

# A Study Of Gender Parity With Respect To Education Of Scheduled Tribes In India

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**Abstract:** This paper relates to the study of gender parity on the higher education of scheduled tribes in India. The time series data for the period 2005-06 to 2016-17 is taken for the study. Pearl Reed S-shape logistic curve and quadratic models are fitted for data under study and trends are estimated. The forecasts are generated for next 20 years under both the models. The estimated trend values as well as the forecasts so generated are tested for significance of difference between the models used. It was observed that there was no significant difference between the models for trend values but they are significantly different for forecasts. We reveal that Pearl Reed S-shape logistic curve is the curve of best fit for the problem under study.

**Key Words:** Gender Parity, Scheduled tribes, higher education, Pearl Reed curve S curve, Quadratic curve, Trend.

## 1 INTRODUCTION

The gender parity index is a universally accepted measure for equality between girls and boys with respect to enrolment in schools and colleges. It takes only non-negative value as it is the ratio of female to boys enrolled in schools/colleges. If it is equal to unity then it is an indication of equality between male and female enrolment in schools and/or colleges. A gender parity index with less than unity is an indication of male enrolment is higher than female enrolment while gender parity index with greater than unity indicates that female enrolment is higher than male enrolment. The higher the value of gender parity index higher is the equality of access between males and females. (1,12) Jayachandran S (2) has expressed the roots of gender inequality in developing countries and suggested the several mechanisms for economic development by empowering women and reducing gender gaps. Dunn D. has represented a descriptive picture of scheduled caste and tribe women's status in Indian society and revealed that social and economic development plays an important role to reduce the disadvantage of scheduled tribe women. She relied on the gender parity as important aspect for overall development of the country. The strategies for improving gender parity to promote deprived women of Coochbehar district, West Bengal, India have been suggested by S Chaudhary and D Sarkar.(14) They observed that gender parity plays the key role for improvement of scheduled tribe and scheduled castes women. Esther Duflo(8) relied upon women favouring policies has significant effect on achievement of gender equality and ultimately women empowerment. Tribal populations continue to have one of the lowest enrolments and retention rates as well as learning outcomes in the country.(1, 2) . A rigorous study of adjustment of tribal students in their schools on the basis of economic conditions has been made by Jeena Shelly(10) and suggested that every stake holder of the education system should attempt for better atmosphere in schools so that dropout rate of tribal's be decreased. Jobin Joy and M. Srihari(11) studied the factors affecting the dropout among scheduled tribe students in their case study of Wayanad district, Kerala and they suggested to conduct awareness and motivational programs for the tribal to recognize the importance of education. An attempt was made by Dhar Diva ,

Tarun Jain & Seema Jayachandran (13) to study the role of parents towards gender equality by conducting a survey in Haryana India. They emphasized on the importance of parent-children relationship for gender equality considering educational and social factors. The only means for ensuring gender equality and empowerment is the education. GPI, which is free from the effects of the population structure of the appropriate age group, provides picture of gender equality in education from the year 2005-06 onwards remarkable development has been achieved towards gender equality in education of scheduled tribes.(3,4,5,6,7)

## 2 METHODOLOGY

In this study Pearl Reed S-shape logistic curve and quadratic trend models are used for analysis of Gender Parity among Scheduled Tribe students with respect to higher education. The trend values are estimated under both the models and also forecasts for next 20 years are generated assuming the normal conditions. Both these models are separately tested for estimated trends as well as forecasts generated using Student's t test. Also the fitted models are tested on the basis of accuracy measures viz. mean absolute percent error (MAPE), mean absolute deviation (MAD) and mean square deviation (MSD) using MINITAB software.

i. Quadratic trend Model:  

$$Y_t = \alpha_0 + \alpha_1 * t + \alpha_2 * t^2 \dots\dots\dots(1)$$

ii. S-Curve Pearl Reed Logistic Trend Model  

$$Y_t = \frac{10^\alpha}{(\beta + \gamma * \delta^t)} \dots\dots\dots(2)$$

Where  $\alpha_0$ ,  $\alpha_1$ ,  $\alpha_2$ ,  $\alpha$ ,  $\beta$ ,  $\gamma$ , and  $\delta$  are the constants to be determined.

**Table1**  
 Gender Parity Index for Scheduled Tribe Students

| Year    | Higher Education | Year    | Higher Education |
|---------|------------------|---------|------------------|
| 2005-06 | 0.55             | 2011-12 | 0.78             |
| 2006-07 | 0.58             | 2012-13 | 0.79             |
| 2007-08 | 0.54             | 2013-14 | 0.81             |
| 2008-09 | 0.58             | 2014-15 | 0.81             |

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|         |      |         |      |
|---------|------|---------|------|
| 2009-10 | 0.57 | 2015-16 | 0.83 |
| 2010-11 | 0.74 | 2016-17 | 0.85 |

Source: Gov. India MHRD Department of School Education & Literacy New Delhi 2016, 2017

### 3 RESULTS AND DISCUSSION

The fitted Quadratic trend Model and S-Curve Pearl Reed Logistic Trend Model using MINITAB are as;

#### 3.1 QUADRATIC TREND MODEL:

$$Y_t = 0.4711 + 0.0412xt - 0.00067xt^2$$

$$\alpha_0 = 0.4711, \alpha_1 = 0.412 \text{ and } \alpha_2 = 0.00067$$

#### 3.2 PEARL REED S-SHAPE LOGISTIC MODEL

$$Y_t = \frac{10^1}{(9.68806 + 11.6379 * 0.860532^t)}$$

$$\alpha = 1, \beta = 9.68806, \gamma = 11.6379 \text{ and } \delta = 0.860532$$

**Table-2**

| Year              | GPI Higher Education ST | Quadratic Trend Model | Pearl Reed S-shape logistic Model |
|-------------------|-------------------------|-----------------------|-----------------------------------|
|                   |                         | Estimated Trend Q     | Estimated Trend S                 |
| 2005-06           | 0.55                    | 0.511621              | 0.507540                          |
| 2006-07           | 0.58                    | 0.550772              | 0.546265                          |
| 2007-08           | 0.54                    | 0.588589              | 0.584652                          |
| 2008-09           | 0.58                    | 0.625072              | 0.622282                          |
| 2009-10           | 0.57                    | 0.660222              | 0.658769                          |
| 2010-11           | 0.74                    | 0.694038              | 0.693775                          |
| 2011-12           | 0.78                    | 0.726521              | 0.727019                          |
| 2012-13           | 0.79                    | 0.757670              | 0.758287                          |
| 2013-14           | 0.81                    | 0.787485              | 0.787430                          |
| 2014-15           | 0.81                    | 0.815967              | 0.814363                          |
| 2015-16           | 0.83                    | 0.843114              | 0.839060                          |
| 2016-17           | 0.85                    | 0.868929              | 0.861543                          |
| Accuracy measures | MAPE                    | 5.75815               | 5.62473                           |
|                   | MAD                     | 0.03698               | 0.03586                           |
|                   | MSD                     | 0.00183               | 0.00177                           |

We are testing the models with respect to estimates of trend values at 5% level of significance. The null hypothesis set up is

$\mu_1$ : Mean of Trend S curve  
 $\mu_2$ : Mean of Trend Q curve  
 Null hypothesis  $H_0: \mu_1 - \mu_2 = 0$   
 Alternative hypothesis  $H_1: \mu_1 - \mu_2 \neq 0$   
 TEST

| T value | DF | P Value |
|---------|----|---------|
| -0.05   | 21 | 0.96    |

Null hypothesis  $H_0$  is accepted at 5% level. This indicates that there is no significant difference between the models fitted.

**Table-3**

| Sr. No. | Year    | Forecasts Generated Under |                     |
|---------|---------|---------------------------|---------------------|
|         |         | Quadratic Trend Model     | S-Curve Trend Model |
| 1       | 2017-18 | 0.89341                   | 0.88188             |
| 2       | 2018-19 | 0.91656                   | 0.90016             |
| 3       | 2019-20 | 0.93837                   | 0.91651             |
| 4       | 2020-21 | 0.95885                   | 0.93107             |
| 5       | 2021-22 | 0.97799                   | 0.94396             |
| 6       | 2022-23 | 0.99581                   | 0.95535             |
| 7       | 2023-24 | 1.01229                   | 0.96538             |
| 8       | 2024-25 | 1.02743                   | 0.97417             |
| 9       | 2025-26 | 1.04124                   | 0.98187             |
| 10      | 2026-27 | 1.05372                   | 0.98859             |
| 11      | 2027-28 | 1.06486                   | 0.99445             |
| 12      | 2028-29 | 1.07467                   | 0.99955             |
| 13      | 2029-30 | 1.08315                   | 1.00398             |
| 14      | 2030-31 | 1.09029                   | 1.00782             |
| 15      | 2031-32 | 1.09610                   | 1.01115             |
| 16      | 2032-33 | 1.10058                   | 1.01404             |
| 17      | 2033-34 | 1.10372                   | 1.01653             |
| 18      | 2034-35 | 1.10553                   | 1.01869             |
| 19      | 2035-36 | 1.10600                   | 1.02055             |
| 20      | 2036-37 | 1.10514                   | 1.02216             |

We are testing the models with respect forecasts generated at 5% level of significance. The null hypothesis set up is

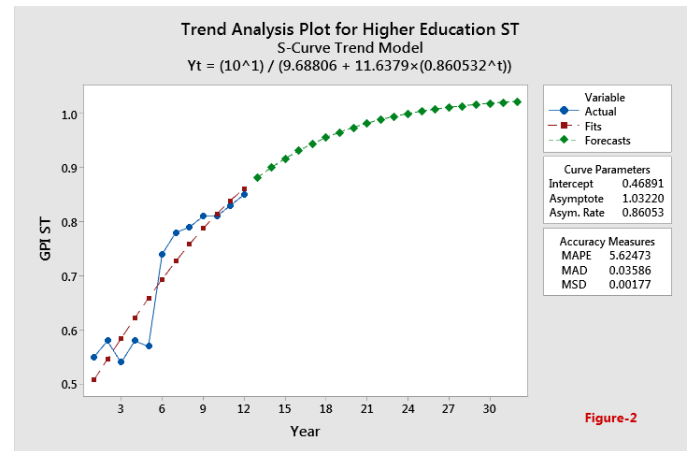
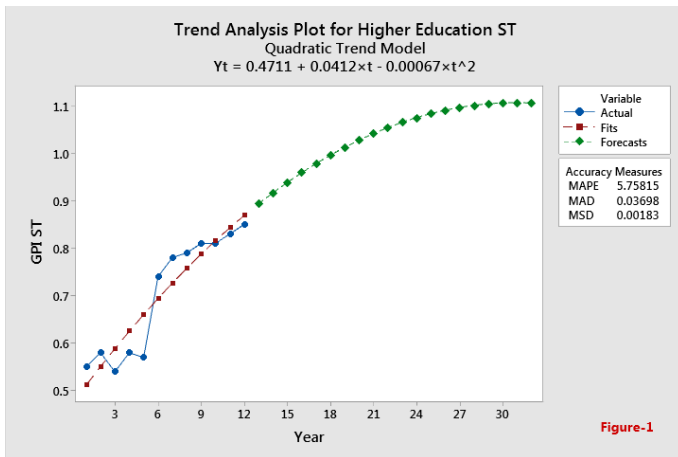
$\mu_1$ : Mean of Forecasts S curve  
 $\mu_2$ : Mean of Forecasts Q curve  
 Null hypothesis  $H_0: \mu_1 - \mu_2 = 0$   
 Alternative hypothesis  $H_1: \mu_1 - \mu_2 \neq 0$   
 TEST

| T value | DF | P Value |
|---------|----|---------|
| -3.30   | 31 | 0.002   |

We reject the Null hypothesis  $H_0$  at 5% level as P-value is less than 0.05. This indicates that there is significant difference between the models fitted with respect to forecasts.

| Sample  | N  | Mean  | StDev | SE Mean |
|---------|----|-------|-------|---------|
| Trend S | 12 | 0.700 | 0.118 | 0.034   |
| Trend Q | 12 | 0.703 | 0.117 | 0.034   |

| Sample     | N  | Mean   | StDev  | SE Mean |
|------------|----|--------|--------|---------|
| Forecast S | 20 | 0.9774 | 0.0428 | 0.0096  |
| Forecast Q | 20 | 1.0373 | 0.069  | 0.015   |



#### 4 CONCLUSIONS

We conclude that the quadratic trend model and the S-curved model are not significant with respect to estimates of trend values. But there is significant difference between these two models with respect the forecasts generated at 5% level. S-curved model is more appropriate model as compared to quadratic model on the basis of accuracy measures for this type of data which depends upon time. The quadratic model shows rapid increase in the gender parity in higher education of scheduled tribes as compared to S-curved model (Table-2). If the gender wise enrolment in higher education of scheduled tribes is exhibiting S-curve trend then the gender equality will be achieved in the year 2029-30 on the other hand if the data exhibits quadratic trend the gender equality may be achieved in 2022-23 (Table-3). By comparing the accuracy measures and current enrolment of scheduled tribes in higher education we suggest that S-curved trend models will be more appropriate for this phenomenon.

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