.08$). This study concludes that the beneficiaries are highly satisfied, with the facilitator as the main strength and planning as the main gap. To improve the program, it is recommended to hold an annual planning meeting in each group, to record production and income for each activity, and to fix the interpretation scale and report confidence intervals in future surveys.

Keywords: community satisfaction index; community empowerment; corporate social responsibility; tin smelting; hypothesis testing; program evaluation; Indonesia

INTRODUCTION

Empowerment programs and mining companies

Community empowerment has become a central part of how mining companies in Indonesia are expected to operate. Companies are expected to run their operations efficiently and, at the same time, to improve the welfare of neighboring communities. This expectation is also a legal obligation. Law No. 40 of 2007 makes corporate social responsibility an obligation for companies that work with natural resources [1, 2], and sector regulation requires mineral and coal mining companies to plan and fund community development and empowerment [3, 4]. Beyond legal compliance, a community that perceives itself as excluded from the benefits of extraction raises a company's costs and weakens its social license to operate [5, 6], and Moffat and Zhang [7] show that acceptance of mining depends

on perceived fairness, on the quality of contact between company and community, and on trust.

Empowerment programs, however, frequently fall short of their objectives; they tend to decline when the company withdraws, fail to address actual community needs, or lack monitoring [2]. Geothermal CSR programs in West Java scored well on effectiveness and relevance but poorly on sustainability and empowerment [8]. In South Sulawesi, stakeholders perceived that a large nickel mining company could demonstrate greater concern despite substantial social investment [9]. Stakeholder theory explains why such views matter, since an organization is accountable to every group it affects [10], and stakeholder analysis helps mining companies incorporate these expectations into their plans [11].

PT TIMAH Tbk, a tin producer, reports community empowerment activities in Bangka, Belitung, and the Riau Islands, ranging from education and fisheries to agriculture and health [12]. Its smelting division on Kundur Island, in Karimun Regency, supports PELITA PULAU KUNDUR, a program for residents of Kundur and Sawang Laut villages that combines pineapple cultivation, pineapple processing, a biostarter made from pineapple peel, hydroponic vegetables, a waste bank, and broiler farming [13]. Because the program bundles several activities, management requires information on which components satisfy the beneficiaries.

Measuring satisfaction with the IKM

Indonesia's Community Satisfaction Index (Indeks Kepuasan Masyarakat, IKM) was designed for public services. It converts four-point ratings into a score between 25 and 100 [14, 15]. Consistent with this origin, most IKM studies examine service counters and licensing offices. A public service mall in Banjarbaru scored 78.8 [16], a licensing office in Tanjungpinang 66.49 [17], an e-KTP service in Madiun about 80.7 [18], and a civil registry in Central Lombok 83.46 [19]. In these studies the weakest items concern processes, such as speed, schedules, and facilities.

The instrument has also been adapted for CSR programs, including red ginger cultivation [20], village programs [21], a mining company's empowerment scheme [22], and a national park program [23]. These adaptations tend to share three methodological limitations. First, they publish indices to two or three decimals from small samples without saying how uncertain the figures are or testing any hypothesis. Second, they apply grading schemes inconsistently, so that the same value may be classified as "satisfied", "good", or "fair". Third, they aggregate away the item-level differences that indicate priorities for improvement. Participation research adds that involvement should be judged stage by stage rather than as a single score [24, 25, 26].

The company report behind this paper follows the same pattern, although its sample of 47 respondents is sufficient for statistical inference, which the report does not perform. The present study reanalyzes the survey to quantify this uncertainty and to translate item results into management decisions.

Objectives and hypotheses

This study aims to analyze how satisfied the beneficiaries of PELITA PULAU KUNDUR are with the program, using the IKM approach. Its significance lies in the fact that the program bundles five activities, that the report gives index values without saying how certain they are, and that its sample of 47 respondents is sufficient for statistical inference. To this end, we pursue four objectives: to reproduce and validate the reported indices, to estimate how precisely they are known, to test hypotheses against the satisfaction threshold and against official grade boundaries, and to translate item results into action groups. Four hypotheses

guide the tests. H1 states that each of the 17 items has a mean above the satisfaction threshold of 3.00. H2 states that dissatisfaction is concentrated in participation and not in the facilitator, so that more respondents are less than satisfied with their involvement in planning than with the facilitator. H3 states that the four facilitator items outscore the four benefit items. H4 states that the total index falls short of the 2017 grade A boundary (88.31). H1 and H2 are primary; H3 and H4 are secondary.

METHODS

Program and setting

PELITA PULAU KUNDUR is an empowerment program of the tin smelting and refining division of PT TIMAH Tbk on Kundur Island, Kundur Barat District, Karimun Regency, Riau Islands. Its beneficiaries live in Kundur Village and Sawang Laut Village. The program has five parts: pineapple cultivation; pineapple processing into snacks and a biostarter made from peel waste; hydroponic vegetable production; waste management through a waste bank; and broiler farming. A company community development officer (CDO) facilitates the groups.

Survey design and respondents

This study employs a quantitative approach and reanalyzes a cross-sectional satisfaction survey commissioned by the company and carried out by PT SUCOFINDO (Persero), Semarang Branch, in July 2026 [13]. Enumerators interviewed respondents with a structured questionnaire and added open questions. Respondents were drawn from the representatives of the groups that receive the program, which the report lists by name and address but does not describe further. The survey therefore covers 47 beneficiaries: 21 with addresses in Sawang Laut (including the Kobel Laut hamlet) and 26 in Kundur Village. We treat it as a purposive, probably near-complete sample of group representatives, and we do not generalize beyond them.

The questionnaire has 17 closed items, each rated 1 (dissatisfied), 2 (less satisfied), 3 (satisfied), or 4 (very satisfied) [27]. The items fall under three aspects. The overall program aspect covers relevance, knowledge gain, skills gain, environmental quality, income gain, and continuity. The management aspect covers participation in planning, implementation, and monitoring and evaluation (M&E), stakeholder synergy, and four facilitator items: closeness, adaptability, responsibility, and competence. The delivery aspect covers method appropriateness, fairness of targeting, and company responsiveness to feedback.

Index calculation and interpretation

For item q with N respondents, the mean rating is

$$M_q = (1/N) \sum_{i=1}^N x_{iq} \quad (1)$$

Every item carries equal weight within its aspect. The index of an aspect with K items is the mean of its item means, and the converted index multiplies it by 25:

$$IKM_d = 25 \times (1/K_d) \sum_{q \in d} M_q \quad (2)$$

The report grades the converted index on one scale (25–50 less satisfied, 50–75 satisfied, 75–100 very satisfied). We also grade it with the two national guidelines, KepMenPAN 25/2004 (D 25–43.75, C 43.76–62.50, B 62.51–81.25, A 81.26–100) and PermenPAN-RB 14/2017 (D 25–64.99, C 65.00–76.60, B 76.61–88.30, A 88.31–100). On the report's scale, a mean of 3.00 corresponds to 75, the lower edge of “very satisfied”, so we call 3.00 the satisfaction threshold.

Reconstruction and validation

The report publishes rating percentages, not respondent-level data. With $N = 47$, each respondent corresponds to 2.13 percentage points, so every published percentage maps to exactly one count. We converted percentages into counts for all 17 items and cross-checked them against the report's charts and text. Two items needed an assumption. Stakeholder synergy was reported as 42.55% satisfied and 53.19% very satisfied, so we assigned the remaining two respondents (4.26%) to “less satisfied”. For fairness, the report gives 51.06% satisfied and a second figure of 48.49% that is inconsistent, because the two must sum to 100; we used 48.94% (23 respondents) for very satisfied. We flag both items with a dagger (†). As a check, the eight management items rebuilt from these counts give 87.367, identical to the reported management index to three decimals, which supports the reconstruction.

Statistical analysis

Rating items are ordinal, but means of four-point scales are robust in samples of this size [28, 29]. We therefore used parametric tests as the main analysis and checked them with exact methods. For each item, we tested the mean against 3.00 with a one-sample t-test ($df = 46$), computed the 95% confidence interval, and reported the standardized effect.

$$d_z = (M_q - 3) / s_q \quad (3)$$

with benchmarks of 0.2, 0.5, and 0.8 for small, medium, and large effects [30, 31]. As a distribution-free check, we ran an exact sign test of 4s against ratings below 3, excluding ties at 3. Across the 17 item tests, Holm's procedure controlled the familywise error rate at 0.05 [32]. With $N = 47$, a two-sided test at $\alpha = 0.05$ has 80% power for $|d_z| \geq 0.42$, and for $|d_z| \geq 0.58$ after the Holm adjustment for 17 tests. Shares of respondents carry Wilson 95% intervals [33, 34].

For H2 we used the exact McNemar test [35]. No respondent rated any facilitator item below 3, so every respondent who differs between planning and a facilitator item is one of those who were dissatisfied with planning, which makes the test valid without respondent-level data. For H3 we compared the means of the four facilitator items with the four benefit items (knowledge, skills, environment, income) using an exact Mann-Whitney test, treating items as units. For H4 and further benchmarks, we used one-sample t-tests of

the item means against the grade boundaries 81.26 and 88.31, and against the 84.75 reported for a comparable CSR program [20], again with items as units and a Holm correction across the six benchmark tests. Items are not independent, so these tests are indicative.

Action groups

To translate the test results into decisions, we assigned each item to one of four groups using only the published distributions. Group D (act) holds items that at least 5 of 47 respondents (10.6%) rated below satisfied. Group C (watch) holds items rated below satisfied by one to four respondents. The remaining items have no respondents below satisfied; group A (sustain) holds those with at least half of respondents very satisfied, and group B (maintain) holds the rest. We report on how the groups change when the cut-offs are changed.

Ethics

This analysis used aggregated results only, involving no new contact with respondents, and does not reproduce the names listed in the report.

RESULTS

The results indicate that satisfaction falls in the “very satisfied” category on the report's scale, with a reported total index of 87.26 (mean 3.49). The sections below describe the respondents, check the reported indices, and test each item.

Respondents

Table 1 presents the profile of the 47 respondents. More than half (55.3%) were 46 to 65 years old, and none was under 26. Half had finished senior high school (51.1%), while 17.0% had primary schooling or none. Almost all (93.6%) described their work as something other than entrepreneurship: housewives, fishers, rubber farmers, livestock farmers, and teachers. Monthly income was below IDR 1,000,000 for 44.7% and between IDR 1,000,000 and 3,000,000 for 42.6%.

TABLE 1: Profile of Respondents ($N = 47$).

Characteristic	n	%
Age (years)		
26–45	17	36.2
46–65	26	55.3
> 65	4	8.5
Education		
No schooling	5	10.6
Primary	3	6.4
Junior high	13	27.7
Senior high	24	51.1
Diploma	2	4.3
Occupation		
Entrepreneur	3	6.4
Other (housewife, fisher, rubber or livestock farmer, teacher)	44	93.6
Monthly income (IDR)		
< 1,000,000	21	44.7
1,000,000–3,000,000	20	42.6
3,000,000–5,000,000	6	12.8

Characteristic	n	%
Village of address		
Sawang Laut (incl. Kobel Laut)	21	44.7
Kundur	26	55.3

Note. Age ≤ 25 and income > IDR 5,000,000: none. Village follows the addresses listed in the report. Source: company survey report [13].

Reproducing the reported indices

Table 2 sets the reported indices beside those rebuilt from the published distributions. The management index is reproduced exactly (87.37). The overall index is not: the rebuilt value is 86.26 against 87.17 reported, a gap of 0.91 points. The delivery index also differs: 87.94 rebuilt against 87.23 reported. The report's scope lists a further delivery element, reliability of the method, but publishes no distribution for it, and it breaks relevance down by "problems and potential" without separate results; either could explain the gaps. The reported total (87.256) equals the mean of the three reported aspect indices, and our rebuilt equivalents give 87.19, or 87.08 when all 17 items are weighted equally. The total is therefore consistent within 0.2 points, although two of its three inputs cannot be reproduced. The report's text also states the total as 3.487 in one sentence and 3.490 in its table. We use the reported values where we cite the report and our rebuilt values in all item-level tests.

TABLE 2: Reported and Reconstructed Indices.

Aspect	Items	Reported	Rebuilt	Diff.
Overall program	6	87.17	86.26	+0.91
Program management	8	87.37	87.37	0.00
Program delivery	3	87.23	87.94	-0.71
Total (mean of three aspects)	17	87.26	87.19	+0.07
Total (17 items, equal weights)	17	87.26	87.08	+0.18

Note. Converted indices (25–100). Rebuilt values use the reconstructed counts. Diff. = reported – rebuilt. The reported total of 87.26 is "very satisfied" on the report's scale, grade A (2004 guideline), and grade B (2017 guideline).

Item-level satisfaction

Figure 1 and Table 3 show that satisfaction is high and broadly shared. Of the 799 ratings, 415 (51.9%) were "very satisfied", 355 (44.4%) were "satisfied", and 29 (3.6%) were "less satisfied"; no one chose "dissatisfied". Item means run from 3.32 (skills gain) to 3.62 (company responsiveness). Nine of the 17 items had no respondent below satisfied. The four facilitator items and company responsiveness rank highest, with 55 to 62% very satisfied. At the lower end, the means for skills (3.32), planning participation (3.34), income (3.36), and M&E participation (3.38) lie closest to the threshold, yet their intervals still lie above 3.00.

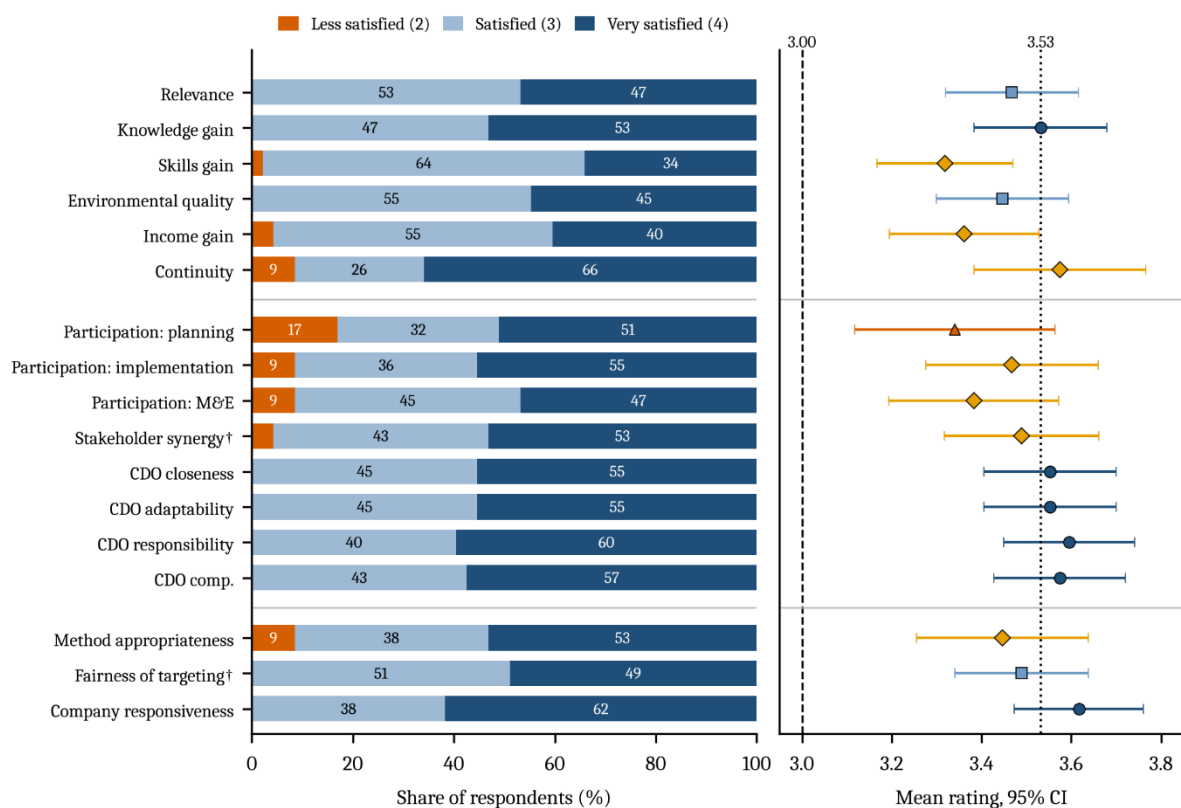


FIGURE 1: Rating Distribution and Mean Rating (95% CI) of the 17 Survey Items (N = 47).

Note. Items are grouped by aspect (overall program, program management, program delivery). Dashed line: 3.00; dotted line: 3.53 (converted to 88.31). Marker shapes follow the action groups in Table 5. † Assumption-dependent items (see Methods).

TABLE 3: Rating Counts and Statistics for the 17 Survey Items (N = 47).

Item	2	3	4	Mean	SD	95% CI	d _z	Adj. p (t)	Adj. p (sign)	Group
Overall program										
Program relevance	0	25	22	3.47	0.50	3.32–3.62	0.93	<0.001	<0.001	B
Knowledge gain	0	22	25	3.53	0.50	3.38–3.68	1.05	<0.001	<0.001	A
Skills gain	1	30	16	3.32	0.52	3.17–3.47	0.62	<0.001	<0.001	C
Environmental quality	0	26	21	3.45	0.50	3.30–3.59	0.89	<0.001	<0.001	B
Income gain	2	26	19	3.36	0.57	3.19–3.53	0.64	<0.001	<0.001	C
Continuity	4	12	31	3.57	0.65	3.38–3.77	0.88	<0.001	<0.001	C
Program management										
Participation: planning	8	15	24	3.34	0.76	3.12–3.56	0.45	0.004	0.007	D
Participation: implementation	4	17	26	3.47	0.65	3.28–3.66	0.72	<0.001	<0.001	C
Participation: monitoring and evaluation	4	21	22	3.38	0.64	3.19–3.57	0.59	<0.001	0.001	C
Stakeholder synergy†	2	20	25	3.49	0.59	3.32–3.66	0.84	<0.001	<0.001	C
CDO closeness	0	21	26	3.55	0.50	3.41–3.70	1.10	<0.001	<0.001	A
CDO adaptability	0	21	26	3.55	0.50	3.41–3.70	1.10	<0.001	<0.001	A
CDO responsibility	0	19	28	3.60	0.50	3.45–3.74	1.20	<0.001	<0.001	A
CDO competence	0	20	27	3.57	0.50	3.43–3.72	1.15	<0.001	<0.001	A
Program delivery										
Method appropriateness	4	18	25	3.45	0.65	3.26–3.64	0.68	<0.001	<0.001	C
Fairness of targeting†	0	24	23	3.49	0.51	3.34–3.64	0.97	<0.001	<0.001	B
Company responsiveness	0	18	29	3.62	0.49	3.47–3.76	1.26	<0.001	<0.001	A

Note. Columns 2–4: number of respondents rating the item 2 (less satisfied), 3 (satisfied), or 4 (very satisfied); no respondent rated 1. $d_z = (M - 3)/SD$. Adj. p: Holm-adjusted over 17 tests against 3.00 (t-test, $df = 46$; exact sign test, 4s against ratings below 3, ties excluded). Group: A sustain, B maintain, C watch, D act (Table 5). † Counts rest on an assumption described in the Methods.

The distributions differ in shape as well as in level. Continuity has the highest share of “very satisfied” (66.0%) alongside 8.5% who were less than satisfied; it is the most polarized item. Planning participation is the most divided: 17.0% (Wilson 95% CI 8.9–30.1%) were less than satisfied, 31.9% satisfied, and 51.1% very satisfied. Because the Wilson interval for zero of 47 extends to 7.6%, the lower bound for planning lies above the upper bound for every item with no dissatisfied respondents.

Hypothesis tests

Table 4 summarizes the tests. H1 is fully supported. All 17 items exceeded 3.00, with Holm-adjusted p values between 6.5×10^{-10} and 0.004 (Table 3). The weakest case was planning participation ($t = 3.07$, adjusted $p = 0.004$, $d_z = 0.45$). Effects were large ($d_z \geq 0.8$) for 11 items and medium for the other six. The exact sign test yields consistent results: every item remains significant after correction (largest

adjusted $p = 0.007$). The sample can detect effects of $d_z \geq 0.58$ after correction, and only planning (0.45) falls below that level, although it remains significant. H2 is supported. Eight respondents were less than satisfied with planning, and none was less than satisfied with any facilitator item, so all eight discordant pairs are in the same direction (exact McNemar $p = 0.008$). Implementation, M&E, and method each had four such respondents, which is too few to separate them from the facilitator ($p = 0.125$ each).

H3 is supported at the nominal level. The four facilitator items averaged 3.57 and the four benefit items 3.41, a difference of 0.15. Each facilitator item scored above each benefit item (Mann–Whitney $U = 16$, the maximum; exact $p = 0.029$). This is the smallest attainable p-value with four items per group, so the number of items limits the contrast, not the data.

TABLE 4: Hypothesis Tests and Benchmark Comparisons.

Hyp.	Test and comparison	Result
H1	Item means vs 3.00 (t-test, Holm, 17 tests)	17 of 17 supported; adj. p 6.5×10^{-10} to 0.004; d_z 0.45–1.26
H1	Item 4s vs ratings below 3 (exact sign test, Holm)	17 of 17 supported; largest adj. $p = 0.007$
H2	Planning vs facilitator items, respondents below 3 (exact McNemar)	8 vs 0 discordant; $p = 0.008$

Hyp.	Test and comparison	Result
H3	Facilitator vs benefit items, 4 vs 4 item means (exact Mann–Whitney)	3.57 vs 3.41; $U = 16$; $p = 0.029$
H4	Management index vs grade A, 2017 (88.31)	87.37; $t(7) = -1.15$; $p = 0.29$
H4	17 items vs grade A, 2017 (88.31)	87.08; $t(16) = -2.22$; adj. $p = 0.083$
Bench.	Management index vs grade A, 2004 (81.26)	$t(7) = 7.44$; adj. $p < 0.001$
Bench.	17 items vs grade A, 2004 (81.26)	$t(16) = 10.46$; adj. $p < 0.001$
Bench.	Management index vs 84.75 [20]	$t(7) = 3.19$; adj. $p = 0.046$
Bench.	17 items vs 84.75 [20]	$t(16) = 4.18$; adj. $p = 0.003$

Note. Benchmark and H4 tests treat items as units (one-sample t-tests of item means; $df = \text{items} - 1$) and are Holm-adjusted over six tests; they are indicative.

Grading and benchmarks

Figure 2 shows that the classification depends on the scale. The reported total of 87.26 is “very satisfied” on the report’s scale and grade A under the 2004 guideline, but only grade B (“Good”) under the 2017 guideline, 1.05 points below grade A. The test of H4 indicates that this gap is not statistically significant. The management items average 87.37 (95% CI 85.43–89.31; $t(7) = -1.15$, $p = 0.29$), and the 17 items average 87.08 (85.90–88.26; $t(16) = -2.22$, $p = 0.042$, Holm-adjusted $p = 0.083$). H4 is therefore not supported: the program cannot be distinguished from the 2017 grade A boundary. Both exceed the 2004 grade A boundary of 81.26 (adjusted $p < 0.001$) and the 84.75 reported for red ginger cultivation [20] (adjusted $p = 0.046$ and 0.003).

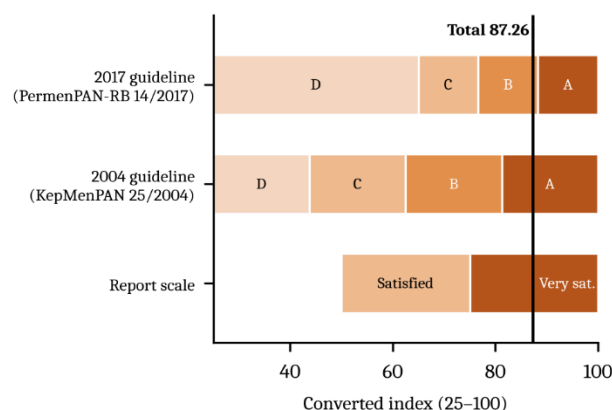


FIGURE 2: The Reported Total (87.26) on Three Interpretation Scales.

Note. Vertical line: reported total. Darker bands are higher grades.

To lift the management index to 88.31, 15 one-step upgrades would suffice among the 172 management ratings that are below 4 (8.7%); for all 17 items, the figure is 40 among 384 (10.4%). Moving the eight respondents who were less than satisfied with planning up to “satisfied” would account for eight of these 40 steps.

Action groups

Table 5 and Figure 3 present the resulting classification. Six items fall in group A: knowledge gain, the four facilitator items, and company responsiveness. Three fall in group B (relevance, environmental quality, fairness). Seven fall in group C: skills, income, continuity, implementation participation, M&E participation, stakeholder synergy, and method. Only planning participation reaches group D. Any cut-off between 5 and 8 respondents gives the same result. A cut-off of 4 would add four items to group D (continuity, implementation, M&E, and method), and a cut-off of 9 would leave it empty.

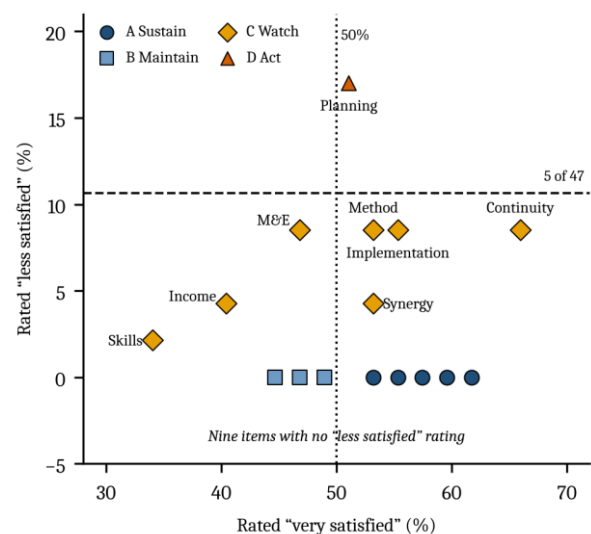


FIGURE 3: Share of Respondents “Very Satisfied” Against Share Below “Satisfied”, by Item.

Note. Items are plotted at their published percentages. Nine items had no respondents below “Satisfied”. Marker shapes as in Figure 1.

TABLE 5: Action Groups and Suggested Management Response.

Group	Rule	Items	Suggested response
A Sustain	None below 3; ≥ 50% rate 4	Knowledge; CDO closeness, adaptability, responsibility, competence; responsiveness	Document of the CDO's approach; train local second-line facilitators
B Maintain	None below 3; < 50% rate 4	Relevance; environmental quality; fairness	Maintain; review targeting rules and fairness in the next round
C Watch	1–4 respondents below 3	Skills; income; continuity; implementation and M&E participation; synergy; method	Record production, sales, and income; ask each group how far it could run without support
D Act	≥ 5 respondents below 3	Planning participation (8 of 47)	Hold an annual planning meeting in each group, report back on suggestions; target ≤ 2 of 47

Note. Cut-offs applied to the published distributions; any cut-off of 5 to 8 respondents for group D gives the same result.

Open-ended responses

The report's open comments are brief and cannot be quantified, but they are consistent with the quantitative results. Respondents said that the income gain comes from turning fresh pineapple into processed snacks such as nastar, jam, wajik, and dodol, which command higher prices. They said they pass what they have learned on to relatives and neighbors. All of them said they still need the company's support, and their main expectation was continued assistance until they can run pineapple and broiler production on their own. The most frequent request was for further training in pineapple cultivation and in making biostarter from pineapple waste.

DISCUSSION

Interpretation of the high scores

PELITA PULAU KUNDUR received very high satisfaction scores. Every item exceeds the satisfaction threshold by a clear margin, a result that holds under parametric and exact tests alike and does not depend on any one correction. This result is notable for a program that combines five activities. Beneficiaries perceive the program as relevant, report gains in knowledge, and regard the company as fair and responsive. Expectation-disconfirmation theory suggests that programs score well when the promised service is delivered [36, 37], and the strongest items here depend most on what the company controls directly: the field staff it assigns and the speed of its response.

Two caveats qualify for this interpretation. First, satisfaction ratings are known to cluster at the favorable end of a scale, partly as an artifact of how they are collected [38]. Here, 52% of all ratings sit in the top category, and every item exceeds the 15% share that psychometric practice takes as a sign that a scale has lost sensitivity at its upper end [39]. When ratings cluster at the top, even substantial differences between items appear small, and the index loses power to discriminate. The range of item means is only 0.30 points. Second, face-to-face interviews about a company's own program may elicit socially desirable answers [40]. We cannot measure that tendency here, but it calls for

interpreting small differences between high scores with caution.

The facilitator as the main strength

The four facilitator items all have means between 3.55 and 3.60 and no respondent below satisfied. Together with company responsiveness (3.62), they form the clearest strength. Beneficiaries tend to judge programs largely by the field staff who deliver them. Contact quality is one of the paths through which communities come to accept mining [7], and the report's own comments note that all respondents know the CDO well. The corresponding risk is that a program that rests on one trusted person becomes vulnerable when that person is reassigned. We recommend that the company document what the CDO does, share it with group leaders, and build a second layer of local facilitators, along the lines of peer mentoring and messaging-group support applied in a stingless bee program [41].

Weak participation in planning

The clearest weakness lies in planning. Planning participation has the lowest mean among the three participation items (3.34) and the highest share of respondents who are less than satisfied (17.0%), while implementation (3.47) and M&E (3.38) score slightly higher. This pattern differs from the one commonly reported, in which beneficiaries are consulted early and then lose influence as oversight begins. In Arnstein's terms, the program appears to achieve involvement in implementation earlier than involvement in decision-making [24]. Participation research emphasizes that presence in a program differs from influence over it [25], and that community-driven programs work best when communities influence decisions rather than only carry them out [26].

The report says the company tries to involve the groups in planning and communicates with local figures, but it does not describe how group members, who are mostly low-income and have limited schooling, take part in setting activities, targets, or schedules. A practical measure would be a short planning meeting each year in each group,

where members rank possible activities, and the company reports on how their suggestions were followed up. The eight respondents who were less than satisfied should be the first to be consulted on how participation in planning could be made more meaningful.

Outcomes: skills, income, and dependence

The benefit items score lower than the facilitator items. Skills (3.32) and income (3.36) have the two lowest means among the outcome items and fall in group C, where one to four respondents were less than satisfied. These results do not indicate dissatisfaction, as both items exceed the threshold by a clear margin. They indicate that the program improves knowledge more readily than skills or income. The evidence on income is encouraging but limited. Respondents attribute higher incomes to processed pineapple products, and community training elsewhere has likewise treated pineapple peel as a resource for fertilizer and small green businesses [42], but the report gives no sales or production data, and 44.7% of respondents still earn under IDR 1,000,000 a month.

The continuity item is the most polarized (66.0% very satisfied; 8.5% less than satisfied), and the open-ended comments help to explain this pattern. Respondents stated that the programs are linked to one another, yet all of them stated that they still need the company's help. This reflects the early stage of the program, but it is consistent with a well-documented risk: programs often collapse when the company withdraws [2], and CSR programs that do well on relevance may still do poorly on sustainability and empowerment [8]. Community projects in other settings show that empowerment tends to pass through stages, from outreach through training to residents running the system themselves [43]. PELITA PULAU KUNDUR appears to stand between the second and third of these stages. Experience with waste bank programs indicates the likely challenges: keeping members active and training successors for the managers [44]. Satisfaction data cannot show whether these challenges have been overcome, so income, skills, and continuity should be verified with records rather than perceptions.

Assessment of a multi-activity program

A limitation of the report, rather than of the program, is that it assesses PELITA PULAU KUNDUR as a whole. Pineapple growing, processing, hydroponics, the waste bank, and broiler farming differ in start-up costs, seasonality, and market risk, and a single score cannot show which of them contributes most to the program's results. Because the report names further training in pineapple cultivation and biostarter as the beneficiaries' main request, the pineapple value chain is likely the area of greatest perceived need. Future rounds should record which activity each respondent belongs to, so that the analysis can compare activities rather than only items.

Implications of the interpretation scale

The most practical implication concerns interpretation. The same 87.26 is "very satisfied" on the report's scale, grade A under the 2004 guideline, and grade B under the 2017 guideline, and it does not differ significantly from the 2017 grade A boundary. The report's scale also has overlapping edges (25–50, 50–75, 75–100). A company that wants to compare years, sites, or programs needs one scale fixed before the survey, and a confidence interval around every score. With 47 respondents, the uncertainty in the total is roughly ± 1.2 points on the converted scale, as the interval for the 17 items shows, so a change of one or two points between years may reflect random variation rather than real change. The aggregate index is also less informative than the item-level pattern. The profile of this program, namely a strong facilitator, a satisfied but cautious view of outcomes, and a visible gap in planning, indicates priorities for management action that a single index value cannot convey.

Comparison with other studies

Table 6 compares the result with other Indonesian IKM studies. Scales and cut-offs differ, so the comparison is indicative. PELITA PULAU KUNDUR's 87.3 is higher than public service scores of 66.49 to 83.46, than the 84.75 for red ginger cultivation [20], and then the 70.4% of maximum for a mining company's program in Gunung Kidul [22]. It is close to 3.48 of 4 (about 87 on the $\times 25$ scale) reported for village CSR programs [21]. Two observations emerge. First, none of the studies reports an interval or a hypothesis test for its index. Second, the weak points in public services are mostly about process, such as speed and schedules, whereas here the weakness concerns participation in planning.

TABLE 6: Comparison with Other Indonesian IKM Studies.

Setting	n	Items	Index
Licensing office, Tanjungpinang [17]	150	14	66.49
Public service mall, Banjarbaru [16]	150	9	78.8
e-KTP service, Madiun [18]	100	9	≈ 80.7
Civil registry, Central Lombok [19]	400	14	83.46
CSR red ginger program, Banjarbaru [20]	n/s	10	84.75
Village CSR programs, Kertajaya [21]	18	8 programs	3.48 of 4 (≈ 87)
Mining company program, Gunung Kidul [22]	135	n/s	3.52 of 5 (70.4%)
This study: PELITA PULAU KUNDUR, tin smelter, Kundur	47	17	87.26 (87.08 rebuilt)

Note. n/s = not stated. Scales and cut-offs differ across studies; comparison is indicative. Indices are on the converted 25–100 scale unless stated.

Implications for management

The results indicate four priorities. First, maintain and document effective practices: the facilitator's approach and the speed of the company's response (group A). Second, strengthen planning (group D) with the annual group meeting described above, and track the number of respondents who are less than satisfied with it as the main indicator, with a target of at most two of 47. Third, strengthen the evidence on outcomes (group C) by recording production, sales, and income for each activity and by asking each group how far it could run without company support. Fourth, fix the interpretation scale, report intervals, and add a question about which activity each respondent belongs to. Because 15 upgrades would carry the management index over the 2017 grade A boundary, a modest target for the next round is realistic.

Limitations

This study has several limitations. We worked from published percentages, not from respondent-level data, so we could not test differences between villages, age groups, or income groups, nor account for the correlation between items. The stakeholder synergy and fairness items depend on assumptions stated in the Methods section, and two of the three reported aspect indices cannot be reproduced from the published distributions. The sample is small, purposive, and made up of group representatives, and the report does not say how many beneficiaries the program has. Interviews were carried out for the company, and social desirability may have inflated the scores. Finally, a satisfaction survey measures opinions, not production, income, or environmental outcomes.

CONCLUSIONS

This study concludes that the beneficiaries of PELITA PULAU KUNDUR are highly satisfied with the program. All 17 items exceed the satisfaction threshold under parametric and exact tests, and the reported total of 87.26 is very satisfied on the report's scale, grade A under the 2004 guideline, and grade B at the edge of grade A under the 2017 guideline. The strongest aspects are the facilitator and the company's responsiveness, while the main weakness lies in planning, where 17% of respondents were less than satisfied, and none were dissatisfied with the facilitator. Skills, income, and continuity are rated satisfactorily but depend on company support that every respondent still needs. To improve the program, it is recommended to hold an annual planning meeting in each group, to keep records of production and income for each activity, to prepare local successors for the facilitator, and to fix the interpretation scale and report confidence intervals in every future survey.

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DECLARATIONS

Ethics statement. This study is a secondary analysis of anonymized, aggregated results from a routine program monitoring-and-evaluation survey. It involved no new contact with respondents and no identifiable personal data, and the names listed in the survey report are not reproduced. Such analysis does not require ethical review.

Informed consent. The survey was administered by PT SUKOFINDO (Persero) for PT TIMAH Tbk Divisi Pengolahan dan Peleburan Kunder. All respondents gave informed consent to take part in the survey and to the use of the aggregated results for program evaluation and publication. No individual-level data is published.

Conflict of interest. Zamrotul Akoba, Eka Budi Susanto, and Reza Dwi Adrianto are employees of PT TIMAH Tbk, the company that runs the PELITA PULAU KUNDUR program evaluated here and commissioned the survey. Dewi Hajar declares no competing interests.

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Author contributions (CRediT [45]). Zamrotul Akoba: conceptualization, methodology, supervision, writing – review and editing. Eka Budi Susanto: investigation, data curation, project administration, validation. Reza Dwi Adrianto: formal analysis, visualization, resources, writing – review and editing. Dewi Hajar: writing – original draft. As corresponding author, Reza Dwi Adrianto takes responsibility for the integrity of the data and the accuracy of the analysis.

Data availability. Item-level rating counts and all derived statistics appear in Tables 1–5. The survey report and underlying data belong to PT TIMAH Tbk and are available from the corresponding author on reasonable request, subject to the company's approval.

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