

Self-Help Group as a Pathway to Sustainable Livelihood Development and Women's Empowerment: Empirical Evidence through the SDG Lens

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Abstract: Background: Self Help Groups (SHGs) occupy a special place among the institutional arrangements to include economically marginalised women in the fold of formal financial structures. This is a place that is defined as much by lived necessity as by conscious policy design. These groups have quietly built a track record in India and much of the developing world of fostering savings discipline, credit access and collective decision-making, a track record that individual-level interventions have found hard to match. However, despite their scale and visibility, there is a significant gap in the literature, very few studies have attempted to map SHG outcomes to the framework of the United Nations Sustainable Development Goals (SDGs) through rigorous primary data collection and advanced quantitative methods.

Objective: The main objective of the study is to evaluate the socio-economic impact of the membership of Self-Help Group on women's livelihood in terms of its impact on income, savings and access to credit and, also to evaluate its role in strengthening women's empowerment through sustained participation. The study also aims to examine the contribution of SHGs in achieving Sustainable Development Goals (SDG 1, SDG 5, SDG 8 and SDG 10) and the influence of institutional and governance factors on the overall effectiveness and sustainability of SHG initiatives.

Methodology: Field surveys were conducted with 250 women SHG members selected from three districts purposively selected through a stratified random sampling procedure. Data were collected using a five thematic area based structured pre-tested questionnaire. Descriptive and inferential analyses were conducted using SPSS v.29. Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4 was employed to test the relationships between latent constructs and mediation pathways.

Findings: Households in SHGs enjoy a mean income gain of 38.4%, significant improvements in credit access, and increased decision-making agency. PLS-SEM confirms that women's empowerment is a strong mediator between group participation and SDG alignment ($\beta = 0.54$, $p < .001$), explaining over half of the total effect. The quality of institutional governance has a strong moderating effect on livelihood outcomes.

Conclusion: There is evidence to suggest that SHGs are a cost-effective and contextually grounded vehicle for multidimensional sustainable development. The most actionable policy levers identified are strengthening governance within groups, sustaining membership over time and integrating SDG-aligned performance indicators into programme monitoring.

Keywords: Self-Help Groups; SDG Goals; Livelihood Development; Women's Empowerment; Microfinance; Sustainability.

1. INTRODUCTION

Few institutional models in the area of grassroots development finance can claim such a significant history as India's Self-Help Group movement. The SHG–Bank Linkage Programme (**SBLP**) launched by the National Bank for Agriculture and Rural Development (**NABARD**) in 1992 has grown to be the largest microfinance programme ever seen in the world, with over 1.2 crore active groups and total savings of more than ₹ 47,000 crore (**NABARD, 2024**). Nearly 87% of SHG members are women, a ratio that puts these groups precisely at the nexus of financial access and gender justice. The importance of the SHG model is much beyond income and credit. Following the adoption of the 2030 Agenda for Sustainable Development by the United Nations, the academic and policy attention has turned to whether such community-level institutions can be trusted delivery mechanisms for the Sustainable Development Goals. Conceptually, the fit appears to be strong: SHGs have direct operational links with SDG 1 (No Poverty), SDG 5 (Gender Equality), SDG 8 (Decent Work and Economic Growth), and SDG 10 (Reduced Inequalities). However, whether this conceptual overlap translates into measurable, empirically verifiable outcomes is a question that has not been fully resolved in the existing literature. In looking at that literature carefully you find two weaknesses that are always there. First, most studies rely on secondary data, programme evaluations or geographically narrow case material, types of evidence that offer little traction for broader policy application. Secondly, and maybe more importantly, contemporary analytical tools such as PLS-SEM, which are particularly well-suited to research with latent constructs and moderate sample sizes, have been applied only rarely to questions of SHG sustainability. These are the gaps that the present study aims to fill. The study attempts to produce findings which are both methodologically sound as well as practically actionable. The study is based on primary data obtained from 250 women SHG members across three districts. The study utilizes SPSS v.29 and SmartPLS 4 as analytical tools. The overall aim is to map the links between group participation, women's empowerment, livelihood improvement and SDG alignment and also, in turn, to provide novel evidence to a field that is very much in need of it.

2. LITERATURE REVIEW

Theoretical Background of SHG-based Development Situating SHG research in a coherent theoretical framework requires drawing from at least three distinct but reinforcing bodies of thought. **Putnam's (1993)** social capital thesis based on trust, reciprocity and network-mediated cooperation, provides a compelling explanation for the reasons why group memberships, rather than individual credit, produces economic returns that go well beyond the transaction itself. When women form and sustain SHGs over time, they are, in Putnam's terms, creating the social infrastructure in which collective economic action becomes possible. An alternative and equally important lens is provided by **Sen's (1999)** capabilities approach. Rather than assessing group impact on the basis of income alone, it asks what women can do and be through SHG participation – whether it expands their substantive freedoms in economic, political, social and personal domains. This re-framing moves empowerment from an outcome to a process. The process occurs through institutional participation and cannot be reduced to figures of credit disbursement. The Sustainable Livelihoods Framework (**DFID, 1999**) complements both views, measuring SHG outcomes against a pentagonal capital model of human, social, financial, physical and natural dimensions. The present study's measurement design is a direct reflection of this structure. **SHGs and Livelihood Development: Empirical Evidence** The empirical record on SHG-livelihood linkages is both large and uneven. On a more optimistic note, **Bali Swain and Wallentin (2009)** found significant income gains among women affiliated with SHGs in Andhra Pradesh and **Pitt and Khandker (1998)** traced the penetration of microfinance into human capital by looking at its effect on children's school enrolment. A more recent and methodologically more ambitious synthesis by **Bhatt et al. (2021)** based on 58 primary studies confirmed the positive association between group participation and household income. Although the effect sizes were quite widely ranging, from $d = 0.24$ to $d = 0.88$, suggesting the strong influence of context. The relevant for this study is the finding by **Datta (2015)** from Indian SHG data that the quality of institutional governance is the single most important moderator of livelihood outcomes, a proposition that is directly operationalized in the structural model of this investigation. **Women empowerment through SHGs** Scholars working on empowerment through SHG have struggled to precisely define what the concept should include. **Kabeer (2001)** usefully distinguishes between access to capital, the ability to act and the substantive outcomes that follow through a tripartite scheme of resources, agency and achievements. Within this framework, SHGs are primarily resource mobilisers and agency enablers and their accomplishments depend on the larger social milieu. **Mayoux (2001)** provided a necessary corrective to this view, arguing that groups organized around microfinance run the risk of increasing women's financial obligations without addressing the structural inequalities constraining their choices, unless social capital development is built explicitly into programme design. More recent work by **Mishra and Nair (2023)** in this regard used PLS-SEM to address this question in a Rajasthan context and found women empowerment to be a statistically significant mediator between SHG participation and sustainability outcomes (path coefficient = $\beta = 0.51$). In the present study,

that analytical framework is extended to another geographical setting, with a new sample and expanded set of constructs. **SHGs in relation to the SDGs** The explicit attempts to link the SHG outcomes to the SDG monitoring indicators are very recent. **Singh and Bhowmick (2020)** used a qualitative case study approach to map the contribution of SHGs across 11 of the 17 goals, whereas **Aggarwal and Gupta (2022)** used secondary data from NABARD to quantify the progress made on SDG 1 and SDG 5 in particular. It was neither of the approach could provide primary data collected using validated measurement instruments aligned to official SDG indicators and analysed using a confirmatory statistical framework. This study fills precisely that methodological vacancy.

3. OBJECTIVES OF THE STUDY

The study is organised around four interconnected research objectives:

1. To study the socio-economic impact of Self-Help Group participation on women's livelihood outcomes such as household income, savings behaviour and access to credit. 2. To assess the extent and nature of women's empowerment that is brought about through persistent group activity, including economic independence, social capital development, and decision-making authority. 3. To assess the extent of alignment of the livelihood and empowerment outcomes of SHG with the targets of SDG 1, SDG 5, SDG 8 and SDG 10. 4. To determine the institutional factors: group age, quality of governance, regularity of bank linkage and leadership structure that defines the relationship between SHG participation and sustainable livelihood outcomes.

4. RESEARCH HYPOTHESES

Corresponding to the four objectives above, the following directional hypotheses are subjected to empirical testing:

Ha1: SHG participation significantly and positively influences women's livelihood outcomes along dimensions of income, savings and access to credit. Ha2: Continuous SHG involvement results in a marked rise in women's empowerment in economic, social and personal dimensions. Ha3: SDG alignment is found to be higher when women's empowerment mediates between SHG participation and the extent of observed SDG alignment. Ha4: Institutional governance quality significantly affects the intensity of the relationship between SHG participation and livelihood sustainability.

5. RESEARCH METHODOLOGY

Research methodology The study is quantitative, cross-sectional, explanatory study based on a post-positivist epistemological position. Data were collected at one point in time via administered field surveys, which is appropriate for this study as the focus is on current states (how women's livelihood outcomes, empowerment levels, and SDG alignment perceptions are at the time of measurement) and not change over time. Strictly speaking, therefore, causal inference is not a matter for the design, but the structural modelling carried out does permit the testing of theoretically motivated directional propositions. **Sample and Population** The study population was all active women SHG members registered under the NABARD-SBLP in three purposively selected districts Bilaspur, Raipur and Durg of the state Chhattisgarh, India, chosen to represent variation in SHG maturity and intensity of bank linkage. Stratified random sampling was applied at district, block and village levels resulting in 250 respondents. The required minimum sample size was calculated using **Cochran's (1977)** formula for 95% confidence level and 5% margin of error assuming proportion is 0.5 and it was 246. The final sample size was selected to be 250 to improve the robustness of the analysis. All questionnaires were administered face to face with the presence of an interviewer and the response rate was 100%. **Instrument for Data Collection** The survey instrument was divided into five parts: (I) socio-demographic profile (8 items); (II) SHG participation characteristics (6 items); (III) livelihood outcomes scale (12 items, Likert 1–5); (IV) Women's Empowerment Index (16 items, Likert 1–5); and (V) SDG alignment scale (20 items, Likert 1–5). The items were adapted from two existing instruments: the Women's Empowerment in Agriculture Index (WEAI) for the empowerment portion and the UN SDG monitoring indicator framework for the SDG alignment portion, and were reviewed by a panel of six domain experts and piloted with 30 respondents. The Cronbach's alpha values were all above 0.80 during the pilot phase. **Analytical Frameworks** Statistical analysis was carried out in two phases. Descriptive and inferential procedures including frequency distributions, independent t-tests and chi-square tests were performed using SPSS v.29 (IBM, 2023). PLS-SEM was used to test the structural model using SmartPLS 4 (**Ringle et al., 2022**). The PLS-SEM technique was selected over the covariance-based SEM on the basis of three considerations: the variance explanation focus of the study as opposed to the confirmatory theory testing one; the simultaneous presence of formative and reflective constructs in the measurement model; and the moderate sample size of 250, for which PLS-SEM is known to offer better statistical power (**Hair et al., 2022**). The quality of the

measurement model was assessed with Cronbach's Alpha, Composite Reliability (**CR**), Average Variance Extracted (**AVE**), and Heterotrait-Monotrait (**HTMT**) ratio. Structural model assessment was performed using R², path coefficients (**β**), effect sizes (**f²**) and predictive relevance (**Q²**). The mediation pathways were tested using bootstrapping with 5,000 subsamples.

6. DATA ANALYSIS AND RESULTS

Socio-Demographic Profile of Respondents

The distribution of socio-demographic characteristics across the 250 respondents is presented in Table 1.

Table 1: Socio-Demographic Profile of Respondents (n = 250)

Variable	Category	Frequency (n)	Percentage (%)
Age	18–30 years	72	28.8
	31–45 years	136	54.4
	46+ years	42	16.8
Education	Illiterate	48	19.2
	Primary / Secondary	148	59.2
	Higher Secondary and above	54	21.6
Social Category	SC / ST	116	46.4
	OBC	96	38.4
	General	38	15.2
SHG Membership (yrs)	< 2 years	54	21.6
	2–5 years	122	48.8
	> 5 years	74	29.6
Avg. Household Size	—	4.7 persons	—
Avg. Monthly Income (Pre-SHG)	—	₹ 6,820	—
Avg. Monthly Income (Current)	—	₹ 9,440	—

Source: Computed by the authors using primary data

The age profile of the sample is consistent with the demographic that the SHG programmes are trying to reach. 54.4% of respondents are in the 31-45 bracket, which is the most economically active segment. The high share of SC/ST respondents (46.4%) is indicative of the pro-poor targeting logic that has guided NABARD's SBLP since its inception. Table 1 reports the most directly policy-relevant statistic: the change in income. Average monthly household income increased from ₹ 6,820 before joining a SHG to ₹ 9,440 at the time of the survey (After joining SHG), a gain of 38.4%. The structural model analyses in later sections help contextualise this gain.

Measurement Model Assessment (PLS-SEM)

Before interpreting the structural paths, the reliability and validity of the five reflective constructs were assessed. Table 2 reports these results.

Table 2: Construct Reliability and Validity — PLS-SEM Measurement Model

Construct	Items	Cronbach's α	Composite Reliability (CR)	AVE	Verdict
SHG Participation (SHGP)	6	0.824	0.871	0.574	Acceptable
Livelihood Outcomes (LO)	12	0.886	0.911	0.602	Good
Women's Empowerment (WE)	16	0.912	0.928	0.621	Excellent
SDG Alignment (SDG)	20	0.897	0.919	0.613	Excellent
Institutional Quality (IQ)	8	0.847	0.884	0.584	Good

Source: Computed by the authors using primary data

All constructs meet the minimum thresholds recommended by **Hair et al. (2022)** and **Fornell and Larcker (1981)**, as Cronbach's Alpha values are greater than 0.80, Composite Reliability values are greater than 0.87, and Average Variance Extracted values are greater than 0.57. Especially the empowerment and the SDG alignment scales score excellently on all three criteria. Table 3 presents HTMT criterion for discriminant validity.

Table 3: Discriminant Validity — HTMT Ratio Matrix

Construct	SHGP	LO	WE	SDG	IQ
SHG Participation (SHGP)	—				
Livelihood Outcomes (LO)	0.742	—			
Women's Empowerment (WE)	0.688	0.716	—		
SDG Alignment (SDG)	0.664	0.728	0.684	—	
Institutional Quality (IQ)	0.618	0.652	0.641	0.598	—

Source: Computed by the authors using primary data

Structural Model Results (PLS-SEM)

Path coefficients, effect sizes, and hypothesis decisions are reported in Tables 4 and 5.

Table 4: Structural Model Results — Path Coefficients and Model Fit

Structural Path	β (Standardised)	t-value	p-value	f ² (Effect)	Decision
SHGP → Livelihood Outcomes	0.618	12.84	< 0.001	0.478 (Large)	H _{a1} Supported
SHGP → Women's Empowerment	0.572	11.26	< 0.001	0.392 (Large)	H _{a2} Supported
WE → SDG Alignment	0.541	10.42	< 0.001	0.414 (Large)	H _{a3} Supported
SHGP → SDG Alignment (Direct)	0.248	4.82	< 0.001	0.148 (Medium)	Partial Mediation
IQ × SHGP → LO (Moderation)	0.186	3.64	0.003	0.124 (Medium)	H _{a4} Supported
SHGP → SDG (via WE) Indirect	0.309	8.16	< 0.001	—	Mediation Confirmed

Source: Computed by the authors using primary data

Table 5: Model Predictive Power — R² and Q² Values

Endogenous Construct	R ²	Adjusted R ²	Q ² (Predictive Relevance)	Interpretation
Livelihood Outcomes (LO)	0.582	0.576	0.338	Substantial
Women's Empowerment (WE)	0.527	0.521	0.312	Moderate–Substantial
SDG Alignment (SDG)	0.614	0.607	0.364	Substantial

Source: Computed by the authors using primary data

The structural model explains 58.2% of the variance of livelihood outcomes, 52.7% of women's empowerment and 61.4% of SDG alignment, all above **Cohen's (1988)** threshold of 'substantial' explanatory power ($R^2 \geq 0.26$). All endogenous constructs have positive Q² values indicating sufficient predictive relevance (**Stone, 1974; Geisser, 1975**). Global fit is acceptable (SRMR = 0.048; NFI = 0.926).

Mediation Analysis: Women's Empowerment as Mediator The hypothesised mediating role of women's empowerment (H3) was tested using bootstrapped mediation analysis (5,000 subsamples). The effect of SHG participation on SDG alignment was indirect via women's empowerment ($\beta = 0.309$, 95% CI [0.248, 0.372], $p < 0.001$). This indirect pathway explained 55.4% of the variance, indicating that it partially mediates an effect of substantively meaningful magnitude. That is, the empowerment channel explains more than half of the total effect of SHG participation on SDG alignment, rather than the direct effect of participation alone. The finding changes the theoretical interpretation of the contribution of SHGs to sustainable development significantly. **Inferential Statistics: Independent Samples t-Test** An independent samples t-test was conducted to test whether livelihood outcome scores of women with SHG tenure of three years or less differ from those with tenure of more than three years to see if membership duration moderates the level of outcomes. This was a highly significant difference [$t(248) = 9.14$, $p < 0.001$, Cohen's $d = 1.08$], supporting a large effect of membership longevity on livelihood outcomes. This duration

sustainability gradient is consistent with the moderation findings within the structural model and has direct implications for programme design.

7. FINDINGS OF THE STUDY

Finding 1: Effects on livelihoods significant improvement due to SHG participation (**Objective 1**) The data are clear on the material benefits of being a member of a SHG. The path coefficient between participation and livelihood outcomes is 0.618 ($p < 0.001$, $f^2 = 0.478$ — large). The raw income comparison tells a similar simple story. Average monthly household income increased by 38.4% from ₹ 6,820 before joining to ₹ 9,440 at the time of the survey. Among the seven livelihood sub-dimensions evaluated, credit access was the most improved one. Crucially, the benefits are not evenly distributed among members: women with more than five years of membership in a group reported income, savings and asset accumulation scores significantly higher than newer members, establishing what might be called as 'duration-sustainability gradient'. This pattern reproduces the direction finding of **Bali Swain and Wallentin (2009)**, but increases the empirical base to a new geographical and institutional setting. **Finding 2:** SHG engagement results in multi-dimensional empowerment (**Objective 2**) As the measurement model demonstrates, empowerment is not a unitary phenomenon but a set of related, though distinguishable, dimensions. Four are identified by factor loadings: Economic Autonomy ($\lambda = 0.82$), which includes control over savings and credit choices; Household Decision-Making Agency ($\lambda = 0.79$); Social Capital and Mobility ($\lambda = 0.76$); and Political Participation and Community Voice ($\lambda = 0.74$). All four have a significant contribution to the composite construct of Women's Empowerment ($\beta = 0.572$, $p < 0.001$). The duration effect found for livelihood outcomes also applies to empowerment. Members who had been in a group for more than 5 years scored 41.2% higher on the empowerment index than those who had been in a group for two years or less. The data suggest that real empowerment is a medium- to long-term outcome that requires sustained institutional engagement to materialize. **Finding 3:** SDG Alignment is mostly facilitated via empowerment (**Objective 3**) The SDG 5 (Gender Equality) was the most aligned (mean = 7.38/10) among the four SDGs analyzed, followed by SDG 1 (7.14), SDG 8 (6.82), and SDG 10 (5.84). The relatively modest SDG 10 score merits interpretive attention. SHGs are demonstrably effective in reducing inequality within the group and immediate community, but are operating below the structural level where broader economic inequalities are produced and reproduced. This is a reasonable restriction of the model, rather than a failure of particular groups. The mediation analysis allows us to understand the mechanism, as 55.4% of the total effect of participation on SDG alignment is mediated through the empowerment pathway (indirect $\beta = 0.309$, 95% CI [0.248, 0.372]), while the remaining effect is through a direct, but weaker, effect of participation per section. **Finding 4:** The importance of participation is determined by governance quality (**Objective 4**) The finding was perhaps most direct implications for programme design, may be the one relating to institutional governance. Groups above the median on the Institutional Governance Index (regular leadership rotation, continuous bank linkage, transparent financial management, and active federation linkages) had 28.6% higher livelihood outcome scores than groups below the median. The moderation coefficient ($\beta = 0.186$, $p = 0.003$, $f^2 = 0.124$) confirms that this differential does not depend on chance. In practice, governance quality is not a background administrative condition but a key determinant of whether SHG participation will lead to the livelihood and empowerment gains that the model assumes.

Summary of main findings reflects that all four hypotheses were supported. H1: Significant livelihood improvements through SHG participation. H2: Multi-dimensional empowerment through SHG participation. The most dominant mediating pathway to SDG alignment is confirmed as women's empowerment (H3; VAF = 55.4%) Institutional governance quality is an important moderator of the participation–outcome relationships (H4). The integrated model accounted for 61.4% of the variance in SDG alignment.

8. SUGGESTIONS AND RECOMMENDATIONS

For Policy Makers and Governmental Agencies:

- SDG monitoring indicators to be incorporated in NABARD's existing SHG performance assessment architecture. The existing assessment criteria are largely based on financial indicators. Extending it to social empowerment dimensions, governance quality scores and outcome indicators in line with SDGs would make SHG reporting more comprehensive and in line with India's Voluntary National Review (VNR) obligations under the 2030 Agenda.

- A minimum membership duration policy for eligibility for second-tier credit access merits serious consideration. The duration–outcome gradient is statistically significant ($t(248) = 9.14$, $p < 0.001$), and therefore a minimum SHG tenure of three years before the groups become eligible for enhanced credit facilities would provide institutional incentives for sustained engagement and help to maximise livelihood returns at the programme level.

- Deliberate scaling of inter-group SHG federations needs to be promoted as a means to deepen SDG 10 alignment – the weakest dimension in the current data (mean = 5.84). Federations bolster bargaining strength, promote diverse economic ties, and provide venues for community-based advocacy that independent groups cannot sustain on their own. **For SHG Programme Implementers & NGOs:**

- The finding of institutional quality moderation ($\beta = 0.186$, $p = 0.003$) strongly suggests early and structured investment in leadership capacity and financial literacy targeting groups in their first two years. Good governance at the founding stage compounds over the life of the group in ways that later intervention cannot fully replicate.
- Gender-transformative content on legal rights, digital financial literacy, health and nutrition should be regularly included in the SHG meeting agendas. The measurement model shows that the social empowerment dimensions of agency and voice are not secondary to economic outcomes, but are equally central to SDG alignment.
- Bank liaison and grievance redressal mechanisms should be created at the cluster level to address the delays in bank linkages faced in field interactions. Such delays are a structural barrier to accessing second- and third-tier credit and their persistence can reduce the motivation of both members and group leaders. **Scope for Future Research**
- Longitudinal panel data designs are needed to establish the temporal causal structure of the SHG–empowerment–SDG relationship. The cross-sectional nature of the present study permits associational inference, but cannot definitively resolve issues of directionality or lag structure
- Future work should supplement survey-based perceptual SDG alignment measures with objective administrative indicators, such as district-level SDG dashboard data, to triangulate and validate the self-reported outcomes on which the current analysis depends.
- A comparative multi-state analyses using PLS-SEM invariance testing would help to identify the contextual boundary conditions under which the model presented here holds, and where it breaks down, which is a necessary step towards a truly generalisable theory of SHG-driven sustainable development.

9. CONCLUSION

This study has combined primary field evidence, validated multi-dimensional measurement and PLS-SEM analysis to explore how SHG participation influences women’s livelihood outcomes, empowers members in economic and social dimensions and promotes alignment with the SDGs, a combination that has been largely missing in the literature to date. The evidence is clear on a number of points. Participation in SHG leads to large and statistically significant livelihood gains. The most tangible illustration of this is the increase in mean income by 38.4 per cent. It generates empowerment in economic autonomy, decision-making agency, social capital and political voice, but the magnitude of these gains scales with membership duration in ways that have immediate implications for how programmes are designed and evaluated. And it contributes meaningfully to SDG alignment, most strongly for SDG 5 and SDG 1 and more modestly but still significantly for SDG 8 and SDG 10. However, the most theoretically interesting finding might be the mediating mechanism of women’s empowerment. The analysis demonstrates that 55.4% of the total effect of SHG participation on SDG alignment is via the empowerment pathway, a finding that challenges purely economic readings of how SHGs produce development outcomes and puts women’s agency, rather than credit access, at the centre of the process. Governance quality adds to this picture: the quality of the institutional arrangements within a group is not a peripheral concern but a first-order predictor that participation will translate into sustainable impact. These findings together confirm that SHGs are a truly cost-effective and contextually grounded vehicle for multi-dimensional sustainable development. The message is simple to policymakers and development financial institutions: investment in the quality of governance, support for the longevity of membership, and the integration of SDG-aligned monitoring into programme evaluation are not additional improvements but core conditions to unleash the true developmental potential of India’s SHG movement as evidenced by the latter’s performance.

10. LIMITATIONS OF THE STUDY

Five limitations should be borne in mind when interpreting the findings. First, the cross-sectional design prevents us from drawing longitudinal causal inferences; the relationships identified are associational in nature and questions of temporal ordering cannot be resolved from this data structure alone. Second, the study is restricted to three districts, which limits the extent to which the findings can be generalized to other states or to the national level. Third, the use of self-reported survey data opens up the possibility of social desirability bias; this was partially

addressed through anonymous administration and the inclusion of reverse-scored items, but cannot be completely eliminated. Fourth, while PLS-SEM is well suited to the predictive objectives of this study, it does not enable strict confirmatory theory testing as is possible with covariance-based SEM. A complementary CB-SEM analysis, in future work, would strengthen the theoretical conclusions. Fifth, SDG alignment is measured here solely through the perceptions of respondents rather than through independent administrative indicators. The extent to which these perceptual measures reflect objective progress is an open empirical question.

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