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ACCESS TO HIGHER EDUCATION AND EMPLOYABILITY OF SCHEDULED TRIBES IN RAJASTHAN: AN ECONOMETRIC ANALYSIS

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ABSTRACT

Despite constitutional safeguards and targeted interventions, Schedule Tribe communities are facing significant challenges in accessing higher education and securing employment. Even among Schedule Tribe individuals who attain higher education, employability remains a concern. The present study aims to examine the status and trends of higher education attainment and employment for Schedule Tribes in Rajasthan. By using Johansen cointegration test and the Vector Error Correction Model (VECM), the study also analyzes the long run and short run relationship between total enrolment of STs in higher education and total employment of STs in Rajasthan. The study adopted both descriptive and econometric approaches using secondary data of Gross Enrolment Ratio (GER), Gender Parity Index (GPI), number of teachers, non-teaching staff and Public Sector Undertakings (PSUs) employment in Rajasthan from 2012-13 to 2023-24. The results revealed that the enrolment of Schedule Tribes in Rajasthan is modest relative to the total enrolment in higher education. The Gross Enrolment Ratio for Schedule Tribes in Rajasthan remains below the national average, with pronounced gender disparities. The representation of Schedule Tribe teachers, non-teaching staff, and PSUs employees in Rajasthan is relatively low compared to the other social groups. Johansen Cointegration Test showed that there is significant long run relation between the variables. The probability output of Vector Error Correction Model revealed that there is significant short run relation between the variables.

Keywords: Higher Education, Schedule Tribes, Total Enrolment, Employability, Johansen Cointegration Test, VECM.

1. INTRODUCTION

The relationship between higher education and employability has emerged as a pressing concern in India's development discourse. Despite impressive expansion in the higher education system since independence, a persistent mismatch remains between academic qualifications and labour market requirements. After India's independence in 1947, the country inherited a limited and elitist system of higher education, designed mainly to produce administrative personnel rather than skilled professionals or researchers. To address this, the University Education Commission (1948) led by Dr. S. Radhakrishnan recommended expanding access, ensuring autonomy, and improving teaching and research quality. Over the decades, especially after the 1960s, India witnessed a massive expansion of higher education institutions, particularly through state and central universities, with an increasing role played by private institutions after the 1990s economic liberalization. However, this quantitative growth did not match improvements in quality. A study

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by Tilak (2006) highlighted that the increasing privatization of higher education has often prioritized profit over quality, accessibility, or equity. Major policies like the National Policy on Education (1986), Rashtriya Uchchatar Shiksha Abhiyan (2013), and the New Education Policy (2020) aimed to improve inclusivity, multidisciplinary learning, and link education with employability, but their implementation remains inconsistent.

One of the most pressing concerns today is the mismatch between higher education and employability. "Employability is the ability of the graduate to get a satisfying job." (Harvey, 2001). Employability is an individual's ability to understand and develop personal attributes such as knowledge, skills, and abilities to secure a job, meet employer expectations, and maintain employment (Bhola & Dhanawade, 2013). In this study, present employment status is used as a proxy for employability. The rationale is that individuals who are currently employed are more likely to possess the skills and attributes demanded by the labor market. Employment thus serves as an observable indicator of the effectiveness of higher education in equipping students with employable skills. According to India Skills Report (ISR) 2025, the overall employability of Indian graduates is 54.81%, reflecting a wide gap between academic curricula and market needs. This issue is even more acute among marginalized groups such as Scheduled Tribes. Although more ST students are entering higher education than before, they continue to face high dropout rates and poor post-education employment outcomes (Brahmanandam & Babu, 2016). These challenges arise from a lack of foundational support, limited access to guidance, and weak linkages between degrees and employable skills. Despite affirmative action policies, deep-rooted social inequalities and cultural alienation restrict the effective participation of ST youth in higher education and subsequently in the job market (Desai & Kulkarni, 2008). Although the gross enrolment ratio, literacy rate among STs has improved, it still falls short of the national average (fig.1) and their access to technical and professional education remains severely limited. For Scheduled Tribes, the path from higher education to gainful employment remains challenging with systemic issues. As a result, many educated tribal youth are either unemployed or working in low-paid, informal sector jobs like data entry, security services, sales, or manual labor.

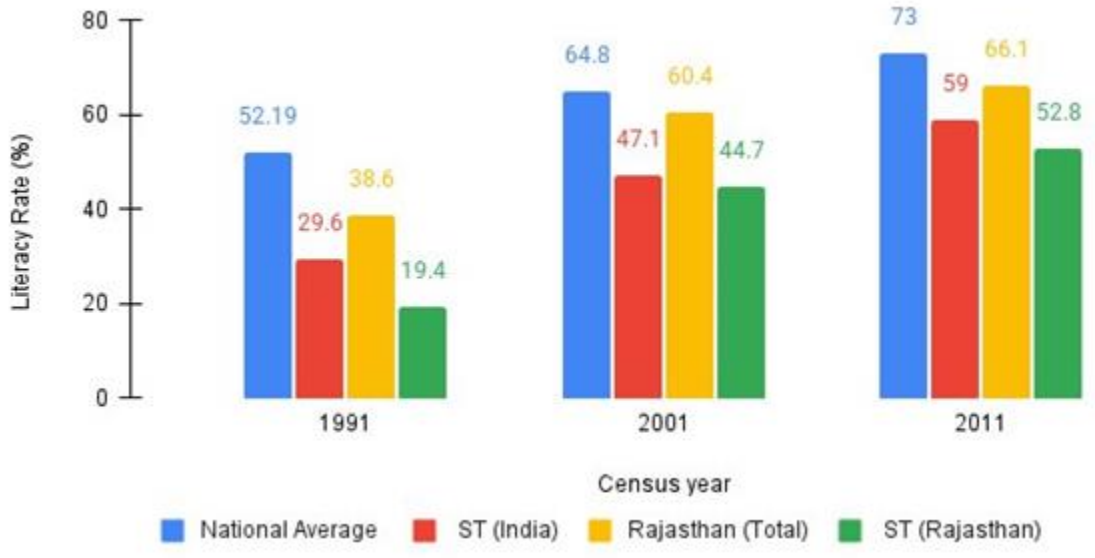

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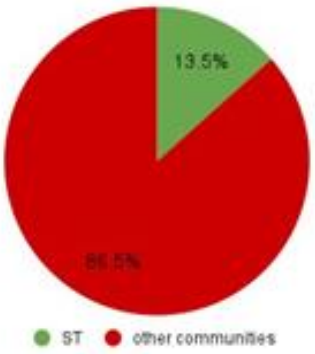
Fig.1. Literacy Rates
Source: Census 1991-2011

In the state of Rajasthan, which has a sizable tribal population concentrated in districts like Banswara, Dungarpur, Udaipur, Pratapgarh, and Sirohi (Census 2011), the challenges are even more pronounced. According to surveys like the Socio-Economic and Caste Census (SECC) and the National Family Health Survey (NFHS), a large number of tribal households lack access to basic amenities like clean water, electricity, sanitation, and healthcare. These deprivations, combined with economic hardship and limited awareness, restrict educational advancement beyond school level. According to India Skills Report (ISR) 2025 Rajasthan did not feature among the top 10 most employable states. This indicates below-average employability among graduates in the state.



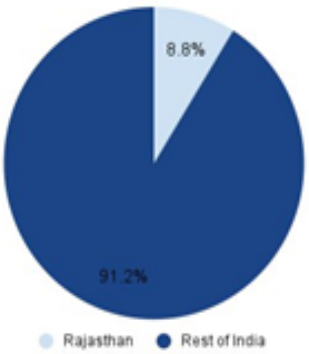


Fig.2. ST Population as a Share of Rajasthan's Total Population **Fig.3.** Share of Rajasthan in National ST Population
Source: Census 2011 **Source: Census 2011**

Most studies and reports provide data either on education or on employment of Scheduled Tribes. However, very few studies have tried to explore whether getting higher education actually helps tribal youth get better jobs. There is also limited research at the state level, especially for Rajasthan, which has a large tribal population. This makes it important to study the link between education and employability among Scheduled Tribes in Rajasthan. Hence, understanding this connection will help in making better policies for tribal development in the future.

The main objective of this research is to study how higher education affects the employability of Scheduled Tribes in Rajasthan. The study aims to: (i) examine the status and trends of higher education attainment and employment for Schedule Tribes in Rajasthan. (ii) analyze the long run and short run relationship between total enrolment of STs in higher education and total employment of STs in Rajasthan.

2. LITERATURE REVIEW

2.1. Persistent Dropouts and Barriers to Higher Education

The shortage of employability skills mainly comes from weaknesses in the education system. The high dropout rate at the primary and secondary levels, along with low enrolment in higher education, results in a limited skilled workforce. In addition, poor infrastructure in schools, colleges, and universities creates further challenges in improving employability **(Bhola & Dhanawade, 2013).** Several studies showed that although enrolment at the primary level among Scheduled Tribes (STs) had improved, very few students moved ahead to higher education.

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Ramachandran & Deepan (2024) stated that poverty, poor school infrastructure, and lack of teacher support led to early dropouts, especially among girls. **Nayak (2024)** found that in Telangana, dropout rates remained high after primary school due to language issues, weak teaching, and limited job opportunities. Together, these studies suggested that school-level challenges restricted the educational growth of tribal children. However, most studies only described these problems in a descriptive manner.

2.2. Gender and Regional Disparities

Female literacy among tribal communities in Telangana was much lower than that of males **(Nayak, 2024). Siddhad & Mujalde (2024)** reported similar trends in Madhya Pradesh, especially in rural Khargone. **Pareek & Sole (2020)** observed that tribal women in Rajasthan faced discrimination and social exclusion, which further limited their education. These findings showed that tribal women suffered from both poverty and gender bias. Yet, most studies stopped at showing the differences and did not explore deeper reasons such as cultural beliefs, early marriage, etc.

2.3. Limitations of Government Schemes

Although many government schemes like Gurukulam schools, scholarships, and overseas study programs had been introduced, researchers argued that their implementation was weak. **Chandel et al. (2023)** stated that even with such support, the Gross Enrolment Ratio (GER) of STs in higher education was only 18.9%, far below the national average**. Singh (2019)** reported that scholarships and free materials were poorly delivered in rural regions**. Rana & Devi (2017)** found that very few students in Rajasthan moved from secondary education to college. These studies suggested that the problem was not policy making but proper execution.

2.4. Socio-Cultural and Institutional Barriers

Apart from financial struggles, cultural practices and weak institutions also created barriers in tribal education. **Kavitha & Vanita (2024)** found that many parents did not prioritise education due to work pressures. Even when free resources were provided, they often arrived late or were of poor quality. **Brahmanandam & Babu (2016)** noted that many tribal graduates remained unemployed or underemployed because they lacked skills and career guidance. **Komaraiah & Singh (2014)** observed that despite reservation policies, ST students were still few in higher education due to weak foundational schooling and lack of institutional support. These studies showed that the problem was not only access but also quality and inclusiveness. However, few researchers examined how local-language teaching or culturally sensitive methods could improve learning.

2.5. Long-Term Trends and Structural Exclusion

Historical evidence showed that tribal literacy increased from less than 1% in 1931 to over 63%in 2011 **(Pattnaik, 2017).** Still, only around 11% of tribal youth entered higher education. **Kothari & Matharu (2020)** agreed that although basic literacy had improved, large gaps remained between STs and the general population in both education and employment. These studies showed that despite progress, long-term exclusion through poverty, discrimination, and poor institutional support continued to affect tribal communities. Yet, one major gap remained i.e very few studies

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examined how education linked to employability or how tribal youth moved from schooling to stable jobs.

The existing literature highlights many barriers in education and employment for Scheduled Tribes in Rajasthan. However, most studies are descriptive and do not measure how these factors affect higher education access or employability. Very few studies have employed econometric or quantitative approaches to analyze the direct relationship between higher education and employability among Scheduled Tribes in Rajasthan. This study aims to fill this gap by using recent data and econometric tools to analyze how access to higher education influences employability among STs in Rajasthan.

3. MATERIAL AND METHODS

The study used secondary data from 2012-13 to 2021-22 collected from All India Survey on Higher Education (AISHE) reports published by Department of Higher Education under Ministry of Education for Gross Enrolment Ratio (GER), Gender Parity Index (GPI), number of teachers, non-teaching staff. The data related to Public Sector Undertakings (PSUs) employment in Rajasthan from 2016-17 to 2023-24 was collected from Public Enterprises Profile, published by the State Enterprises Department, Government of Rajasthan. In this study, the present employment levels are used as a proxy to represent employability.

The study used both descriptive and econometric methods. At first, the data was studied to show the trends and patterns in higher education and employment indicators. These tables were analyzed to understand the gap between national averages and the situation in Rajasthan. After the descriptive analysis, advanced econometric tools were used to study the relationship between higher education and employability focusing only on STs in Rajasthan. Both variables total employment and enrolment number were transformed into their natural logarithmic form, and the model was estimated as a log-log model, allowing the coefficients to be interpreted as elasticities. The relationship between total employment and enrolment in higher education among STs in Rajasthan was estimated using a log-log model as follows:

$$LN(EMP_t) = \alpha + \beta LN(ENROL_t) + \mu_t \quad \text{.....(1)}$$

$LN(EMP_t)$ = natural logarithm of total employment (teaching staff, non-teaching staff, and PSU employment) at time – dependent variable

$LN(ENROL_t)$ natural logarithm of total enrollment in higher education at time- independent variable

α = intercept term

β = elasticity coefficient (percentage change in employment for a 1% change in enrollment)

μ_t = error term at time

Further econometric tools like the VAR lag order selection criterion for optimal lag length selection, Augmented Dickey-Fuller (ADF) unit root test to check stationarity, the Johansen cointegration test to identify long-run relationship and at the end Vector Error Correction Model (VECM) to showcase both the long-run and the short-run causality between the variables.

4. RESULTS AND DISCUSSION

4.1 Descriptive Analysis

4.1.1 Comparative Trends in Higher Education Access

This section examines two key indicators of higher education access GER, GPI trends among

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Scheduled Tribes in Rajasthan compared to national averages from 2012-13 to 2021-22. GER measures the total enrolment in higher education as a percentage of the population in the official age group (18–23 years) in India. GPI indicates the ratio of female to male enrolment in higher education, with a value of 1 representing gender parity. Together, they provide a comprehensive picture of inclusion and disparities in the higher education system.

Table 1: Gross Enrolment Ratio (GER) for the 18-23 Age Group in Higher Education

Year	(1) National Avg (All categories)	(2) National Avg (ST)	(3) Rajasthan (ST)	(4) Gap 1 = 1-3	(5) Gap 2 = 3-2
2021-22	28.4	21.2	28.2	0.2	7
2020-21	27.3	18.9	23.3	4	4.4
2019-20	27.1	18	22.3	4.8	4.3
2018-19	26.3	17.2	21.3	5	4.1
2017-18	25.8	15.9	18.5	7.3	2.6
2016-17	25.2	15.4	17.9	7.3	2.5
2015-16	24.5	14.2	15.2	9.3	1
2014-15	24.3	13.7	15.8	8.5	2.1
2013-14	23	11.3	15.3	7.7	4
2012-13	21.5	11.1	12.4	9.1	1.3

Source: AISHE Reports

Table 1 highlights a steady improvement in the GER of STs in Rajasthan between 2012–13 and 2021–22. In the early years, the GER of Rajasthan's ST population was significantly below the national average for all social categories. Gap 1 (1 – 3) represents the difference between the national average for all social categories and Rajasthan STs. The large positive values in earlier years (such as 9.1 in 2012–13) indicate that STs in Rajasthan were significantly lagging behind the general national trend in higher education access. However, this gap has consistently narrowed over the years. In 2021–22 gap reduced to just 0.2, suggesting remarkable improvement in the inclusion of STs in Rajasthan into the higher education system. At the same time, Gap 2, which compares Rajasthan's ST GER with the national ST average, remained positive across all years.

This suggests that STs in Rajasthan have consistently outperformed their tribal counterparts in other states in terms of higher education enrolment. This positive trend may be linked to various supportive policies such as Post-Matric Scholarships, Eklavya Model Residential Schools (EMRS), and Rajasthan's Tribal Area Development (TAD) initiatives. Together, these trends

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highlight substantial progress but also signal the need for continued efforts to bridge the remaining equity gap between STs and the broader population.

Table 2: Gender Parity Index (GPI) for the Age Group 18-23 Years in Higher Education

Year	(1) National Avg (All categories)	(2) National Avg (ST)	(3) Rajasthan (ST)	(4) Gap 1 = 1-3	(5) Gap 2 = 2-3
2021-22	1.01	0.98	0.96	0.05	0.02
2020-21	1.05	1.02	1.04	0.01	-0.02
2019-20	1.01	0.97	1	0.01	-0.03
2018-19	1	0.92	0.92	0.08	0
2017-18	0.97	0.87	0.87	0.1	0
2016-17	0.94	0.85	0.83	0.11	0.02
2015-16	0.92	0.83	0.8	0.12	0.03
2014-15	0.92	0.81	0.76	0.16	0.05
2013-14	0.92	0.81	0.75	0.17	0.06
2012-13	0.89	0.79	0.57	0.32	0.22

Source: AISHE Reports

Table 2 shows a steady improvement in the GPI at the national level and among STs in Rajasthan. In 2012–13, the GPI for STs in Rajasthan was just 0.57, indicating a large gender gap in higher education. This means that for every 100 boys enrolled, only 57 girls were enrolled. The gap 1 (national average – Rajasthan ST) was highest i.e. 0.32 in that year. But it reduced significantly by 2021–22 to just 0.02, showing near parity. This improvement may be linked to various government initiatives such as Beti Bachao Beti Padhao (2015), Post-Matric Scholarships for ST Girls, and hostel facilities for tribal girls. Schemes like RUSA (Rashtriya Uchchatar Shiksha Abhiyan) also aimed to enhance access and equity in higher education, including gender balance. However, the GPI for STs in Rajasthan remained slightly below both the national average (all categories) and the national ST average in most years. This may be due to early marriage, poor school infrastructure in tribal areas, safety concerns, financial constraints, and gendered social norms that discourage higher education for girls in remote regions. The small negative values in Gap 2 such as -0.02 in 2020–21, -0.03 in 2019-20 show that in some years, Rajasthan ST girls slightly outperformed the national ST average, possibly due to targeted efforts by the state government. Overall, the trend reflects a positive shift towards gender parity, but persistent social and economic barriers still affect girls' participation in higher education in tribal areas.

4.1.2 Employability Patterns

This section explores employability patterns by assessing the representation of individuals in formal sector positions such as teaching, non-teaching, and public sector employment. While employability includes various factors such as skills, opportunities etc., actual job placement is a clear measure of education's impact on employability.

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Table 3: Number and Share of Teachers by Social Category in Higher Education Institutions in Rajasthan

Year	ST Teachers	SC Teachers	OBC Teachers	Total Teachers	% Share of ST Teachers	% Share of SC Teachers	% Share of OBC Teachers
2021-22	2702	6668	26357	83192	3.25	8.02	31.68
2020-21	2560	6359	25032	80420	3.18	7.91	31.13
2019-20	2484	6089	23811	77377	3.21	7.87	30.77
2018-19	2307	5592	21311	71088	3.25	7.87	29.98
2017-18	1905	4705	17289	60045	3.17	7.84	28.79
2016-17	2085	4945	18158	66540	3.13	7.43	27.29
2015-16	2422	4881	15356	68904	3.52	7.08	22.29
2014-15	2862	5219	15873	73952	3.87	7.06	21.46
2013-14	2320	5054	15327	74992	3.09	6.74	20.44
2012-13	2246	4258	13623	74043	3.03	5.75	18.40

Source: AISHE Reports

Table 3 presents the representation of teachers belonging to different social groups ST, SC, and OBC in higher education institutions in Rajasthan from 2012–13 to 2021–22. While the absolute number of teachers from all categories has increased over the decade, the percentage share of ST teachers remains significantly lower than both SC and OBC groups. In 2021–22, ST teachers comprised only 3.25% of the total, compared to 8.02% for SCs and 31.68% for OBCs. Despite some fluctuations, the share of ST teachers has largely remained around 3%, showing limited progress. In contrast, the SC share has steadily increased from 5.75% in 2012–13 to over 8% in 2021–22. The gap is even wider when compared to OBC representation, which has grown from 18.40% to over 31% in the same period. This disparity indicates that even though efforts have been made to improve educational access, they have not translated into proportional representation in academic employment for STs. The consistently low share suggests structural barriers in recruitment, lack of higher qualifications, and limited opportunities for ST candidates to secure teaching roles. This contrast shows that SC and OBC groups have gained more from affirmative action, while STs still face deeper structural barriers.

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Table 4: Number and Share of Non-Teaching Staff by Social Category in Higher Education Institutions in Rajasthan

Year	ST Non-TS (RJ)	SC Non-TS (RJ)	OBC Non- TS (RJ)	Total Non-TS (RJ)	% Share of ST Non-TS (RJ)	% Share of SC Non-TS (RJ)	% Share of OBC Non-TS (RJ)
2021-22	3977	7971	15919	55570	7.16	14.34	28.65
2020-21	4471	9474	16241	67014	6.67	14.14	24.24
2019-20	3733	8410	17634	57733	6.47	14.57	30.54
2018-19	3383	7667	15682	54142	6.23	14.16	28.97
2017-18	3384	7596	14995	52535	6.44	14.46	28.54
2016-17	2830	6401	12931	48866	5.79	13.09	26.46
2015-16	2248	5447	11488	45114	4.98	12.07	25.463
2014-15	1985	4984	10312	42523	4.67	11.72	24.25
2013-14	1539	3766	7388	32393	4.75	11.63	22.81
2012-13	1428	3533	6515	29225	4.89	12.09	22.29

Source: AISHE Reports; Non-TS: Non-Teaching Staff

The total non-teaching staff in Rajasthan increased from 29,225 in 2012-13 to 55,570 in 2021-22. During this period, ST non-teaching staff rose from 1,428 to 3,977, and their share grew from 4.88% to 7.15%. In comparison, SC staff increased from 3,533 to 7,971, with their share rising from 12.08% to 14.34%. OBC staff showed the highest growth, increasing from 6,515 to 15,919, and their share went up from 22.29% to 28.64%. Although the number of ST staff has increased, their share is still much lower than that of SCs and OBCs. This gap highlights that STs remain the most under-represented group in non-teaching jobs in higher education institutions, even after a decade of growth (Table 4).

Table 5: Employment in Public Sector Undertakings (PSUs) in Rajasthan

Year	Total (No.)	ST Employees (No.)	ST Employment (%)	SC Employees (No.)	SC Employment (%)
2023-24	76135	9449	12.41	12671	16.64
2022-23	78836	9895	12.55	13066	16.57
2021-	76844	9069	11.8	13098	17.04

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22					
2020-21	79316	8929	11.26	12961	16.34
2019-20	82612	8815	10.67	13219	16
2018-19	84544	8404	9.94	12741	15.07
2017-18	83937	7826	9.32	11298	13.46
2016-17	87676	8615	9.83	10890	12.42

Source: Public Enterprises Profile, by the State Enterprises Department, Government of Rajasthan
Table 5 presents that the total number of PSU employees in Rajasthan has slightly decreased from 87,676 in 2016-17 to 76,135 in 2023-24. However, both SC and ST employees have increased in number during this period. ST employees rose from 8,615 to 9,449, and their share grew from 9.83% to 12.41%. SC employees increased from 10,890 to 12,671, with their share rising from 12.42% to 16.64%. In all years, the share of SC employees is higher than that of ST employees by about 3 to 4 percentage points. This shows that SCs have better representation in PSU jobs in Rajasthan as compared to STs, even though both groups have seen some improvement in employment.

4.2 Econometric Approach

This section presents the results based on the econometric analysis conducted to examine the relationship between total enrolment number in higher education and employability. In this study employability is measured through number of teachers, non-teaching staff, and PSUs employment. In this approach two variables related to STs in Rajasthan were analyzed.

Table 6: Employment and Enrolment of Scheduled Tribes in Rajasthan

Year	Teachers (1)	Non-Teaching staff (2)	PSU employment (3)	Total employment (4= 1+2+3)	Enrolment number (5)
2023	2522*	5110*	9449	17081	346880*
2022	2502*	4769*	9895	17166	326929*
2021	2702	3977	9069	15748	340033
2020	2560	4471	8929	15960	277798
2019	2484	3733	8815	15032	254029
2018	2307	3383	8404	14094	245866
2017	1905	3384	7826	13115	211313
2016	2085	2830	8615	13530	201505
2015	2422	2248	7895*	12565	169556
2014	2862	1985	7610*	12457	173338
2013	2320	1539	7508*	11367	165878
2012	2246	1428	7305*	10979	132665

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Source: AISHE Reports; * denotes forecasted values.

4.2.1 Lag Structure

The VAR lag order selection was done to choose the optimal lag length for the model. Information criteria such as FPE (Final prediction error), Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn Criterion (HQ) were used for this purpose.

Table 7: VAR Lag Order Selection Criteria

Endogenous variables: LN_ENROL LN_EMP

Lag	Log	LR	FPE	AIC	SC	HQ
0	19.66725	NA	0.0001	-3.533449	-3.472932	-3.599836
1	35.37207	21.98675*	1.00E-05	-5.874414	-5.692863	-6.073575
2	41.52446	6.152391	7.63e-06*	-6.304892*	-6.002307*	-6.636827*

Source: Authors own calculation; *indicates lag order selected by the criterion

Table 7 shows that the lowest values of FPE, AIC, SC, and HQ are at lag 2. Hence, lag 2 was selected as the optimal lag for further estimation.

4.2.2 Unit Root Test

Table 8: The Augmented Dickey-Fuller (ADF) Unit Root Test (Automatic- based on AIC, maxlag =2)

			Level t-Statistics	1st difference t-Statistics
LN_ENROL	ADF test statistics		0.211015	-6.222033
	critical values	1% level	-4.420595	-4.297073
		5% level	-3.259808	-3.212696
		10% level	-2.771129	-2.747676
	Prob*		0.9553	0.0008
LN_EMP	ADF test statistics		-0.911582	-4.612507
	critical values	1% level	-4.297073	-4.420595
		5% level	-3.212696	-3.259808
		10% level	-2.747676	-2.771129
	Prob*		0.7391	0.0078

Source: Authors own calculation; *MacKinnon (1996) one-sided p-values.

The ADF unit root test was applied to log transformed variables related to STs in Rajasthan to check for stationarity. The test was done using lag 2, which was suggested by most criterion (Table 7). All variables were stationary at first level differencing, implying they are integrated of order one, I(1). The ADF statistics for all variables at I(1) were significant at the 5% critical level (p-values < 0.05), leading to rejection of the unit root null hypothesis for all variables (Table 8).

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4.2.3 Johansen Cointegration Test

The Johansen cointegration test was used to study the long-run relationship between total employment (LN_EMP) and enrolment number (LN_ENROL) in higher education for STs in Rajasthan. Both variables were non-stationary and had the same order of integration i.e. I(1). The test was conducted using both trace statistics and maximum eigenvalue statistics.

Table 9: Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.928966	24.09322	15.49471	0.002
At most 1	0.031907	0.291841	3.841465	0.589

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 10: Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.928966	23.80138	14.2646	0.0012
At most 1	0.031907	0.291841	3.841465	0.589

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
*denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values; Source: Authors own calculation.

The trace statistic value (20.99) is greater than the 5% critical value (15.49), and the p-value (0.009) is less than 0.05 (Table 9). This means the null hypothesis of no cointegration is rejected and alternative hypothesis is accepted that there is at least one cointegrating relationship. The maximum eigenvalue statistic (19.80) is also greater than the 5% critical value (14.26), and the p-value (0.002) is less than 0.05 (Table 10), confirming the result. For the next rank i.e. at most 1, both test statistics are smaller than their critical values, and the p-values are greater than 0.05, which means there is no second cointegrating equation. Hence, both tests confirm that there is exactly one cointegrating relationship between LN_EMP and LN_ENROL. Hence the Johansen cointegration test shows the presence of a long-run relationship between employment and higher education enrolment.

4.2.4 Vector Error Correction Model (VECM)

Since the variables were non-stationary but cointegrated, the VECM method was applied to study both the long-run relationship through the cointegrating equation and the short-run dynamics through the error-correction term and lagged differences. Since the VAR model suggested optimal lag length of 2 based on information criteria, the Johansen cointegration test used the same lag length and the VECM was estimated with one less lag (p-1). Therefore, the VECM was run with lag 1.

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Table 11: Vector Error Correction Estimates; Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1	
LN_EMP(-1)	1.000000	
LN_ENROL(-1)	-0.459484	
	(0.01943)	
	[-23.6511]	
C	-3.875427	
Error Correction:	D(LN_EMP)	D(LN_ENROL)
CointEq1	-1.087355	2.116906
	(0.43713)	(0.92278)
	[-2.48747]	[2.29405]
D(LN_EMP(-1))	-0.227844	-1.493404
	(0.29304)	(0.61860)
	[-0.77752]	[-2.41416]
D(LN_ENROL(-1))	-0.240311	0.164319
	(0.16055)	(0.33891)
	[-1.49684]	[0.48484]
C	0.072583	0.1257
	(0.01733)	(0.03659)
	[4.18726]	[3.43515]
R-Squared	0.742269	0.626013

Vector Error Correction Estimates, Probability result

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-1.087355	0.437133	-2.487469	0.0286
C(2)	-0.227844	0.293039	-0.777519	0.4519
C(3)	-0.240311	0.160546	-1.496837	0.1603
C(4)	0.072583	0.017334	4.187263	0.0013
C(5)	2.116906	0.922783	2.294045	0.0406
C(6)	-1.493404	0.618602	-2.414158	0.0327
C(7)	0.164319	0.338911	0.484843	0.6365
C(8)	0.1257	0.036592	3.435147	0.0049

Equation: D(LN_EMP) = C(1)*(LN_EMP(-1) - 0.459484199196*LN_ENROL(-1) - 3.87542747893) + C(2)*D(LN_EMP(-1)) + C(3)*D(LN_ENROL(-1)) + C(4)
R-squared 0.742269

Equation: D(LN_ENROL) = C(5)*(LN_EMP(-1) - 0.459484199196*LN_ENROL(-1) - 3.87542747893) + C(6) *D(LN_EMP(-1)) + C(7)*D(LN_ENROL(-1)) + C(8)
R-squared 0.626013

Source: Authors own calculation.

The cointegrating equation shows that the coefficient of LN_ENROL(–1) is –0.4595. This means that a 1% increase in higher education enrolment leads to ~0.46% increase in employment in the

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long run. The t-statistic (23.65) is highly significant, showing a strong positive long-run causality running from LN_ENROL (independent variable) to LN_EMP (dependent variable). The error-correction term for the employment equation (C1) is negative (–1.0874) and significant (0.0286 < 0.05), meaning about 109% of deviations from the long-run equilibrium are corrected each year, showing a fast adjustment or convergence towards equilibrium. Also, the VECM estimation produced R^2 values of 0.74 for the employment equation. This implies that ~ 74% of the variation in employment is explained by the factors included in the model i.e. enrolment. These values indicate a good fit for both equations (Table11).

Hence, the study shows a positive long-run relationship from higher education enrolment to employment. This might be because students need several years to complete their degrees and become eligible for jobs. Teaching, non-teaching, and PSU jobs require higher qualifications, so as enrolment increases, more people get the necessary degrees. Over time, the growth of colleges and universities also creates more job opportunities. Also, recruitment in these sectors usually happens in cycles, so the effect of higher enrolment appears after some years.

The short-run results show that most lagged coefficients are not significant. The coefficient C6 (–1.4934, p = 0.0327) is negative and significant, meaning that an increase in employment reduces enrolment in the short run (Table 11). This suggests that when more jobs are available, some individuals may prefer to take up work rather than continue their studies. Also, the opportunity cost of education becomes higher as families prefer current income over spending time and money on further higher studies. Some students may also migrate for jobs and leave higher education, leading to a short-term fall in enrolment growth.

4.2.5 Residual Diagnostic Tests

After running the VECM, some residual tests were performed to check the model stability. The VEC residual serial correlation LM test, White test, and Jarque-Bera test all had p-values above 0.05 and failed to reject null hypothesis (Table 12-14).

Table 12: VEC Residual Serial Correlation LM Tests

Null hypothesis: No serial correlation at lag h

Lag	LRE* stat	df	Prob.	Rao F-stat	df2	Prob.3
1	2.174156	4	0.7038	0.546352	(4, 6.0)	0.7093
2	2.944851	4	0.5671	0.784525	(4, 6.0)	0.5747

Null hypothesis: No serial correlation at lags 1 to h

Lag	LRE* stat	df	Prob.	Rao F-stat	df2	Prob.3
1	2.174156	4	0.7038	0.546352	(4, 6.0)	0.7093
2	8.117896	8	0.422	1.017802	(8, 2.0)	0.5846

*Edgeworth expansion corrected likelihood ratio statistic; Source: Authors own calculations.

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Table 13: VEC Residual Heteroskedasticity Test

Null Hypothesis: No Heteroskedasticity

Joint test:		
Chi-sq	df	Prob.
20.88669	18	0.2852

Source: Authors own calculations.

Table 14: VEC Residual Normality Tests

Null Hypothesis: Residuals are multivariate normal

Component	Jarque-Bera	df	Prob.
1	1.056488	2	0.5896
2	0.549523	2	0.7598
Joint	1.606011	4	0.8077

Source: Authors own calculations.

This means the residuals had no autocorrelation, no heteroskedasticity, and were normally distributed. These results show that the model is good and can be used for further analysis.

5. LIMITATIONS OF THE STUDY

This study gives useful information about the relationship between higher education and employability for Scheduled Tribes in Rajasthan, but it has some limitations. The study uses secondary data and detailed state-level data is not always available, therefore a limited number of observations are tested for the results. The study uses forecasted values for the years where data were not available. The forecasted values depend on the model and assumptions used, and they may not fully show future changes.

6. CONCLUSION AND SUGGESTIONS

The descriptive analysis shows that enrolment of Scheduled Tribes in higher education in Rajasthan has improved steadily, and gender parity has also increased over the years. ST students in Rajasthan have performed better in enrolment compared to the national ST average. However, their share in teaching, non-teaching, and PSU jobs remains much lower than SCs and OBCs. The econometric analysis confirms a positive and significant long-run relationship between higher education enrolment and employability. The results show that a 1% rise in enrolment leads to only a 0.46% rise in employment, which means job growth is not matching the growth in education which indicates skill mismatch. However, in the short run, increase in employment reduces enrolment as many students choose jobs over studies due to immediate income opportunities. Some students also migrate for work, which further lowers enrolment in the short run.

Therefore, effective steps are needed to convert the rise in enrolment into improved employability for ST youth. Regular recruitment drives should be held to fill the vacant posts. Higher education should include practical skills and vocational courses to prepare students for jobs. Industry and colleges should work together to provide internships, training, and job fairs. Financial support like scholarships, hostels, and stipends should be expanded to help students complete their studies. Also, awareness campaigning in tribal areas can motivate families to support higher education

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even when jobs are available. Hence, a robust mechanism is needed for education planning and job creation so that the benefit of increasing enrolment leads to better employability for STs in Rajasthan.

Competing Interests
Authors have no competing interests.

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