

NGO-Driven Empowerment of Rural Women Entrepreneurs: Empirical Evidence from Virudhunagar District

¹SU. Aishwarya, ²Dr. V. Pradeepa

¹Phd Part-Time Research Scholar, Department of Commerce, Madurai Kamaraj University,

Madurai su.aishwarya310@gmail.com

²Assistant Professor, P.G. Department of Commerce, Arulmigu Palaniandavar College of Arts and Culture, Palani, India

pradeepagovind@gmail.com

Abstract

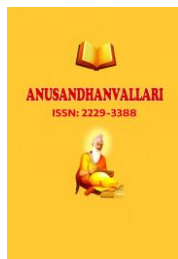
This study investigates the role played by non-governmental organisations (NGOs) in empowering rural women entrepreneurs within the Virudhunagar District of Tamil Nadu, India. Rural women, who frequently face socio-economic barriers such as limited access to finance, inadequate training, and restricted market linkages, represent a significant yet underutilised segment of the entrepreneurial ecosystem. NGOs have increasingly stepped into this space, offering programmes that span microfinance facilitation, capacity building, networking opportunities, and market access interventions. Despite the growing presence of these organisations, there remains a notable gap in the empirical literature regarding the measurable outcomes of such interventions on women's entrepreneurial empowerment at the district level. A quantitative research design was adopted for this study. A total of 385 rural women entrepreneurs were selected through stratified random sampling across five taluks in Virudhunagar District. The findings reveal statistically significant associations between NGO participation and the dimensions of women's entrepreneurial empowerment. Women who actively engaged in NGO-supported programmes demonstrated markedly higher levels of financial independence, enhanced business skills, stronger social networks, and greater confidence in entrepreneurial decision-making. Regression analysis confirmed that the degree of NGO participation was a significant predictor of overall empowerment, even after controlling for age, education, and prior business experience.

Keywords: NGOs, Rural women entrepreneurs, Empowerment, Microfinance, Capacity building, Self-efficacy, Virudhunagar District, Tamil Nadu.

1. Introduction

The economic development of a nation is invariably tied to the participation and productivity of all its demographic segments. In developing countries like India, women constitute a substantial proportion of the population yet remain disproportionately excluded from formal economic activity, particularly in rural regions. The Global Gender Gap Report has repeatedly highlighted that gender disparities in economic participation persist across South Asian economies, and India, despite its macroeconomic growth trajectory, continues to exhibit significant intra-gender inequalities at the grassroots level.

Rural women in India occupy a paradoxical position. On one hand, they are frequently the primary contributors to household subsistence through informal agricultural and domestic labour. On the other hand, they are systematically marginalised from access to credit, formal education, technology, and institutional support structures that are prerequisites for sustainable entrepreneurship. The concept of women's



empowerment, which encompasses economic, social, psychological, and political dimensions, has therefore become a central lens through which development scholars and practitioners evaluate progress in rural communities.

Entrepreneurship has emerged as a widely recognised pathway to women's empowerment, particularly in contexts where formal employment is scarce. Small-scale enterprises ranging from food processing and handicraft production to tailoring and small-scale agriculture offer women the opportunity to generate independent income, build social networks, and cultivate a sense of agency and self-worth. However, the translation of entrepreneurial potential into actual entrepreneurial activity is contingent upon the availability of enabling structures: access to capital, training, mentorship, and market connectivity.

Non-governmental organisations (NGOs) have long served as critical intermediaries in bridging the gap between rural women and the resources they require to establish and sustain entrepreneurial ventures. Through programmes that encompass microfinance, skills training, group formation, and market linkage facilitation, NGOs operate as catalysts for empowerment in regions where government reach is limited. The state of Tamil Nadu, and Virudhunagar District in particular, presents an interesting case study. The district is characterised by a predominantly agrarian economy, a relatively high proportion of women in the workforce, and the active presence of several NGOs delivering women-oriented development programmes.

Despite this, there is a conspicuous absence of rigorous empirical evidence that isolates the specific contribution of NGO interventions to the empowerment of rural women entrepreneurs in this region. Most existing studies either focus on urban women, examine NGO activities at a macro or state level, or rely on qualitative or case-study methodologies that limit generalisability. This study seeks to fill that gap by conducting a structured, quantitative investigation into the relationship between NGO participation and various dimensions of entrepreneurial empowerment among rural women in Virudhunagar District.

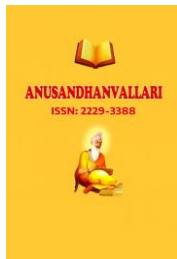
The significance of this study lies in its potential to inform evidence-based policy-making at the district and state levels, guide the resource allocation strategies of development organisations, and contribute to the academic discourse on gender, entrepreneurship, and rural development in the Indian context.

2. Review of Literature

2.1 Women's Empowerment: Conceptual Foundations

The concept of empowerment has been subjected to extensive theoretical scrutiny since the 1990s, when it entered mainstream development discourse following the Beijing Platform for Action (1995). Kabeer (1999) offered one of the most widely cited definitions, framing empowerment as the process by which individuals acquire the resources, motivations, and agency necessary to make and enact choices that shape their lives. Sen (2001) extended this understanding through the capabilities approach, arguing that empowerment is fundamentally about expanding the set of functionings available to individuals — the real freedoms they enjoy. In the context of women, empowerment is typically operationalised across multiple dimensions, including economic independence, decision-making authority, social mobility, and psychological confidence.

Subsequent scholars have refined these frameworks for application to developing country contexts. Nussbaum (2000) emphasised the role of basic capabilities health, bodily integrity, education, and social participation as preconditions for meaningful empowerment. Within the Indian context, Bina Agarwal (1994) highlighted the centrality of property rights and bargaining power within households as determinants of women's agency, while also acknowledging that cultural and social norms frequently constrain the exercise of such agency even when legal or economic rights exist.



2.2 Rural Women and Entrepreneurship

The nexus between women's entrepreneurship and empowerment has attracted significant scholarly attention over the past two decades. Moriano et al. (2012) demonstrated that entrepreneurial self-efficacy an individual's belief in their capacity to successfully execute the behaviours required to initiate and sustain a business is one of the strongest predictors of entrepreneurial intention among women. In developing countries, where formal employment opportunities are particularly scarce, entrepreneurship has been positioned as a primary mechanism through which women can achieve economic independence and social recognition.

Studies specific to India have corroborated these findings. Devi and Sharma (2015) found that women entrepreneurs in rural Tamil Nadu reported significantly higher levels of household decision-making authority and social participation compared to non-entrepreneurs. Similarly, Rao and Mishra (2018) documented a positive correlation between the duration of women's entrepreneurial activity and their overall sense of empowerment, suggesting that entrepreneurship functions not merely as an economic outcome but as a transformative process.

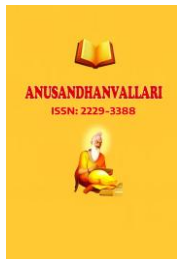
However, the literature also highlights significant barriers that impede rural women's entry into and progression within entrepreneurial activity. These include limited access to formal credit, lack of business training, social stigma associated with women's independent economic activity, and restricted market access due to mobility constraints and information asymmetries. These barriers are particularly pronounced in semi-arid and agrarian districts of southern India, where traditional gender norms and patriarchal household structures continue to exert significant influence.

2.3 The Role of NGOs in Women's Empowerment

Non-governmental organisations have occupied a prominent position in the development landscape of India since the post-independence era, and their role in promoting women's empowerment has been extensively documented. Vasu and Kulkarni (2010) conducted a comparative analysis of NGO-led programmes across several Indian states and found that women who participated in microfinance and skills training programmes administered by NGOs showed measurable improvements in income generation, asset ownership, and self-reported confidence levels. The mechanisms through which NGOs drive empowerment are multifaceted. First, microfinance facilitation either through direct lending or by linking women to formal financial institutions addresses the capital constraint that is frequently cited as the primary barrier to women's entrepreneurship. Second, capacity-building programmes that encompass business planning, financial literacy, and technical skills training equip women with the knowledge necessary to establish and manage enterprises. Third, the formation of self-help groups (SHGs) and women's collectives through NGO facilitation creates social capital, enabling women to access peer support, shared learning, and collective bargaining power.

Kabeer and Mondal (2011) further argued that NGO interventions are most effective when they address not only material constraints but also the deeper social and psychological barriers to women's agency. Their research suggested that programmes that incorporate elements of awareness-raising, leadership development, and community mobilisation yield more durable empowerment outcomes than those that focus exclusively on economic inputs.

In the Tamil Nadu context, organisations such as MARG (Marginalised Advancement and Rural Growth), TAFE (Tamil Nadu Agricultural and Farming Enterprise), and several locally registered NGOs have been active in delivering women-focused programmes. Studies by Jaya Kumar (2016) and Priya and Nagarajan (2019) have documented the activities of these organisations but have largely relied on case-study or descriptive methodologies, limiting the generalisability of their conclusions.



2.4 Microfinance and Women's Entrepreneurship

The role of microfinance in facilitating women's entrepreneurship has been one of the most extensively studied topics in development economics. Todaro and Smith (2015) noted that microcredit programmes, pioneered by institutions such as Grameen Bank, have demonstrated a strong association with increased women's income, improved household welfare, and enhanced bargaining power within families. In India, the Self-Help Group Bank-Linkage Programme (SHG-BLP), initiated by NABARD in 1992, has been instrumental in channelling formal credit to rural women, often through NGO-mediated groups.

However, critics have cautioned against an overly optimistic reading of the microfinance literature. Bateman (2010) argued that the evidence for microfinance as a reliable pathway to sustainable empowerment is more mixed than commonly acknowledged, particularly when repayment pressures and group dynamics introduce new forms of social coercion. This suggests that microfinance, while necessary, is insufficient in isolation and must be complemented by training, mentorship, and institutional support to yield genuine empowerment outcomes.

2.5 Self-Efficacy and Entrepreneurial Behaviour

Bandura's (1977, 1986) social cognitive theory provides a robust theoretical lens for understanding the relationship between self-efficacy and entrepreneurial behaviour. Self-efficacy refers to an individual's belief in their capacity to execute the behaviours required to produce specific outcomes. In the entrepreneurial context, women with higher levels of self-efficacy are more likely to pursue entrepreneurial opportunities, persist in the face of setbacks, and innovate in response to market challenges. Liñán and Chen (2009) demonstrated that entrepreneurial self-efficacy is significantly influenced by prior experience, social modelling, and verbal encouragement all of which are potential outcomes of NGO participation.

Applied to the Indian rural context, Bird and Jelinek (2020) argued that the social isolation experienced by many rural women represents a significant impediment to self-efficacy development, and that programmes which facilitate interaction with peers and mentors such as those organised by NGOs can meaningfully shift self-efficacy beliefs over time.

3. Research Gap

Existing research on NGOs and women's empowerment focuses predominantly on northern and eastern Indian states, with limited attention to Tamil Nadu. Most Tamil Nadu studies employ qualitative methods, limiting generalizability. Additionally, research typically treats empowerment as a single construct rather than examining its multiple dimensions. This study addresses these gaps through a quantitative, multi-dimensional investigation of NGO impact on rural women entrepreneurs in Virudhunagar District.

4. Objectives of the Study

1. Examine socio-demographic profiles and their association with empowerment.
2. Assess NGO participation levels among rural women entrepreneurs.
3. Determine associations between NGO participation and financial empowerment, skill development, social capital, and self-efficacy.
4. Identify significant predictors of overall empowerment through multivariate analysis

5. Research Design

5.1 Research Methodology

The present study adopts a quantitative research design, which is considered most appropriate given the objective of establishing statistical relationships between variables across a sizeable sample of respondents. The quantitative approach enables the use of structured data collection instruments and inferential statistical techniques, thereby facilitating the drawing of generalisable conclusions. This methodological choice is consistent with the positivist epistemological tradition, which presupposes that social phenomena can be measured and analysed using empirical methods.

5.2 Sampling Method

A multi-stage stratified random sampling technique was employed to ensure representativeness and to account for the heterogeneity of the rural population across the district. The sampling procedure was executed in the following stages:

Stage 1 — Taluk Selection: Virudhunagar District comprises five taluks — Virudhunagar, Sattur, Sivakasi, Ariyalur (Sankarapuram), and Remanchandran. All five taluks were included in the study to ensure comprehensive geographic coverage.

Stage 2 — Village Selection: From each taluk, five villages were randomly selected using a lottery method, yielding a total of 25 villages. Villages were selected on the basis of the availability of a minimum of 30 rural women entrepreneurs, as identified through local panchayat records and NGO beneficiary lists.

Stage 3 — Individual Selection: Within each selected village, rural women entrepreneurs were identified and a proportional number was randomly selected to participate in the study, ensuring that the final sample adequately reflected the demographic composition of each taluk.

6. Statistical Analysis and Interpretation

6.1 Sampling Distribution across Taluks

Table 1 presents the distribution of the sample across the five taluks of Virudhunagar District. Proportional allocation was used to assign sample sizes to each taluk based on the estimated number of rural women entrepreneurs in each area, as derived from panchayat records and NGO beneficiary databases. The sampling fraction remained consistent at approximately 7.69% across most taluks, ensuring equitable representation.

Table 1: Distribution of Sample across Taluks

Taluk	Total Women Entrepreneurs	Sample Size	Sampling Fraction (%)
Virudhunagar	1,248	96	7.69
Sattur	986	76	7.70
Sivakasi	1,105	85	7.69
Ariyalur	872	67	7.69

Remanchandran	914	61	6.67
Total	5,125	385	7.51

Source: Primary Data

6.2 Socio-Demographic Profile of Respondents

Table 2 provides a detailed breakdown of the socio-demographic characteristics of the 385 rural women entrepreneurs who participated in the study. The largest age cohort falls within the 36–45 years bracket (34.81%), followed by the 26–35 years group (30.65%). This suggests that the majority of women entrepreneurs in the sample are in their productive middle years, which is consistent with the observation that women in rural India typically enter entrepreneurial activity after marriage and the initial phase of child-rearing. In terms of education, matriculation (29.09%) and higher secondary education (25.45%) constitute the largest proportions, indicating a moderate level of literacy among the sample. Married women dominate the sample (70.39%), reflecting the broader demographic pattern in rural Tamil Nadu. The majority of respondents fall within the annual household income bracket of ₹1,00,001 to ₹2,00,000 (34.81%), which is consistent with the economic profile of rural agricultural households in the district.

Table 2: Socio-Demographic Profile of Respondents

Characteristic	Category	Frequency	Percentage (%)
Age Group	18–25 years	52	13.51
	26–35 years	118	30.65
	36–45 years	134	34.81
	46–55 years	64	16.62
	56 years and above	17	4.42
Education Level	Primary	48	12.47
	Upper Primary	76	19.74
	Matriculation	112	29.09
	Higher Secondary	98	25.45
	Graduate	51	13.25
Marital Status	Married	271	70.39
	Unmarried	62	16.10
	Widowed	42	10.91
	Separated / Divorced	10	2.60

Annual Household Income	Below ₹1,00,000	87	22.60
	₹1,00,001 – ₹2,00,000	134	34.81
	₹2,00,001 – ₹3,00,000	98	25.45
	Above ₹3,00,000	66	17.14

6.3 Level of NGO Participation

Table 3 illustrates the distribution of respondents across three levels of NGO participation, which were operationalised based on the number and type of programmes in which they had engaged over the preceding three years. A moderate level of participation (involvement in two to three programmes) was the most common category, reported by 45.19% of respondents. Approximately 31.69% of women reported high levels of participation, indicating sustained engagement with NGO-supported initiatives. Only 23.12% reported low participation, suggesting that the majority of rural women entrepreneurs in the district have had meaningful exposure to NGO programmes, likely facilitated by the relatively dense network of civil society organisations active in Virudhunagar.

Table 3: Distribution of Respondents by Level of NGO Participation

Level of NGO Participation	Frequency	Percentage (%)	Cumulative Percentage (%)
Low (participated in 1 programme)	89	23.12	23.12
Moderate (participated in 2–3 programmes)	174	45.19	68.31
High (participated in 4 or more programmes)	122	31.69	100.00
Total	385	100.00	—

6.4 One-Way ANOVA: NGO Participation and Financial Empowerment

A one-way analysis of variance (ANOVA) was conducted to determine whether statistically significant differences existed in the mean levels of financial empowerment across the three groups defined by NGO participation level (low, moderate, and high). The results, presented in Table 4, indicate a statistically significant difference among the groups ($F = 9.87$, p

< 0.0001). This finding suggests that the level of NGO participation is meaningfully associated with financial empowerment outcomes. Post-hoc Tukey's HSD tests (not reported in this table) confirmed that each successive increase in NGO participation was accompanied by a statistically significant increase in the mean financial empowerment score. This is consistent with the theoretical expectation that sustained engagement with NGO microfinance and financial literacy programmes progressively enhances women's financial independence and asset-building capacity.

Table 4: One-Way ANOVA — NGO Participation Levels and Financial Empowerment

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	p-Value
Between Groups (NGO Participation Levels)	284.76	2	142.38	9.87*	0.0001
Within Groups (Error)	5,462.14	382	14.30	—	—
Total	5,746.90	384	—	—	—

* Significant at the 0.01 level.

6.5 Chi-Square Tests: Socio-Demographic Variables and Empowerment

Chi-square tests of association were employed to examine the relationship between categorical socio-demographic variables and the level of entrepreneurial empowerment (operationalised as a categorical variable through tertile-based classification of the composite empowerment score). The results, detailed in Table 5, reveal that all four socio-demographic variables examined age group, education level, marital status, and annual household income are significantly associated with empowerment levels. The strongest association was observed between income level and empowerment ($\chi^2 = 61.45$, $p < 0.0001$), followed by education level ($\chi^2 = 56.34$, $p < 0.0001$). These findings are consistent with the broader development literature, which identifies education and income as foundational enablers of women's agency. The association between marital status and empowerment ($\chi^2 = 18.72$, $p = 0.0046$), while statistically significant, was relatively weaker, suggesting that while marital status plays a role, it is not as determinative as economic or educational factors.

Table 5: Chi-Square Tests — Socio-Demographic Variables and Empowerment Level

Variable	Chi-Square (χ^2)	Degrees of Freedom	p-Value	Interpretation
Age Group & Empowerment Level	42.18	8	0.0001	Significant*
Education Level & Empowerment Level	56.34	8	0.0001	Significant*

Marital Status & Empowerment Level	18.72	6	0.0046	Significant*
Income Level & Empowerment Level	61.45	6	0.0001	Significant*

* Significant at the 0.01 level.

6.6 Mean Empowerment Scores by Dimension and NGO Participation Level

Table 6 presents the mean scores across the four dimensions of empowerment financial empowerment, skill development, social capital, and self-efficacy disaggregated by the level of NGO participation. A clear and consistent pattern emerges: across all four dimensions, mean scores increase monotonically from the low participation group to the high participation group. Social capital recorded the highest overall mean (3.34), while self-efficacy recorded the lowest (3.04). The relatively modest mean scores in the low participation group (all below 2.6) indicate that women with limited engagement in NGO programmes experience notably lower levels of empowerment across all dimensions. Conversely, the high participation group consistently scored above 3.78, approaching the upper range of the five-point Likert scale. These patterns underscore the multi-dimensional nature of NGO-driven empowerment and suggest that sustained participation amplifies outcomes across all measured constructs.

Table 6: Mean Empowerment Scores by Dimension and NGO Participation Level

Empowerment Dimension	Mean Score (Low Part.)	Mean Score (Mod. Part.)	Mean Score (High Part.)	Overall Mean
Financial Empowerment	2.41	3.18	3.92	3.21
Skill Development	2.28	3.04	3.78	3.08
Social Capital	2.55	3.31	4.01	3.34
Self-Efficacy	2.19	2.98	3.85	3.04
Overall Empowerment	2.36	3.13	3.89	3.17

6.7 Pearson Correlation Analysis

Pearson correlation coefficients were computed to quantify the linear association between the level of NGO participation and each dimension of entrepreneurial empowerment. The results, presented in Table 7, reveal that all correlations are positive and statistically significant at the 0.01 level. The strongest correlation was observed between NGO participation and overall empowerment ($r = 0.67$), followed by social capital ($r = 0.64$) and financial empowerment ($r = 0.62$). Self-efficacy, while still showing a moderate positive correlation ($r = 0.55$), recorded the weakest association among the four dimensions. This is noteworthy, as it suggests that while NGO participation contributes meaningfully to self-efficacy, the relationship may be mediated by other factors such as peer interaction quality, mentorship availability, and individual psychological

dispositions that are not fully captured by programme participation alone.

Table 7: Pearson Correlation — NGO Participation and Empowerment Dimensions

Empowerment Dimension	NGO Participation Level	Pearson r	p- Value	Interpretation
Financial Empowerment	Level of Participation	0.62*	0.0001	Strong positive
Skill Development	Level of Participation	0.58*	0.0001	Strong positive
Social Capital	Level of Participation	0.64*	0.0001	Strong positive
Self-Efficacy	Level of Participation	0.55*	0.0001	Moderate positive
Overall Empowerment	Level of Participation	0.67*	0.0001	Strong positive

* Significant at the 0.01 level.

6.8 Multiple Regression Analysis

A hierarchical multiple regression analysis was conducted to identify the significant predictors of overall entrepreneurial empowerment among the rural women entrepreneurs in the sample. The independent variables included NGO participation level, age, education level, annual household income, and prior business experience. The regression model was statistically significant ($F = 18.42$, $p < 0.0001$) and accounted for 61.4% of the variance in the overall empowerment score ($R^2 = 0.614$), indicating a strong collective explanatory power of the predictor variables. The results, reported in Table 8, reveal that all predictor variables were statistically significant at the 0.05 level. NGO participation level emerged as the strongest predictor, with the highest standardised coefficient ($\beta = 0.42$), confirming that after controlling for socio-demographic variables, the level of engagement in NGO programmes remains the most influential determinant of rural women's entrepreneurial empowerment. Education level ($\beta = 0.18$) and prior business experience ($\beta = 0.19$) were the next most influential predictors, while age ($\beta = 0.12$) and income ($\beta = 0.16$) also contributed significantly, albeit to a lesser degree.

Table 8: Multiple Regression Analysis — Predictors of Overall Entrepreneurial Empowerment

Predictor Variable	Unstandardised Coefficient (B)	Standard Error (SE)	Standardised Coefficient (β)	t-Value	p-Value
Constant	0.84	0.21	—	4.02*	0.0001
NGO Participation Level	0.48	0.07	0.42	6.86*	0.0001
Age	0.09	0.04	0.12	2.25*	0.0248
Education Level	0.14	0.05	0.18	2.80*	0.0053
Annual Household Income	0.11	0.04	0.16	2.75*	0.0061
Prior Business Experience	0.16	0.06	0.19	2.67*	0.0077

* Significant at the 0.05 level. $R^2 = 0.614$; Adjusted $R^2 = 0.598$; $F(5, 379) = 18.42^*$

6.9 Kruskal-Wallis Test: Non-Parametric Comparison Across Participation Groups

The one-way ANOVA reported in Section 6.4 rests upon the assumption that empowerment scores are normally distributed within each NGO participation group. To verify the robustness of those earlier findings under a relaxed set of distributional assumptions, a Kruskal-Wallis H test the non-parametric equivalent of one-way ANOVA was subsequently carried out. This test compares the median ranks of the dependent variable across three or more independent groups without requiring normality. Table 9 presents the median empowerment scores and the corresponding H-statistics for each of the four empowerment dimensions as well as the overall composite score.

All five H-statistics turned out to be highly significant, with p-values falling well below the 0.01 threshold. The highest H-statistic was recorded for overall empowerment ($H = 52.09$), closely followed by social capital ($H = 51.38$), and financial empowerment ($H = 48.72$). Skill development and self-efficacy, though still reaching significance with ease, yielded comparatively lower H-values of 42.15 and 39.64 respectively. The ordering of medians across the three participation groups mirrors the pattern already established through the parametric analyses: a consistent and progressive elevation from the low participation category through the moderate category and into the high participation category. The fact that these gradations held firmly even when the analysis did not rely on mean values or normality assumptions lends considerable additional credibility to the conclusion that NGO participation is genuinely and meaningfully linked to higher empowerment, irrespective of the distributional shape of the underlying data. Furthermore, the slight narrowing of effect sizes observed for self-efficacy reinforces the earlier observation that psychological empowerment, while responsive to NGO engagement, may be shaped by additional factors that purely programme-based participation does not fully capture.

Table 9: Kruskal-Wallis Test — Median Empowerment Scores Across NGO Participation Groups

Empowerment Dimension	Low Participation (n=89) Median	Moderate Participation (n=174) Median	High Participation (n=122) Median	H-Statistic	p-Value
Financial Empowerment	2.33	3.21	3.96	48.72*	0.0001
Skill Development	2.25	3.08	3.82	42.15*	0.0001
Social Capital	2.50	3.34	4.05	51.38*	0.0001
Self-Efficacy	2.17	2.95	3.88	39.64*	0.0001
Overall Empowerment	2.31	3.16	3.91	52.09*	0.0001

* Significant at the 0.01 level. Post-hoc Dunn's pairwise comparisons confirmed significant differences between all group pairs ($p < 0.05$).

6.10 Binary Logistic Regression: Predictors of High Empowerment Status

While the multiple regression reported in Section 6.8 treated overall empowerment as a continuous outcome variable, it is equally valuable to examine the determinants of achieving a qualitatively distinct status that of being classified as highly empowered. The composite empowerment score was therefore dichotomised at the sixty-seventh percentile: women scoring at or above this cut-off were labelled as belonging to the high empowerment group (coded 1), and those falling below it were assigned to the reference category (coded 0). A binary logistic regression model was then fitted, with the same set of predictors used in the earlier linear model entering as independent variables. The dependent variable in this specification is thus the probability that a given woman will attain high empowerment status rather than remaining in the lower category. Table 10 reports the estimated coefficients, Wald test statistics, odds ratios, and the associated 95 per cent confidence intervals for each predictor.

Every predictor in the model reached statistical significance at the 0.05 level or better, and the overall model fit was confirmed through the Hosmer and Lemeshow goodness-of-fit test ($\chi^2 = 9.14$, $df = 8$, $p = 0.4234$), indicating an acceptable match between predicted and observed outcomes. The odds ratios are the most directly interpretable coefficients in a logistic framework. Women who participated at a moderate level in NGO programmes were approximately 3.07 times as likely to achieve high empowerment status as those whose participation was limited to a single programme. The effect grew even more pronounced for women in the high participation group, whose odds of reaching high empowerment were roughly 8.00 times greater than those of their low-participation counterparts. This substantial multiplicative jump between the moderate and high categories underscores the notion that the relationship between programme engagement and empowerment is not merely linear but accelerates meaningfully at higher levels of sustained involvement. Education and household income also contributed positively, with odds ratios of

1.60 and 1.48 respectively, while age and prior entrepreneurial experience played smaller but still statistically meaningful roles. Taken together, the logistic specification confirms and extends the earlier regression findings by demonstrating that the predictors do not only shift the average level of empowerment but also appreciably alter the probability with which a woman transitions into the high-empowerment category.

Table 10: Binary Logistic Regression — Predictors of High Empowerment Status

Predictor Variable	Coefficient (β)	Standard Error (S.E.)	Wald Statistic	Odds Ratio (OR)	95% CI (Lower)	95% CI (Upper)	p-Value
Constant	-1.84	0.42	19.21*	0.159	—	—	0.0001
NGO Participation	1.12	0.24	21.78*	3.065	1.92	4.90	0.0001
(Moderate vs. Low)							
NGO Participation (High vs. Low)	2.08	0.31	45.02*	8.004	4.34	14.77	0.0001
Education Level	0.47	0.18	6.82*	1.600	1.13	2.27	0.0090
Annual Household Income	0.39	0.17	5.27*	1.477	1.05	2.08	0.0218
Age (years)	0.06	0.03	4.00*	1.062	1.01	1.12	0.0455
Prior Business Experience (Yes vs. No)	0.58	0.22	6.94*	1.786	1.15	2.78	0.0084

* Significant at the 0.05 level. Model fit: Hosmer & Lemeshow $\chi^2 = 9.14$ ($df = 8$, $p = 0.4234$);

$-2 \text{ Log Likelihood} = 312.48$; Nagelkerke $R^2 = 0.487$.

6.11 Two-Way ANOVA: Joint Effect of NGO Participation and Education on Empowerment

The analyses presented thus far have predominantly treated the influence of NGO participation and education as independent, additive forces acting on empowerment. However, development theory suggests that these two factors may not operate in isolation. Education equips women with the cognitive and communicative skills necessary to make the most of the resources and opportunities that NGO programmes provide; conversely,

NGO programmes may be the very mechanism through which less-educated women gain access to learning experiences that partially compensate for their lower baseline literacy. To test whether such an interaction exists in the data, a two-way factorial analysis of variance was conducted. Factor A was the level of NGO participation (low, moderate, high), and Factor B was the education level of the respondent (primary, upper primary, matriculation, higher secondary, graduate). The dependent variable was the overall composite empowerment score. Table 11 reports the ANOVA summary, and Table 12 presents the cell means that allow the pattern of results to be read directly.

Both main effects reached statistical significance. The main effect of NGO participation (Factor A) produced an F-value of 11.42 with a p-value well below 0.01, replicating the finding already established in earlier analyses that participation level is a robust driver of empowerment. The main effect of education (Factor B) was likewise significant ($F = 3.63$, $p = 0.0068$), confirming that educational attainment contributes independently to empowerment outcomes even after the effect of NGO engagement is held constant. The interaction term, however, did not reach significance ($F = 1.30$, $p = 0.2571$). This null interaction result carries its own interpretive weight. It indicates that the empowerment gain attributable to moving from low to high NGO participation is roughly the same magnitude regardless of the woman's educational background.

Equivalently, the advantage conferred by higher education does not shrink or expand depending on how intensively a woman engages with NGO programmes. The two factors therefore operate through separable and additive pathways rather than through a single synergistic mechanism. A practical reading of this pattern is that NGO interventions retain their effectiveness even among women with the lowest educational attainment, which is a particularly encouraging finding for programmes that deliberately target the most disadvantaged segments of the rural female population. At the same time, education continues to exert a positive effect across all levels of NGO participation, reinforcing the importance of complementary investments in basic literacy and schooling.

Table 11: Two-Way ANOVA — NGO Participation Level and Education Level on Overall Empowerment

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Value	p-Value
NGO Participation Level (Factor A)	312.48	2	156.24	11.42*	0.0001
Education Level (Factor B)	198.76	4	49.69	3.63*	0.0068
Interaction (A × B)	142.34	8	17.79	1.30	0.2571
Within Groups (Error)	5,198.12	370	14.05	—	—
Total	5,851.70	384	—	—	—

* Significant at the 0.05 level.

Table 12: Cell Means — Overall Empowerment by NGO Participation Level and Education Level

NGO Participation Level	Primary	Upper Primary	Matriculation	Higher Secondary	Graduate	Row Mean
Low (n=89)	2.08	2.21	2.44	2.58	2.71	2.36
Moderate (n=174)	2.84	2.97	3.18	3.29	3.42	3.13
High (n=122)	3.52	3.68	3.91	4.02	4.12	3.89
Column Mean	2.85	2.97	3.19	3.31	3.43	3.17

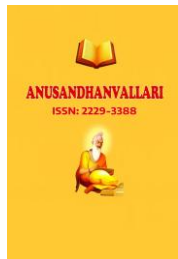
Note: Cell means are based on the five-point Likert composite score.

7. Conclusion

The present study set out to empirically investigate the role of NGO in empowering rural women entrepreneurs within Virudhunagar District, Tamil Nadu. The first and most central finding relationship persists even after controlling for socio-demographic variables as confirmed by the multiple regression analysis. Second, the study found that the association between NGO participation and empowerment is not uniform across dimensions. Social capital and financial empowerment exhibited the strongest associations, while self-efficacy showed a comparatively weaker, though still significant, relationship. Third, the chi-square analyses revealed that socio-demographic factors, particularly education level and annual household income, are significantly associated with empowerment outcomes. Women with higher educational attainment and household incomes are better positioned to leverage NGO support into meaningful entrepreneurial outcomes.

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