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SHARED SPACE CLEANING AND HOUSEHOLD WASTE SORTING IN SIX ETHNIC MINORITY COMMUNES OF DAK NONG PROVINCE, VIETNAM

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ABSTRACT

Environmental participation encompasses practices that may coincide without reaching the same households. This exploratory study examines shared-space cleaning and household waste sorting in a 2024 survey of 730 ethnic minority households across six Dak Nong communes. Paired cross-tabulations identify participation profiles; descriptive linear projections and sensitivity analyses examine geographical and social patterning. Cleaning was reported by 44.7% and sorting by 28.8%. Cleaning-only reports numbered 133, compared with 17 sorting-only reports. Excluding a commune with concentrated all-item checklist endorsement left 133 cleaning-only and 16 sorting-only reports, while the proportion of cleaning households also reporting sorting fell from 59.2% to 35.7%. Thus, the directional imbalance persisted, but the apparent integration of practices depended substantially on the site composition. Commune-adjusted social associations were imprecise, and their intervals did not account for village clustering. The contribution is a bounded account of unequal coverage across practices, rather than a causal explanation of behaviour. Environmental monitoring should distinguish reported activities and validate exceptional response patterns before interpreting local differences or designing targeted support.

Keywords: environmental practices; household waste sorting; shared-space cleaning; paired reports; ethnic minority households; rural Vietnam

1.0 INTRODUCTION

A household can contribute to a cleaner village environment without separating its own solid waste. Conversely, sorting at home need not involve work in shared spaces. Both activities matter, but their co-occurrence is an empirical question. A programme that records only whether a household participates in environmental protection can lose information about which activities reach the same households and which do not. The practical issue is not simply that two questions have different wording: it is whether their joint distribution reveals groups that an undifferentiated participation category would conceal.

This issue is relevant to the environmental objectives of Vietnam's National Target Programme on New Rural Development for 2021–2025 (Prime Minister of Vietnam, 2022). The programme provides the historical policy setting for this study, rather than an intervention whose effectiveness is evaluated here. In rural settlements, cleaning roads or residential areas and sorting waste at home concern different spaces and arrangements. It is therefore useful to

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establish their empirical relationship before treating visible activity in one setting as evidence of practice in another.

Behavioural differentiation is already established in environmental research. Stern (2000) argues for specifying environmentally significant actions, and Barr (2007) demonstrates that the predictors of waste reduction, reuse and recycling can differ. Dolnicar and Grün (2009) examine patterned heterogeneity across individuals and contexts. These studies make it inappropriate to claim that recognising multiple behaviours is itself a new theoretical discovery. The more focused task is to identify how particular practices combine in a defined setting and what an aggregate label would miss.

Vietnamese research provides complementary explanations of waste practices. Nguyen et al. (2023) investigate social and material arrangements through qualitative research, while Phan (2026) examines rural waste separation through capability, opportunity and motivation. Those approaches direct attention to the conditions under which action is possible. The present study addresses a different empirical question: within the same households and recall period, how strongly do reports of shared-space cleaning and household sorting overlap, and how sensitive is that apparent overlap to the composition of the surveyed sites? This is a contextual extension of behavioural differentiation, not a claim that previous research has ignored all combinations of environmental practices.

Using household reports from six communes surveyed in Dak Nong in March–April 2024, the article asks three questions. First, which combinations of cleaning and sorting are recorded? Second, does the imbalance between cleaning-only and sorting-only reports persist across sites and diagnostic restrictions? Third, what do exploratory commune-adjusted projections add about respondent and household characteristics? The primary contribution is the paired description of unequal coverage, including evidence that the apparent integration of the practices is much more sensitive to one site than the direction of their prevalence difference. The article concerns the 2024 administrative setting and does not assess subsequent territorial changes.

2.0 CONCEPTUAL APPROACH AND RELATED RESEARCH

2.1 Behavioural specificity and participation profiles

Behavioural specificity provides the main organising principle (Stern, 2000). The analytical unit is the household, and the outcomes are two reported activities rather than a latent score of environmental responsibility. Four profiles distinguish neither focal activity, cleaning only, sorting only and both. These profiles preserve information that a count or a single participation indicator would compress. They are descriptions of reported combinations, not stages of moral development, levels of civic virtue or stable household types.

Barr's (2007) comparison of waste-management behaviours supplies a reason to resist assuming common determinants. Dolnicar and Grün's (2009) work further supports examining patterns rather than only an average environmental disposition. However, the present data do not establish that differences between two reports reflect different motivations. A household may encounter different opportunities, interpret the items differently, or report an infrequent

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activity alongside a repeated one. The profiles identify differences needing explanation without resolving their source.

This distinction changes how the comparison is evaluated. An overall prevalence gap addresses how common each reported activity is; conditional proportions address how often one is present among households reporting the other. The gap may remain stable when site composition changes even while the apparent degree of overlap changes considerably. Reporting both quantities can therefore reveal whether a narrative of integrated environmental engagement rests on the same evidence as a narrative of unequal coverage.

2.2 Practices in social and material settings

Shove (2010) directs attention to the organisation of everyday practices beyond individual attitudes. Cleaning shared space may involve tools, access and locally arranged occasions; sorting at home may involve storage, material categories and onward handling. These possible conditions help specify subsequent research. They are not measured mechanisms in the present models, and the cleaning item does not establish collective organisation.

Vietnamese qualitative evidence links waste practices to social institutions and technical arrangements (Nguyen et al., 2023). Phan (2026) highlights the distinction between participation in separation and its implementation within a wider handling system. Bernstad's (2014) study of household food-waste separation in Sweden illustrates why practical convenience can warrant examination, although its intervention findings cannot be transferred directly to these communes. Together, the studies motivate investigating enabling conditions after participation profiles are identified, rather than attributing differences immediately to awareness or household commitment.

Ethnic minority households form the study population, not an explanatory category whose effect is identified. Ethnicity and locality are closely related in these sites, and the survey provides no matched comparison with majority households. Its value is evidence from an underexamined study setting. Explaining a pattern through ethnic culture would require additional comparative and process evidence beyond the fact that respondents belong to minority groups.

2.3 Reporting and the limits of co-occurrence

Household reports are evidence of reported activity, not direct observations of its frequency or quality. Kormos and Gifford (2014) review the validity of environmental self-reports and the reasons they need not coincide with objective measures. This distinction is especially relevant to a long multiple-response checklist: broad endorsement may represent genuine activity, interpretation of the question or response processes. Unusual concentration warrants verification, without making the responses automatically invalid.

Co-occurrence also differs from behavioural spillover. Nilsson et al. (2017) show why temporal and contextual relationships matter when examining spillover. Since this survey does not date the two activities or establish their order, the analysis cannot determine whether cleaning encourages sorting or the reverse. The study is explicitly exploratory, with focal practices selected after inspecting the questionnaire; no preregistered directional hypothesis is claimed.

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3.0 MATERIALS AND METHODS

3.1 Survey setting and sample

The source is the ministerial research project on community culture in New Rural Development in ethnic minority areas of Dak Nong, implemented by the Institute of Sociology with Phan Duc Nam as principal investigator. The questionnaire, synthesis report and SPSS dataset constitute the analytical materials (Vietnam Academy of Social Sciences, 2024). The report dates fieldwork to March-April 2024 and defines the collection unit as the household, represented by one adult familiar with its socioeconomic circumstances. Participants consented to take part in the survey after being informed of its research purpose; only aggregate results are reported, without identifying individual respondents.

The survey covered Dak Glong, Dak Mil and Dak Song districts and six communes: Quang Khe, Dak Som, Nâm N'Jang, Truong Xuan, Dak R'La and Long Son. The report describes one recognised and one not-yet-recognised New Rural Development commune per district. Four villages per commune were selected purposively to reflect ethnicity, living standard, occupation and location. Updated village household lists supported systematic household selection, with 30 intended interviews and six reserve households per village. Reserves were intended for prolonged absence or inability to answer. Overall inclusion probabilities and realised replacement records are unavailable for this analysis.

The target was 720 household interviews; fieldwork ultimately yielded 730 completed questionnaires, all retained in the analytical file. The principal investigator confirms that 730 is the realised fieldwork total, rather than a transcription error in the sample description. Commune totals range from 120 to 123. The difference from the target is reported as an achieved-sample deviation, without attributing it to an undocumented replacement mechanism. An adult familiar with household circumstances represented each household. The materials do not provide approached-household counts, refusal counts or realised reserve use, so a response rate cannot be calculated. Results are unweighted descriptions of the surveyed households, not provincial prevalence estimates.

The file includes 394 male and 336 female respondents. Mean age is 43.9 years, with a range of 18-84. Although the original report described an intended respondent range ending at 80, the principal investigator confirms that the four respondents above 80 were actually interviewed. They are retained with their recorded ages and included in the older-adult category of 60 years or above. There are 623 respondents below 60 and 107 aged 60 or above. Original ethnicity responses identify M'Nong, Ma, Ede, Tay, Thai, Nung, Hmong and other minority groups, including Dao and Cao Lan. An inconsistent pre-existing derived ethnicity grouping is excluded. Table 1 distinguishes respondent attributes from household self-rated living standard.

Table 1: Characteristics of household representatives and households

Domain	Category	n	%
Respondent sex	Male	394	54.0
	Female	336	46.0
Respondent age group	Below 60 years	623	85.3

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Domain	Category	n	%
	60 years or above	107	14.7
Respondent education	Primary or less	216	29.6
	Lower secondary	352	48.2
	Upper secondary or higher	162	22.2
Household self-rated living standard	Poor or near-poor	125	17.1
	Average	555	76.0
	Better-off	50	6.8

Source: 2024 survey, n = 730 for each domain. Representative age: mean 43.9, SD 12.8, median 42, range 18–84 years. Living standard is a self-rating, not an administrative poverty classification. Percentages may differ from 100 through rounding.

3.2 Definitions and paired measures

Question Q702 asks which activities the household undertook to protect or improve the environment during the preceding year, with multiple selections from 19 items. Shared-space cleaning is the selection of cleaning village roads, lanes or residential areas (Q7029); sorting is the selection of sorting solid waste at home (Q70212). The term shared-space cleaning follows the location described in the item. It does not imply a collectively organised cleanup, voluntary association or official mobilisation.

Each item is coded one when selected and zero otherwise. The file has no missing values on these items or the model covariates, and every record selects at least one checklist activity. Absence of stored missing values does not establish that nonresponse was distinguished correctly from non-selection during fieldwork or entry. A zero is therefore described as a non-selected activity. Neither item measures frequency, continuity, waste fractions, disposal destination or observed environmental improvement.

Let C denote cleaning and S denote sorting. The difference $D = C - S$ takes values −1, 0 and 1. Its sample mean equals the cleaning proportion minus the sorting proportion; multiplying by 100 expresses percentage points. Four joint profiles retain the paired structure. Conditional proportions $P(S = 1 \mid C = 1)$ and $P(C = 1 \mid S = 1)$ describe coverage among the other activity's reporters. They are asymmetric descriptions with different denominators, not estimates of behavioural transition probabilities.

3.3 Exploratory modelling and uncertainty

The primary analysis consists of counts, separate percentages and paired profiles. Supplementary ordinary least squares projections describe associations with respondent sex, age group below 60 versus 60 or above, education and household self-rated living standard, with commune indicators. Education distinguishes primary or less, lower secondary and upper secondary or higher. Living standard distinguishes poor/near-poor, average and better-off self-ratings; these are not verified administrative poverty classifications. Respondent education is not a measure of the whole household's educational resources, and respondent sex is not the sex of the person performing the activity.

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For outcome Y in {S, C, D}, the combined specification is $Y_i = \alpha + \beta_1 Female_i + \beta_2 Older60_i + \beta_3 LowerSecondary_i + \beta_4 UpperPlus_i + \beta_5 Average_i + \beta_6 BetterOff_i + \Sigma\gamma_j Commune_{ij} + \varepsilon_i$. Older60 equals one for respondents aged 60 or above, including the four over 80. Reference categories are respondents below 60, male respondents, primary education or less, poor/near-poor households and Quang Khe. Separate specifications contain only the social variables or only commune indicators. On identical records and regressors, the coefficients for D equal the cleaning coefficients minus the sorting coefficients, providing a direct comparison of activity-specific associations.

These linear projections accommodate a commune with no recorded sorting, which creates separation difficulties for conventional commune-indicator logistic models. They are not bounded probability forecasts and may produce fitted values outside zero and one. Their coefficients describe adjusted linear contrasts within the sample. Ordinary and adjusted R^2 are reported together, with the number of slope parameters, to avoid overlooking model complexity. Fit comparisons do not identify causal contributions or establish that locality is substantively more important than social circumstances.

HC3 intervals address heteroskedasticity but not dependence within villages (MacKinnon & White, 1985). Village/bon identifiers are not used in this analysis; the models describe households and adjust for commune. This analytical choice does not remove possible village dependence. Six communes do not provide a straightforward basis for conventional large-cluster inference. No population significance claim, ranking by p-value or formal independence-based test of the paired proportions is made. Model-conditional 95% HC3 intervals appear in the appendices as exploratory diagnostics; descriptive effect sizes and their changes across samples carry the main argument. Analyses used Python 3.12.14, pandas 3.1.1, statsmodels 0.15.0 and pyreadstat 1.3.7.

3.4 Response audit and sensitivity restrictions

The audit identifies 141 records selecting all 19 activities: 109 in Nâm N'Jang, 30 in Long Son and two in Truong Xuan. In Nâm N'Jang, all 121 records also share one interviewer code. Assignment of one interviewer to one site may be normal field organisation; the concern is the concentration of all-item endorsement and the inability to separate site conditions from interviewing or entry processes. The available file cannot determine whether the code identifies interviewing or a later processing responsibility. No record is declared invalid on this basis.

All 730 records are retained in the full-file description. A second analysis omits Nâm N'Jang; additional checks omit each commune in turn and omit all-item endorsements across sites. The last restriction is diagnostic, not a validated cleaning rule: all-item reporters necessarily select both focal practices, so their removal preserves net discordance while reducing the denominator. Restrictions change the study sample and do not validate the remaining observations or address village dependence.

4.0 RESULTS

4.1 Unequal coverage within households

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Shared-space cleaning is reported by 326 of 730 households (44.7%), and household sorting by 210 (28.8%), a 15.9-percentage-point difference. Table 2 presents the paired distribution: 193 households report both, 133 cleaning alone and 17 sorting alone. The 387 selecting neither focal activity select at least one other checklist activity, so they cannot be described as environmentally inactive. The asymmetry concerns the two specified practices.

Table 2: Paired reports of the two practices

Cleaning report	Sorting not selected (n)	Sorting not selected (%)	Sorting selected (n)	Sorting selected (%)	Total (n)	Total (%)
Not selected	387	53.0	17	2.3	404	55.3
Selected	133	18.2	193	26.4	326	44.7
Total	520	71.2	210	28.8	730	100.0

Source: Q7029 and Q70212. Every percentage uses 730 households, not a row or column denominator. Neither selected means neither of these two activities; all households select at least one other activity or one of the focal activities. Counts preserve the paired structure.

Among cleaning reporters, 193 of 326 (59.2%) also report sorting. Among sorting reporters, 193 of 210 (91.9%) report cleaning. A broad category defined as either activity would contain 343 households (47.0% of the sample), but would combine three different profiles. It would conceal the 133 households reporting work in shared space without reporting home sorting, as well as the smaller reverse group. This is the concrete information lost by collapsing the two items; the study does not show that any existing programme actually used such a collapsed indicator.

4.2 Place patterns and the sensitivity of overlap

Table 3 shows the four profiles by commune. Quang Khe contains 46 cleaning-only reports and no sorting reports; Dak Som contains 15 cleaning-only reports and one sorting-only report, with none reporting both. By contrast, 119 of the 121 Nâm N'Jang households report both. The remaining three communes display mixtures. The pooled concentration of sorting within cleaning is therefore not a uniform local pattern.

Table 3: Joint participation profiles by commune

Commune	n	Neither (n)	Cleaning only (n)	Sorting only (n)	Both (n)
Quang Khe	120	74	46	0	0
Dak Som	122	106	15	1	0
Nâm N'Jang	121	1	0	1	119
Truong Xuan	123	87	19	4	13
Dak R'La	123	43	45	8	27
Long Son	121	76	8	3	34
All communes	730	387	133	17	193

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Source: 2024 survey. Categories are mutually exclusive and sum to each commune's sample size. Neither refers only to the focal practices. All-item checklist endorsement counts, in commune order: 0, 0, 109, 2, 0 and 30; these are diagnostics, not validated counts of erroneous records.

Nâm N'Jang contributes 119 of the 193 both-practice reports (61.7%), while accounting for 16.6% of the sample. It also contains 109 all-item endorsements, 90.1% of its records. Its near-universal reporting cannot be treated as verified evidence of superior management. These observations show why the degree of pooled overlap requires sensitivity assessment alongside the prevalence gap.

Without Nâm N'Jang, the remaining 609 households include 386 neither, 133 cleaning-only, 16 sorting-only and 74 both-practice reports. Cleaning is reported by 207 (34.0%) and sorting by 90 (14.8%). The gap is 19.2 points, and cleaning-only reports still substantially outnumber sorting-only reports. Yet only 74 of 207 cleaning reporters (35.7%) also report sorting, compared with 59.2% in the full file. Conversely, 74 of 90 sorting reporters (82.2%) also report cleaning. The directional imbalance persists while the apparent integration of practices weakens markedly.

4.3 Diagnostic restrictions and social associations

Table 4 summarises additional restrictions. The difference remains positive when each commune is omitted separately, ranging from 11.5 to 19.2 points. These are comparisons of observed subsets rather than confidence limits. Omitting all-item endorsements produces a larger gap partly through the denominator mechanism described above; it is not independent confirmation of response validity.

Table 4: Sensitivity of the reported prevalence difference

Sample restriction	n	Sorting (n)	Sorting (%)	Cleaning (n)	Cleaning (%)	Gap pp
Full file	730	210	28.8	326	44.7	15.9
Exclude Nâm N'Jang	609	90	14.8	207	34.0	19.2
Exclude all-19 selections	589	69	11.7	185	31.4	19.7

Source: 2024 survey. Restrictions are diagnostic, not validated corrections. Gap = cleaning minus sorting, in percentage points. Omitting all-item endorsements preserves net discordance while reducing the denominator.

Appendices A and B report combined-model coefficients for the full sample and the sample without Nâm N'Jang. Upper-secondary-or-higher education is associated with a 7.6-point sorting contrast relative to primary-or-less education in the full sample (model-conditional HC3 interval - 0.2 to 15.5 points), and 7.4 points without Nâm N'Jang (-0.9 to 15.8). The corresponding cleaning contrasts are 7.0 and 6.6 points. Comparing representatives aged 60 or above with those below 60 gives full-sample contrasts of 1.9 points for sorting and 1.2 points for cleaning, with wide intervals. The paired-difference coefficients do not establish different

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education or age-group associations between practices. These are characteristics of household representatives, not evidence about which member performed each activity.

Appendix C reports fit for the social, commune and combined specifications. In the full sample, sorting-adjusted R^2 is 0.079 for social variables, 0.547 for communes and 0.547 for both. Without Nâm N'Jang the corresponding values are 0.003, 0.129 and 0.129. For cleaning, adding social characteristics to commune indicators slightly reduces adjusted R^2 in both samples, although ordinary R^2 necessarily increases or stays unchanged in nested models. Thus, the supplementary projections describe strong recorded site patterning in the full file, much reduced after restriction; they do not rank the causal importance of culture, institutions or household characteristics.

5.0 DISCUSSION

5.1 What paired profiles add to behavioural differentiation

The contribution is not the general proposition that environmental behaviours differ. It is the demonstration that unequal coverage and apparent integration can respond differently to the same sample restriction. Cleaning-only reports dominate sorting-only reports with and without Nâm N'Jang, yet a majority of cleaning reporters also reporting sorting becomes a minority after that restriction. An interpretation based only on the full-sample conditional percentage would overstate how consistently the practices combine across these sites. A prevalence comparison alone would miss this change in overlap.

This evidence extends behavioural specificity into the practical interpretation of household participation. In Stern's (2000) terms, specifying the action remains essential. In relation to Barr (2007), the present study describes combinations rather than testing distinct psychological predictors. Its connection to Dolnicar and Grün (2009) is the importance of patterns and context, not replication of their design or identification of stable segments. The four profiles are an economical way to preserve distinctions within a common household report, including contributions that would be invisible under an exclusive focus on sorting.

The comparison also qualifies a simple deficit account of rural environmental participation. Households reporting cleaning without sorting have reported one environmental contribution; the evidence does not justify labelling them unconcerned. Equally, sorting cannot be assumed to represent successful handling through to treatment. The sociological value of the distinction is to keep different forms of action visible without attributing them prematurely to a single disposition or ranking households by civic merit.

5.2 Social organisation remains a question for investigation

A practice approach suggests that action in shared space and action inside the household may be sustained by different arrangements (Shove, 2010). Collective invitations, tools or scheduling could matter for some cleaning, while storage, waste categories and collection could matter for sorting. However, the cleaning item does not confirm collective organisation, and the survey does not measure the relevant arrangements comprehensively. These are plausible lines of inquiry, not explanations already established by the commune coefficients.

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Nguyen et al. (2023) contribute qualitative evidence about social and material processes; Phan (2026) addresses rural separation and implementation conditions. The present profiles can help select contrasting households for such process research: cleaning-only households, both-practice households and the smaller sorting-only group. Interviews and observation could distinguish absent opportunities from competing household demands, differences in interpretation and actual continuity of practice. The present data cannot select one of those accounts as the mechanism.

Respondent-level social coefficients offer little basis for targeting demographic groups. Their sensitivity and uncertainty do not establish that education or resources are irrelevant; the measures are limited and refer partly to the representative rather than all members. Nor does geographical patterning identify an ethnic effect. Comparing minority populations across differently situated sites requires attention to service conditions and survey processes before invoking cultural explanations.

5.3 Implications supported by the evidence

The direct monitoring implication is to retain separate indicators and their joint distribution. Reporting whether a household cleaned shared space, sorted at home, did both or reported neither preserves more useful information than an undifferentiated participation rate. Adding frequency, the household members involved and the fate of separated materials would make future monitoring more informative. Data checks should accompany comparisons, particularly when unusually high endorsement is concentrated in a site.

A second implication is to diagnose needs before prescribing a common intervention. The profiles identify households for follow-up, not their specific barriers. Practical sorting support or coordination with collection may be worth investigating, as suggested by Bernstad (2014) and Vietnamese practice research. Their relevance here remains to be established through local observation and consultation. The current evidence does not demonstrate that providing bins, information or community mobilisation will increase sorting, and therefore does not support presenting those measures as proven solutions for the surveyed communes.

5.4 Limits of interpretation

Purposive village selection, unavailable inclusion probabilities and undocumented realised replacement prevent representative population inference. The achieved total and inclusion of the four respondents over 80 have been clarified by the principal investigator; this clarification does not replace verification of the exceptional environmental checklist patterns. One respondent reports household activity over a year, without independent validation of timing, frequency or quality. Consistent with the measurement concerns reviewed by Kormos and Gifford (2014), recorded occurrence should not be equated with verified performance.

The exceptional all-item pattern remains unresolved. Omitting an entire commune changes composition; omitting all-item reporters changes the denominator and may remove genuine broad participation. Neither restriction establishes a corrected dataset. The decision not to use village/bon identifiers leaves village dependence unaddressed, and the HC3 intervals are model-conditional diagnostics. Focal items were selected exploratorily, so the study offers a bounded descriptive contribution rather than a confirmatory test of a general theory.

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Finally, no temporal sequence or causal spillover is observed. The combined profiles cannot determine whether one activity leads to the other (Nilsson et al., 2017). Subsequent work should link verified household reports to village identifiers, service observations and repeated measures. That would permit stronger investigation of how social organisation and household arrangements sustain different practices while preserving the distinction established here.

6.0 CONCLUSION

The surveyed households show an asymmetric combination of shared-space cleaning and home waste sorting. Cleaning-only reports substantially outnumber sorting-only reports, including after removal of the commune with concentrated all-item endorsement. At the same time, the apparent overlap is markedly sensitive to that site: the direction of unequal coverage is more stable than the impression that the practices are widely integrated. This distinction is the study's principal empirical contribution.

Environmental participation should therefore be interpreted through specified activities and their combinations. The findings support separate monitoring and targeted follow-up to establish enabling conditions; they do not establish demographic causes or a cultural explanation of local differences. Verification of exceptional response patterns and design-appropriate assessment of village dependence would strengthen the evidence. Future research can build on the paired profiles by observing how practices are organised and maintained, rather than assuming that participation in one demonstrates performance in another.

REFERENCES

1. Barr, S. (2007). Factors influencing environmental attitudes and behaviors: A U.K. case study of household waste management. Environment and Behavior, 39(4), 435–473. https://doi.org/10.1177/0013916505283421
2. Bernstad, A. (2014). Household food waste separation behavior and the importance of convenience. Waste Management, 34(7), 1317–1323. https://doi.org/10.1016/j.wasman.2014.03.013
3. Dolnicar, S., & Grün, B. (2009). Environmentally friendly behavior: Can heterogeneity among individuals and contexts/environments be harvested for improved sustainable management? Environment and Behavior, 41(5), 693–714. https://doi.org/10.1177/0013916508319448
4. Kormos, C., & Gifford, R. (2014). The validity of self-report measures of proenvironmental behavior: A meta-analytic review. Journal of Environmental Psychology, 40, 359–371. https://doi.org/10.1016/j.jenvp.2014.09.003
5. MacKinnon, J. G., & White, H. (1985). Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties. Journal of Econometrics, 29(3), 305–325. https://doi.org/10.1016/0304-4076(85)90158-7
6. Nguyen, A. T., Nguyen, N., Phung, P., & Yến-Khanh, N. (2023). Residents' waste management practices in a developing country: A social practice theory analysis. Environmental Challenges, 13, 100770. https://doi.org/10.1016/j.envc.2023.100770
7. Nilsson, A., Bergquist, M., & Schultz, W. P. (2017). Spillover effects in environmental behaviors, across time and context: A review and research agenda. Environmental Education Research, 23(4), 573-589. https://doi.org/10.1080/13504622.2016.1250148

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8. Phan, T. H. L. (2026). Hành vi phân loại rác của hộ nông thôn dưới khung lý thuyết "Khả năng – Cơ hội – Động lực" [Waste separation behavior of rural households under the capability–opportunity–motivation framework]. Can Tho University Journal of Science, 62(4), 80–91. https://doi.org/10.22144/ctujos.2026.150
9. Prime Minister of Vietnam. (2022). Decision No. 263/QD-TTg approving the National Target Programme on New Rural Development for 2021–2025. https://vanban.chinhphu.vn/?docid=205378&pageid=27160
10. Shove, E. (2010). Beyond the ABC: Climate change policy and theories of social change. Environment and Planning A, 42(6), 1273–1285. https://doi.org/10.1068/a42282
11. Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. Journal of Social Issues, 56(3), 407-424. https://doi.org/10.1111/0022-4537.00175
12. Vietnam Academy of Social Sciences. (2024). Vai trò của văn hóa cộng đồng trong xây dựng nông thôn mới ở vùng dân tộc thiểu số tỉnh Đắk Nông hiện nay [The role of community culture in New Rural Development in ethnic minority areas of Dak Nong] [Unpublished ministerial research project report, questionnaire and survey dataset]. Institute of Sociology. Phan Duc Nam, principal investigator.APPENDICES

Appendix A Full sample social coefficients

Table A1: Combined model social coefficients for all six communes

Characteristic	S b	95% HC3 CI	C b	95% HC3 CI	Gap b	95% HC3 CI
Female versus male representative	-3.3	-7.9 to 1.4	1.3	-5.1 to 7.7	4.6	-1.8 to 10.9
Representative age 60 or above versus below 60	1.9	-5.4 to 9.3	1.2	-8.6 to 11.0	-0.7	-10.5 to 9.0
Lower secondary versus primary or less	3.6	-3.4 to 10.5	1.9	-7.7 to 11.6	-1.6	-10.4 to 7.2
Upper secondary or higher versus primary or less	7.6	-0.2 to 15.5	7.0	-3.3 to 17.3	-0.6	-11.0 to 9.8
Average versus poor or near-poor self-rating	-0.2	-6.9 to 6.4	2.0	-7.8 to 11.8	2.2	-7.4 to 11.8
Better-off versus poor or near-poor self-rating	3.3	-6.4 to 12.9	4.8	-11.1 to 20.6	1.5	-13.5 to 16.5

Source: Author's analysis, n = 730. Coefficients are percentage points. All listed variables and commune indicators enter simultaneously. Gap = cleaning minus sorting. Model-conditional HC3 intervals do not correct village clustering and are not design-based population intervals. References: representative below 60, male representative, primary or less, poor/near-poor self-

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rating and Quang Khe. Rounded 0.0 does not imply an exact zero. Commune contrasts are reported in Appendix D. S = sorting; C = cleaning.

Appendix B Social coefficients without Nâm N'Jang

Table B1: Combined model social coefficients for the remaining five communes

Characteristic	S b	95% HC3 CI	C b	95% HC3 CI	Gap b	95% HC3 CI
Female versus male representative	-4.2	-9.8 to 1.4	1.0	-6.7 to 8.8	5.2	-2.4 to 12.9
Representative age 60 or above versus below 60	1.5	-6.6 to 9.6	0.5	-10.4 to 11.4	-1.0	-11.9 to 9.9
Lower secondary versus primary or less	2.1	-4.8 to 9.0	0.4	-9.6 to 10.3	-1.7	-11.0 to 7.5
Upper secondary or higher versus primary or less	7.4	-0.9 to 15.8	6.6	-4.5 to 17.7	-0.8	-12.3 to 10.6
Average versus poor or near-poor self-rating	-0.2	-7.2 to 6.8	2.3	-8.0 to 12.6	2.5	-7.6 to 12.6
Better-off versus poor or near-poor self-rating	3.1	-7.2 to 13.4	5.0	-12.1 to 22.0	1.9	-14.2 to 18.0

Source: Author's analysis, n = 609. Coefficients are percentage points. All listed variables and commune indicators enter simultaneously. Gap = cleaning minus sorting. Model-conditional HC3 intervals do not correct village clustering and are not design-based population intervals. References: representative below 60, male representative, primary or less, poor/near-poor self-rating and Quang Khe. Rounded 0.0 does not imply an exact zero. Commune contrasts are reported in Appendix D. S = sorting; C = cleaning.

Appendix C Model fit and complexity

Table C1: Ordinary and adjusted model fit

Sample and model	n	k	S R^2	Adj R^2	C R^2	Adj R^2	Gap R^2	Adj R^2
Full Social	730	6	0.086	0.079	0.059	0.051	0.017	0.009
Full Commune	730	5	0.550	0.547	0.310	0.306	0.106	0.100
Full Combined	730	11	0.554	0.547	0.313	0.303	0.109	0.096
Without Nâm N'Jang Social	609	6	0.013	0.003	0.025	0.015	0.014	0.004
Without Nâm N'Jang Commune	609	4	0.135	0.129	0.104	0.098	0.078	0.072

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Sample and model	n	k	S R^2	Adj R^2	C R^2	Adj R^2	Gap R^2	Adj R^2
Without Nâm N'Jang Combined	609	10	0.143	0.129	0.108	0.093	0.082	0.067

Source: Author's analysis. k = slope parameters, excluding intercept. Social = six social slopes; Commune = commune indicators only; Combined = both sets. Adjusted R^2 penalises parameter count; neither fit measure establishes causal importance or out-of-sample accuracy. Comparisons across restricted samples involve changed observations and outcome distributions. S = sorting; C = cleaning.

Appendix D Commune contrasts and model diagnostics

Table D1: Adjusted commune contrasts relative to Quang Khe

Sample and commune	S b	95% HC3 CI	C b	95% HC3 CI	Gap b	95% HC3 CI
Full Dak Som	4.0	-0.4 to 8.3	-22.6	-35.0 to -10.2	-26.6	-39.1 to -14.1
Full Nâm N'Jang	100.3	96.7 to 103.9	61.5	51.3 to 71.7	-38.8	-48.7 to -28.9
Full Truong Xuan	17.2	9.9 to 24.4	-10.5	-23.8 to 2.7	-27.7	-40.7 to -14.8
Full Dak R'La	30.0	21.5 to 38.4	21.8	9.1 to 34.5	-8.1	-21.7 to 5.4
Full Long Son	34.0	25.0 to 43.1	-0.8	-14.0 to 12.5	-34.8	-46.5 to -23.2
Restricted Dak Som	3.8	-0.6 to 8.2	-22.8	-35.2 to -10.3	-26.6	-39.2 to -13.9
Restricted Truong Xuan	18.2	10.6 to 25.8	-9.9	-23.6 to 3.8	-28.1	-41.5 to -14.7
Restricted Dak R'La	30.0	21.6 to 38.5	21.9	9.2 to 34.7	-8.1	-21.7 to 5.5
Restricted Long Son	34.0	24.9 to 43.1	-0.9	-14.3 to 12.4	-34.9	-46.7 to -23.1

Source: Combined models with all social covariates. Restricted = without Nâm N'Jang. Coefficients are percentage points and describe recorded site differences, not policy or ethnic effects. HC3 intervals do not correct village clustering. The reference commune has no selected sorting reports; reference-based contrasts should not be interpreted as differences in a verified behavioural propensity. S = sorting; C = cleaning.

Fitted-value diagnostic for full: sorting and cleaning combined models produce 168 and 26 fitted values outside [0, 1], respectively. This reinforces the interpretation of the equations as linear projections rather than individual probability forecasts.

Fitted-value diagnostic for the sample without Nâm N'Jang: sorting and cleaning combined models produce 105 and 0 fitted values outside [0, 1], respectively. This reinforces the interpretation of the equations as linear projections rather than individual probability forecasts.

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