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Structural Equation Modeling of Socio-Economic Development and Empowerment among Scheduled Tribes in Karnataka

[1]DR.WAJEEDA BANO and [2]RAKESH NAIK
[1]Assistant Professor, [2]Research Scholar
[1]Department of Economics, Mangalore University, Karnataka, India
[2]Department of Economics, Mangalore University, Karnataka,India

Abstract: The socio-economic development of Scheduled Tribes (STs) in India remains a critical concern despite decades of constitutional safeguards and targeted welfare programmes. This study examines the determinants influencing socio-economic empowerment among Scheduled Tribes in Dakshina Kannada district of Karnataka, with a specific focus on the role of awareness, utilization of government schemes, and the moderating effect of discrimination. Using Structural Equation Modeling (SEM), the research validates a conceptual framework linking awareness, scheme utilization, and empowerment outcomes.

Primary data were collected from 800 respondents representing three tribal communities: Marati (400), Malekodiya (200), and Koraga (200). A multi-stage stratified sampling method was adopted, complemented by secondary data from published studies and reports. Descriptive statistics were used to outline socio-demographic characteristics, while SEM tested causal relationships between awareness, utilization, and empowerment. The results demonstrate that awareness significantly enhances both the utilization of welfare schemes ($\beta = 0.701$, $p < .001$) and socio-economic empowerment ($\beta = 0.443$, $p < .001$). Utilization itself also contributes positively to empowerment ($\beta = 0.248$, $p < .001$), confirming Hypothesis 1. Model fit indices (CFI = 0.94, GFI = 0.93, RMSEA = 0.06) indicated robust structural validity.

However, findings also revealed that discrimination significantly moderates this relationship, dampening the positive impact of utilization on empowerment ($\beta = -0.387$, $p < .001$), thus supporting Hypothesis 2. The Koraga community, in particular, experienced the lowest levels of literacy, healthcare access, and scheme benefits, highlighting persistent social exclusion.

The study concludes that enhancing awareness through grassroots initiatives such as self-help groups, NGOs, and targeted government outreach is vital to improving scheme utilization and empowerment. Simultaneously, reducing entrenched discriminatory practices remains imperative for inclusive development. Addressing both structural and social barriers can ensure equitable participation of Scheduled Tribes in India's development trajectory.

I. INTRODUCTION:

The socio-economic development of Scheduled Tribes (STs) in India remains a pressing concern despite constitutional safeguards, affirmative action, and targeted welfare programmes. STs continue to face systemic disadvantages in education, employment, health, and political participation, resulting in persistent exclusion and marginalization. Among these communities, disparities in literacy, income, housing, and access to government schemes highlight the depth of inequality compared to other social groups. In Karnataka, the Dakshina Kannada district provides a unique context where diverse tribal groups such as the Marati, Malekodiya, and Koraga coexist, yet experience uneven levels of development and empowerment.

Understanding the determinants of socio-economic empowerment is crucial for designing effective interventions. Awareness and utilization of government schemes play a central role, while factors like discrimination significantly moderate their impact. This study employs Structural Equation Modeling (SEM) to validate a conceptual framework linking awareness, scheme utilization, and empowerment, thereby offering insights for more inclusive policy and practices.

1.1. Review of literature: Scheduled Tribes (STs) in India remain one of the most disadvantaged groups despite constitutional safeguards and reservations in education, employment, and political representation. A wide range of literature highlights their persistent exclusion, which manifests economically, socially, politically, and culturally.

Economic and social exclusion continues to affect the majority of tribal communities. Corbridge (2000) observed that reservations in Bihar provided secure employment for some tribals, strengthening their identity, but benefits were uneven, particularly for women. Similarly, development projects in Odisha displaced many tribal groups, leading to loss of livelihoods and cultural disintegration (Suresh & Cheeran, 2015). Poverty remains disproportionately high among STs; Shah and Sah (2004) found that 76% of STs in Madhya Pradesh were poor, attributing this to low education levels, locational disadvantages, and systemic discrimination.

Educational exclusion has been another persistent barrier. Ramakrishnappa (2022) reported that STs significantly lag behind the general population in literacy due to poverty, remoteness, and weak institutional support. Even in relatively advanced states such as Kerala, exclusion persists in both education and healthcare services (Rajasenan, 2016). Although certain groups, like the Marati tribes in Karnataka, have achieved higher literacy, gender gaps remain evident (Govindaraju, 2018).

Gender disparities further exacerbate exclusion. Studies of the JenuKurubas in Karnataka (Thapa & Malilni, 2016) and the Adiya tribes in Kerala (Aswathy et al., 2018) show persistent deprivation in health, education, and sustainable livelihoods, worsened by inefficient welfare delivery. Sarkar et al. (2006) highlighted that tribal women's participation in education and modern employment is significantly lower than men's. Jose and Cherayi (2018) emphasized psychosocial exclusion among unwed tribal mothers, indicating intersecting forms of gender and tribal marginalization.

Labour market discrimination remains prevalent. Attewell and Sukhadeo (2015) demonstrated that equally qualified ST, Dalit, and Muslim candidates face systemic bias in hiring processes in India's private sector. Singh et al. (2015) also found rising economic disparities among SCs and STs over three decades, with rural tribal populations especially disadvantaged. Structural barriers further prevent tribal youth from benefiting from diversification of livelihoods; Shandilya et al. (2016) identified constraints such as lack of irrigation, transport, training, and access to agricultural equipment.

A critical issue across studies is the **lack of awareness and underutilization of government schemes**. Despite numerous welfare programmes, many tribal communities remain unaware of entitlements or face bureaucratic barriers in accessing them. Aswathy et al. (2018) noted that inadequate targeting and underutilization of funds worsened exclusion among the Adiya tribes, while similar patterns are reported across other tribal regions.

Thus literature shows that exclusion among Scheduled Tribes is rooted in systemic poverty, limited access to education, labour market discrimination, and weak welfare delivery. While affirmative action has benefited a small segment, overall progress is hindered by poor awareness and ineffective implementation. Ensuring equality requires participatory governance, community-level awareness campaigns, and effective monitoring of welfare initiatives to fulfill the constitutional promise of justice and inclusion.

1.2 Statement of the Problem: This research paper seeks to validate a model of key determinants, developed on the basis of a review of literature, that influence the utilization of government schemes designed for the socio-economic empowerment of Scheduled Tribes. Specifically, it examines how awareness impacts the utilization of such schemes and, in turn, promotes empowerment. Furthermore, the study investigates how discrimination within and outside tribal communities dampens the positive relationship between utilization and socio-economic empowerment.

1.3. Objective of the study:

1. To know how the awareness and utilisation of various government schemes among the scheduled tribe influence socio-economic empowerment of ST
2. To understand how discrimination among the scheduled tribes dampens the utilisation and socio-economic empowerment,

II. RESEARCH METHODOLOGY:

2.1. Source of Data: This research paper consisting of both Primary and Secondary source of information collected. **Primary Data** collected through questionnaire and s**econdary Data** collected through various published articles, magazines, reports, etc.

2.2. Data Collection: A purposive and multi-stage stratified sampling technique is used to select the sample of scheduled tribe households. A total of 800 sample respondents were selected which consist of 400 marati, 200 malekodiya and 200 from koraga. In depicting the sample respondent's characteristics,

descriptive statistics of frequencies and percentages were calculated.45.8% of the respondents were female and 54% are male, 37% of the sampled respondents were in the age group of 36-45years, 25 % are in the age group 18-35 years, 35% are illiterate, 26% studied till primary level, 18% are studied till secondary level and around 18% are graduates.

2.3. Data Analysis tools: SEM, a multivariate statistical analysis method, is used to look at the structural relationships between quantifiable variables and latent components. Path analysis is used to quantify the causal relationships between the constructs. To ascertain how the awareness and utilisation of various government schemes among the scheduled tribe positively influence their socio-economic empowerment, Government intervention in relation to the socio-economic status and how discrimination among the scheduled tribes dampens the utilisation and socio-economic empowerment, SEM was used in the current investigation.

III. ANALYSIS AND RESULTS

Estimating the Hypothesized Model: Based on given conceptual framework in (fig 1&2) following hypotheses are developed:

H1: The awareness and utilisation of various government schemes among the scheduled tribe community positively influences their socio-economic empowerment.

H2: Discrimination among scheduled tribes dampens the positive relationship between utilisation and Socio-economic Empowerment.

Fig 1: Conceptual Framework: There is direct relationship between Utilization, Socio-economic Empowerment and Awareness of ST

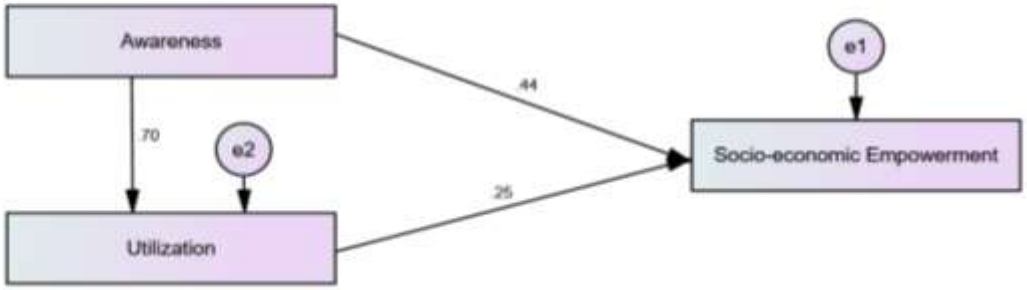

Table.1 Regression estimates results for relationship between Utilization, Socio-economic Empowerment and Awareness.

Relationship			Estimate	S.E.	C.R.	P	Label
Utilization	<---	Awareness	.701	.029	27.820	***	HS
Socio-economic Empowerment	<---	Awareness	.443	.039	11.648	***	HS
Socio-economic Empowerment	<---	Utilization	.248	.034	6.530	***	HS

Note: HS = Highly Significant; S=Significant; NS=Not Significant

Since the model fit indices were found to be within the permitted limits, structural equation modelling was utilized to test the conceptual model. The hypothetical relationship between the study variables Utilization, Socio-economic Empowerment and Awareness is depicted in Figure 1. As the p-value was highly significant (p<001***), there is a significant relationship between these variables. As per the results shown in Table 1, it can be said that Awareness regarding government schemes among the scheduled tribe community positively influences the Utilization of the various government schemes among the STs (E=.701, P < .001). Moreover, it was also observed that Awareness also impacts Socio-economic Empowerment (E=.443, P <.001**), which says the increase in the awareness of government schemes empowers the Socio-Economic condition among the respondents. Furthermore, Utilization also plays an important role in empowering socio-economic conditions among the respondents (E=.248, P <.001**). Therefore, H1 is accepted. In addition, in order to clearly understand the relationship between the variable a model has been demonstrated in Figure 1.

Table.2 **Goodness-of-fit & Incremental Indices of SEM model**

Fit Index	Threshold Limit	Estimated Value
χ^2/df	<3.0	2.830
GFI	≥0.90	0.93
AGFI	≥0.90	0.91
CFI	≥ 0.90	0.94
SRMR ≤ 0.08	≤ 0.08	0.08
RMSEA ≤ 0.06	≤ 0.06	0.06
PClose	> 0.05	0.07

When analyzing the link between Awareness (IV), Socio-economic Empowerment (DV), and Utilization (MV), the model fit indices show consistent with standards set in the literature on structural equation modelling (Hu &Bentler, 1999; Kline, 2015). At 2.830, the Chi-Square to Degrees of Freedom ratio (χ^2/df) is below the 3.0 cutoff. This number indicates that there is a satisfactory fit between the observed and estimated covariance matrices of the model (Schumacker& Lomax, 2016).

With respective values of 0.93 and 0.91, the Goodness-of-Fit Index (GFI) and Adjusted Goodness-of-Fit Index (AGFI) are both above the conventional 0.90 cutoff. These findings show that even after controlling for model complexity, the model maintains its adequacy and explains a significant amount of the variance (Jöreskog&Sörbom, 1981). Strong structural validity is additionally indicated by the Comparative Fit Index (CFI) of 0.94, which is also above the suggested threshold of 0.90. This shows that the model fits the data closely when compared to a null model (Bentler, 1990).Furthermore, the average standardized residual between observed and predicted correlations appears to be within an acceptable range, as indicated by the Standardized Root Mean Square Residual (SRMR) of 0.08, which satisfies the upper criterion for acceptability. This result is deemed acceptable despite being somewhat high, particularly in light of the strong support from other fit indices (Hu &Bentler, 1999). The PCLOSE value of 0.07 (higher than 0.05) shows that the model's RMSEA is close to zero, further indicating a decent approximation of the data structure, and the Root Mean Square Error of Approximation (RMSEA) is precisely 0.06, hitting the criterion for a satisfactory fit (Browne &Cudeck, 1993).Following accepted standards, these indices taken together show that the model offers a sufficient fit to the data, enabling a confident interpretation of the connections between Awareness, Socio-economic Empowerment, and Utilization (Hu &Bentler, 1999; Kline, 2015).

H2: Discrimination among scheduled tribes dampens the positive relationship between utilization and Socio-economic Empowerment.

Table .3 Moderating Role of Discrimination

Relationship	Beta	C.R.	P
Utilization→Socio-Economic Empowerment	.559	17.339	***
Discrimination →Socio-Economic Empowerment	-.349	-6.445	***
Utilization* Discrimination → Socio-Economic Empowerment	-.387	-6.896	***

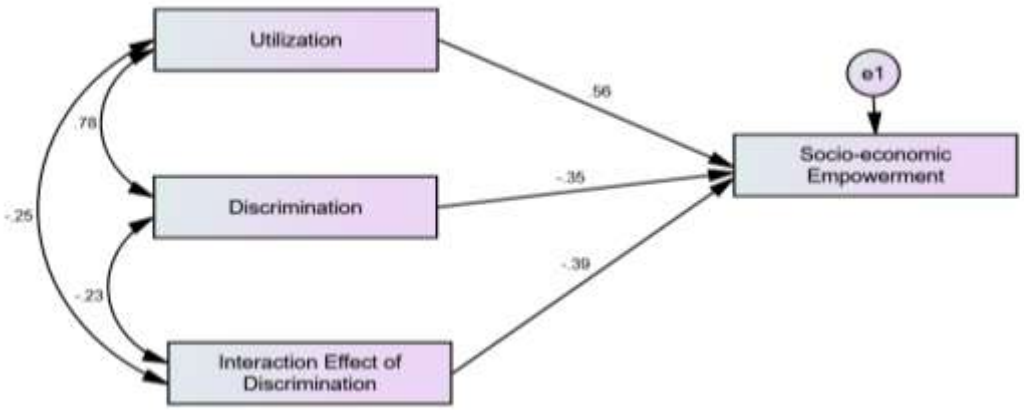

Figure 3

Effect of Discrimination

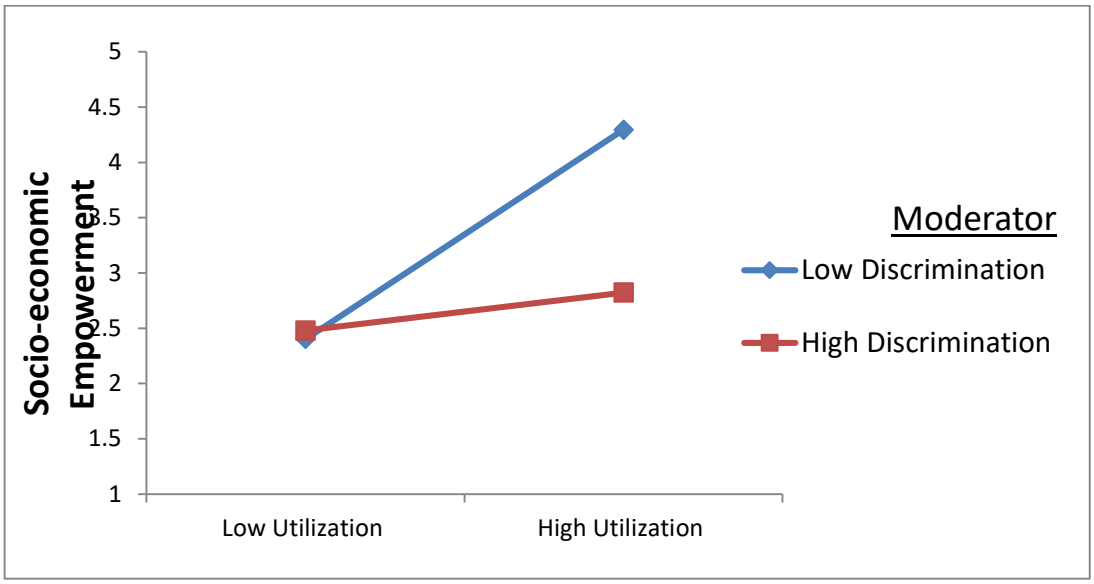

Figure 4 Moderating Role of Discrimination

The study examined the moderating role of discrimination on the relationship between utilization and socio-economic empowerment. The results revealed a negative and significant moderating impact of discrimination on the relationship between utilization and socio-economic empowerment (β=-.387, t=-6.896, p=0.000) supporting H2. Figures 3 and 4 summarise the moderation effect of discrimination. As a whole, it is evidenced that discrimination among scheduled tribes dampens the positive relationship between Utilization and Socio-economic Empowerment.

IV. FINDINGS AND DISCUSSION: The results confirmed that there is a direct relationship between utilization, socio-economic empowerment, and awareness among Scheduled Tribes. However, discrimination hampers this positive relationship. Hypothesis testing in the present study shows that awareness of government schemes significantly influences their utilization, which in turn contributes to socio-economic empowerment. At the same time, discrimination negatively affects the utilization of schemes, thereby limiting the empowerment of Scheduled Tribes.

Awareness creation must therefore be prioritized, especially in rural areas and among Scheduled Tribe women. Strengthening awareness through self-help groups (SHGs), NGOs, and government agencies can enhance the effective utilization of welfare schemes. Discriminatory practices, though often indirect, remain prevalent in tribal society. Compared to the Marati tribe, the Koraga community is more severely affected, often experiencing feelings of inferiority in relation to upper castes. Targeted interventions are needed: ASHA workers should actively identify and support Koraga families, while NGOs should extend special care and provide necessary facilities to reduce discrimination and foster inclusion.

V. CONCLUSION: The findings reveal significant disparities in literacy, housing, employment, access to health services, and benefits from government schemes, with the Koraga tribe particularly lagging in most indicators. . Moreover, qualitative insights emphasise that deeply rooted issues, such as social exclusion, cultural marginalisation, and institutional apathy, continue to hinder inclusive development. It is, therefore, imperative that policies not only target economic indicators but also address entrenched social hierarchies and stigma that perpetuate marginalisation.

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