

Farm Level Transformation through Quality of Life: A Case Study of Barak Valley

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Abstract: *Agricultural performance can promote human development by ensuring food security for sustainable development, raising the per capita income, providing better amenities of life, improving the nutrition and health status of the people while raising the environmental sustainability through agricultural growth. On the other hand, human development expands the productivity of the farmers in the form of raising the skill of farming, giving access to modern technology, more market information, extension services etc. The present paper analyses the agro - human development linkage of Barak Valley. The methodology used in this study was by collection of primary data and field observations. Samples for statistics were taken from heads of rural households in selected Agricultural Development Circles of three districts of Cachar, Karimganj and Hailakandi in Barak Valley. The sample consisted of 450 Households. Each component of agricultural performance is analyzed with the help of factor indices. The factor indices assist to understand the actual scenario of agricultural situation of sample ADOs in Barak Valley. A number of indices have been constructed to address the objectives of the study which includes: (a) Agricultural Performance Index (API), (b) Human development by Quality of Life (c) Wealth Index, (d) Health Index, and (e) Education Index. All these indices have been constructed at the household level. Moreover, suitable statistical, regression techniques and econometric models have been used to analyze the relationship among concerned variables of the study.*

Keywords: Agricultural Performance Index, Human Development, Rural Economy, Sustainable Farming

1. Introduction

Human development of any region requires an expansion of the choice set of population. It includes a variety of dimensions to promote human development - economic, social, political, cultural etc. On the other hand, agriculture is the mainstay of life in rural areas. Thus, economic development or human development can never be ascertained without the growth and development of agriculture. Agriculture can play a lead role in the promotion of human development in agro - based countries or regions. Rural development in true sense of the term possible when there shall be a proper mix of agricultural and human development parameters.

Brief Review

World Development Report (2008), Rosegrant et al (2007), Dutta and Ravallion (1996), Dayal (1984), Dasgupta (1998), etc has nicely analyzed the relation between agriculture and incidence of poverty in LDCs. Many other studies have highlighted the empirical interconnection among social sector variables and farm level transformation.

Objectives

- 1) To study the relation between agricultural performance and quality of life.
- 2) To study the determinants of agricultural performance.
- 3) To study the determinants of human development.

Hypotheses

- 1) There exists a positive relation between agricultural performance and quality of life.
- 2) The social sector variables determine not only human development but also agricultural performance.

2. Data Source and Methodology

a) Method of Data Collection

Data has been collected from both primary and secondary sources. Multistage sampling has been followed. In the Barak Valley region, there are six agricultural subdivisions— (1) Cachar district (3 subdivisions), (2) Karimganj district (2 subdivisions) (3) Hailakandi (1 subdivisions). From each subdivision one ADO circle has been selected subject to the condition that the selected circle represents the entire subdivision. From each ADO circle two villages (one agriculturally developed having at least some marketing network and other agriculturally underdeveloped) have been selected in consultation with Agricultural Development Officer. From the selected villages 450 sample of farming households has been selected for the study.

b) Method of Data Interpretation and Analysis

A number of indices have been constructed to address the objectives of the study which includes: (a) Agricultural Performance Index (API), (b) Human development by Quality of Life Index (c) Wealth Index, (d) Health Index and (e) Education Index. All these indices have been constructed at the household level. Moreover, suitable statistical and regression techniques will be used to analyze the relationship among concerned variables of the study.

GLM or Multivariate Model along with four test statistics of Pillai's trace, Wilks' lambda, Hotelling's trace, and Roy's largest root criterion and F statistic are provided for determinants of agricultural performance. Maximum Likelihood method of optimisation has been used to analyse the determinants of human development.

3. Data Analysis, Findings and Discussion

Agricultural Performance Index and Quality of Life Index in Barak Valley

Agricultural performance is a measure of the changes (positive or negative) in the principal variables that constitute the agricultural sector. The study has considered all aspects related to farm practices to include in performance so that an agricultural index can be able to present the entire scenario of agriculture and rural development. Agricultural Performance Index is a composite index of all four-dimension index - Land Fertility Index, Market Index, Technology Achievement Index and Labour Productivity Index having equal weights.

Performance in human development has been measured by achievement in quality of life/standard of living. A composite index has been formed to measure the progress in quality of life by 28 indicators of household - housing characteristics, quality of sanitation, electricity, drinking water, cooking fuel, a bunch of electronic goods, essential goods, vehicles etc. Moreover education index made of literacy level and enrolment, health index made of BMI - Body Mass Index and child mortality have been prepared. Since both dimensions of composite index should move in the same direction, the child mortality has been reciprocated. Quality of life index is a composite measure of all three-dimension indices having equal weights.

Table 1: Brief performance statistics in Barak Valley

Variables	Minimum	Maximum	Mean	Std. Deviation
LFI	0.012	0.978	0.51419	0.151807
MI	0	1	0.5266	0.30564
TAI	0.1	1	0.5428	0.23907
LPI	0.02	1	0.291	0.12652
API	0.071	0.854	0.46847	0.160284
WI	0.26	0.98	0.56067	0.151895
EI	0	1	0.61689	0.262101
HI	0	0.991	0.771	0.136504
QLI	0.18	0.854	0.643	0.133352

API—Agricultural Performance Index, LFI - Land Fertility Index, MI - Market Index, TAI - Technology Achievement Index, LPI - Labour Productivity Index, WI - Wealth Index, EI - Education Index, HI - Health Index, QLI - Quality of Life Index, MPI - Multidimensional Poverty Index

4. Findings

- 1) Land fertility index is crucial importance in Barak Valley as natural fertility of the soil contributes largely for the crop production in right time and in required amount in the midst of infrastructural bottlenecks. Land fertility index has been made to analyse properly the land's contribution in output. The mean observation is 0.514 in Barak Valley which shows moderate performance in this regard.
- 2) The mean Market index is 0.526 in Barak Valley which is moderate. It shows the level of commercialization of agriculture in Barak Valley.

- 3) Technology Achievement Index is a composite measure of use of improved seeds i. e. HYVseeds and other modernising tools. Adoption of modern technology by the farmers in Barak Valley has been calculated by percentage of output by HYVseeds, use of tractor/powertiller, use of pumpset, use of sprayer, use of harvester/thresher and application of fertiliser & pesticides. The technology achievement index is 0.542 which is good in the circumstances of Barak Valley.
- 4) The mean Labour Productivity index is 0.291 in Barak Valley which is less than the average. Labour Productivity Index is prepared to measure the efficacy of human labour. LPI is calculated as output per worker of each sample. From the data of total output and total number of workers, output per worker has been calculated while on the basis of output per worker, dimension index has been found out for 450 samples.
- 5) The mean value of Agricultural Performance Index is 0.468 in Barak Valley which shows moderate achievement regarding entire agrarian system. Agricultural performance is indicative of all aspects of agricultural development land fertility or labour efficacy or technology or marketing. Thus the API in Barak Valley shows the medium or moderate performance.
- 6) Wealth index does not mean that it has been calculated by only property and income of the farmers, rather wealth index is a composite measure of 28 all such indicators which include every facets of human life and his/her different choices. The mean of Wealth Index is 0.560 in Barak Valley which is average, however there is ample gap between rich, medium and small farmers regarding wealth.
- 7) Education is one of the most important aspect of human development. Education index is prepared to analyse the level of improvement in social development parameter. In Barak Valley education has played an important role in fostering human development. Education index is measured by two dimensions - literacy level and child enrolment. The mean of Education Index is 0.616 in Barak Valley showing moderate performance.
- 8) Health index in Barak Valley has been prepared with the help of two dimensions - Body Mass Index and Child Mortality. The mean performance of 0.771 index denotes moderate achievement in health.
- 9) The quality of life index is 0.643 showing average achievement in Barak Valley for the sample farmers.

The GLM Multivariate Analysis

The GLM Multivariate procedure provides regression analysis and analysis of variance for multiple dependent variables by one or more factor variables or covariates. The factor variables divide the samples into groups. Using this general linear model procedure, one can test null hypothesis about the effects of factor variables on various groupings of a joint distribution of dependent variables.

Four tests of significance for each model effect

Table 2: Multivariate Tests

	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	0.929	8.5022	4	261	0	0.929
	Wilks' Lambda	0.071	8.5022	4	261	0	0.929
	Hotelling's Trace	13.031	8.5022	4	261	0	0.929
	Roy's Largest Root	13.031	8.5022	4	261	0	0.929
WI	Pillai's Trace	0.846	2.023	140	1.0563	0	0.211
	Wilks' Lambda	0.34	2.314	140	1.0423	0	0.236
	Hotelling's Trace	1.442	2.674	140	1.0383	0	0.265
	Roy's Largest Root	1.061	8.002	35	264	0	0.515
EI	Pillai's Trace	0.911	3.245	96	1.0563	0	0.228
	Wilks' Lambda	0.289	3.978	96	1.0363	0	0.267
	Hotelling's Trace	1.832	4.953	96	1.0383	0	0.314
	Roy's Largest Root	1.468	16.15	24	264	0	0.595
HI	Pillai's Trace	1.339	1.071	496	1.0563	0.082	0.335
	Wilks' Lambda	0.192	1.078	496	1.0473	0.061	0.338
	Hotelling's Trace	2.074	1.085	496	1.0383	0.041	0.342
	Roy's Largest Root	0.754	1.605	124	264	0.001	0.43

a. Design: Intercept + WI + EI + HI

b. Dependent Variables are Land Fertility, Market, Technology Adoption & Labour Productivity Indices

c. Independent Variables Wealth, Education and Health Indices

The table has shown the role of social sector variables in API. If more than one dependent variable is specified, the multivariate analysis of variance using Pillai's trace, Wilks' lambda, Hotelling's trace, and Roy's largest root criterion with approximate F statistic are provided.

Pillai's trace is a positive - valued statistic. Increasing values of the statistic indicate effects that contribute more to the model. On the above model land fertility index, market index, technology achievement index and workers productivity index are contributed highly by wealth, education and health indices of Barak Valley.

Wilks' Lambda is a positive - valued statistic that ranges from 0 to 1. Decreasing values of the statistic indicate effects that contribute more to the model. Here education and health contribute more than wealth index.

Hotelling's trace is the sum of the Eigen values of the test matrix. It is a positive - valued statistic for which increasing values indicate effects that contribute more to the model. Hotelling's trace is always larger than Pillai's trace, but when the Eigen values of the test matrix are small, these two statistics will be nearly equal. This indicates that the effect probably does not contribute much to the model. But here they differ largely and do contribute to the model.

Roy's largest root is the largest Eigen value of the test matrix. Thus, it is a positive - valued statistic for which increasing values indicate effects that contribute more to the model. In Barak Valley wealth and education contribute more than health index.

Roy's largest root is always less than or equal to Hotelling's trace. When these two statistics are equal, the effect is predominantly associated with just one of the dependent variables, there is a strong correlation between the dependent variables, or the effect does not contribute much to the model. Each multivariate statistic is transformed into a test statistic with an approximate or exact F distribution.

The hypothesis (numerator) and error (denominator) degrees of freedom for that F distribution are shown. The significance values of the main effects, WI, HI and EI are less than 0.05, indicating that the effects contribute to the model.

Table 3: The maximum likelihood method of optimization

Generalized linear model No. of obs = 450	
Optimization Residual df = 445	
Scale parameter =	.0107047
Deviance =	4.763599556
(1/df) Deviance =	.0107047
Pearson =	4.763599556
(1/df) Pearson =	.0107047
Log likelihood =	384.8325581
AIC =	- 1.688145
BIC =	- 2713.851575

qli	Coef. Std. Err. z P> z [95% Conf. Interval]

lfi	.212616 .034858 6.10 0.000 .1442955 .2809364
mi	.1546852 .0236977 6.53 0.000 .1082386 .2011319
tai	.1624495 .0257085 6.32 0.000 .1120617 .2128373
lpi	.1471434 .0491396 3.96 0.001 .0491684 .1434552
_cons	.3505139 .0203887 17.19 0.000 .3105528 .3904751

Here all coefficients play a positive role in the determination of human development in Barak Valley. The maximum likelihood method ensures the role of agrarian components in human development. The z - values are significant for all predictors.

5. Conclusion

The study confirms the strong inter - connection between agricultural performance and human development in Barak Valley. The technologies people use, play a significant role in determining how fast agricultural productivity grows and how that growth affects the poor and the condition of their living. The development of agricultural technology for both food and non - food crops, the dissemination of assets and information, developing agricultural research and extension facilities

targeted towards the smallholder farmer, all work together to promote long - term agricultural productivity. Results show that emphasis over development and extension of rural services and enhancing production resources of the farming community that leads to improvement quality of life can have a considerable influence on agricultural sustainability.

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