

## **Agriculture and Multidimensional Poverty for Human Development: A Case Study of Barak Valley in Assam**

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**ABSTRACT:** *This paper aims to study linkage among agriculture, poverty and human development and evaluate sustainability indicators in the Barak Valley zone of Assam. 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 Barak Valley. The sample consisted of 450 Households. The present paper analyses the agriculture-human development linkage of Barak Valley. 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 Index (c) Multidimensional Poverty Index etc. All these indices have been constructed at the household level. Moreover, suitable statistical, regression techniques and econometric models will be used to analyze the relationship among concerned variables of the study*

**KEYWORDS:** *Agricultural Performance Index, Quality of Life Index & Multidimensional Poverty Index.*

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### **I. INTRODUCTION**

Barak Valley consists of three districts of Cachar, Karimganj and Hailakandi in southern part of Assam on the bank of river Barak and her tributaries. The population of the valley is 3,612,581 as per 2011 census. The economy of the Barak Valley is pre dominated by agriculture and allied sectors. More than 58 percent of the total working population in the valley is either cultivators or agricultural laborers and 70.7 percent of its workers earn their livelihood from the primary sector activities. But agriculture is already overcrowded and it shows that only 30.9 percent of the total geographical area in the valley constitutes its net sown area against 41.6 percent in the State of Assam. This means that the Barak Valley suffers from relative scarcity of cultivable land. In the consequence, Barak Valley is constrained to feed as many as 8277 persons per 1000 hectares of cultivable land. The corresponding figures for the Brahmaputra Valley and the State of Assam are 6445 hectares and 6567 hectares respectively whereas the all-India figure is 4305 hectares. Added to the scarcity of cultivable land in the valley, inadequate progress in intensive farming also exists. As such it would be interesting to study the interrelationships between performance of agriculture and human development scenario in the valley.

#### **Previous work**

World Development Report (2008), Rosegrant et al (2007), Dutta and Ravallion (1996), Dayal (1984), Dasgupta (1998), Thirtle et al (2001) etc have nicely analyzed the relation between agriculture and incidence of poverty in LDCs. Other studies by Pathasarathy (1975), Singh (2010), Gibson et al (1998), Kennedy (1987), (1990), Bezbruah (1994), Sen (1989), Singh et al (1984) etc made empirical analysis of quality of life in relation with agricultural productivity and rural development.

The main objectives of the study are:-

- To study the relation between agricultural performance and human development.
- To study the relation among multidimensional poverty, agricultural performance and human development.
- To find out the socio-economic factors determining sustainability of agriculture and rural development.

### **II. METHODOLOGY OF THE STUDY**

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 will represent the entire subdivision. From each ADO circle two villages (one agriculturally developed having at least some marketing network and other agriculturally underdeveloped) has been selected in consultation with Agricultural Development Officer. From the selected villages 450 sample of farming households has been selected for the

study. 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 and (f) Multidimensional Poverty 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.

The definition and process of calculation of indices are

#### Agricultural Performance Index

Agricultural performance is defined as results/achievements in the field of agriculture including all aspects- land fertility, marketing, technology and labor productivity. The study has endeavored to make a composite index including all these factors.

Fig-1



Agricultural Performance Index (API) would comprise the weighted measure of:

1. Physical potential – as measured by levels of land fertility.
2. Availability and accessibility of markets, as measured by commercial sale levels of key agricultural commodities.
3. Level of technological achievements (innovations) as measured by use of improved seeds and other modernizing agricultural technologies.
4. Level of human effort (output per worker).

Factor Indices or dimension indices will be prepared

$$FI = \frac{\text{Actual value of the factor} - \text{Minimum value of the factor}}{\text{Maximum value} - \text{Minimum value}}$$

Agricultural Performance Index =  $\frac{1}{4}(\text{Land fertility index}) + \frac{1}{4}(\text{Market index}) + \frac{1}{4}(\text{Technical achievement index}) + \frac{1}{4}(\text{Workers productivity index})$

#### Wealth Index

Wealth index does not mean 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. They are 1) House type 2) Separate room for cooking/Kitchen 3) Ownership of house 4) Flooring 5) Toilet facility 6) Source of Electricity/Lighting 7) Main fuel for cooking 8) Source of Drinking Water 9) Car or Tractor 10) Moped or Scooter 11) Telephone 12) Refrigerator 13) Colour TV 14) Black and white TV 15) Bicycle 16) Electric fan 17) Radio 18) Sewing machine 19) Mattress 20) Pressure cooker 21) Chair 22) Cot or bed 23) Table 24) Clock or watch 25) Ownership of livestock 26) Water pump 27) Bullock cart 28) Harvester/Thresher. These indicators have been given weights and scores. On the basis of individual scores of 450 samples, dimension index or wealth index will be made.

The Wealth Index =  $\frac{\text{Actual score of the sample} - \text{Minimum score of the sample}}{\text{Maximum score} - \text{Minimum score}}$

#### Education index

Education index is calculated by taking equal weights of the two indicators- literacy level and child enrolment (if any school-aged child is out of school).

The Literacy Index =  $\frac{\text{Actual value of the factor} - \text{Minimum value of the factor}}{\text{Maximum value} - \text{Minimum value}}$

Therefore the Education Index =  $50\% \times \text{Literacy Index} + 50\% \times \text{Child Enrolment}$

Health Index

Health is an important parameter of Human Development. Health Index is prepared with the help of two sub dimensions- Body Mass Index and Child Mortality, giving them equal weights.

Now Factor Index for BMI = 
$$\frac{\text{Actual value of the factor} - \text{Minimum value of the factor}}{\text{Maximum value} - \text{Minimum value}}$$

Therefore Health Index =  $50\% \times \text{BMI} + 50\% \times \text{Child Mortality}$

Quality of Life Index

Quality of Life is calculated simply as Human Development Index by three equally weighted dimension indices- wealth index, education index and health index-

Quality of Life Index =  $1/3 (\text{wealth index}) + 1/3 (\text{education index}) + 1/3 (\text{health index})$

### **Multidimensional Poverty Index**

In Barak Valley Multidimensional Poverty Index has been prepared to assess the poverty. The methodology has been borrowed from Sabina Alkire and Maria Emma Santos. MPI uses the household as a unit of analysis. There are total three dimensions and ten indicators. Dimensions are deprivation in Education, deprivation in Health and deprivation in Living Standard. Education has two indicators a) Years of schooling and b) Child school attendance. They are defined as- he/she is deprived if a) No household member has completed five years of schooling and b) Any school-aged child is not attending school up to class 8. Health has also two indicators- a) Child mortality and b) Nutrition. Anyone will be deprived if a) Any child has died in the family and b) Any adult for whom nutritional information is malnourished or their BMI is less than  $18.5 \text{ kg/m}^2$ . The dimension is Living standard and the indicators are measured as- anyone is deprived if

- [1] The household has no electricity,
- [2] The household's sanitation facility is not improved or it is improved but shared with other households,
- [3] The household does not have access to safe drinking water or safe drinking water is more than a 30-minute walk from home roundtrip,
- [4] The household has a dirt, sand or dung floor,
- [5] The household cooks with dung, wood or charcoal,
- [6] The household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.

## **III. DATA ANALYSIS, FINDINGS AND DISCUSSION**

### **3.1 Agricultural Performance 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 Labor Productivity Index having equal weights.

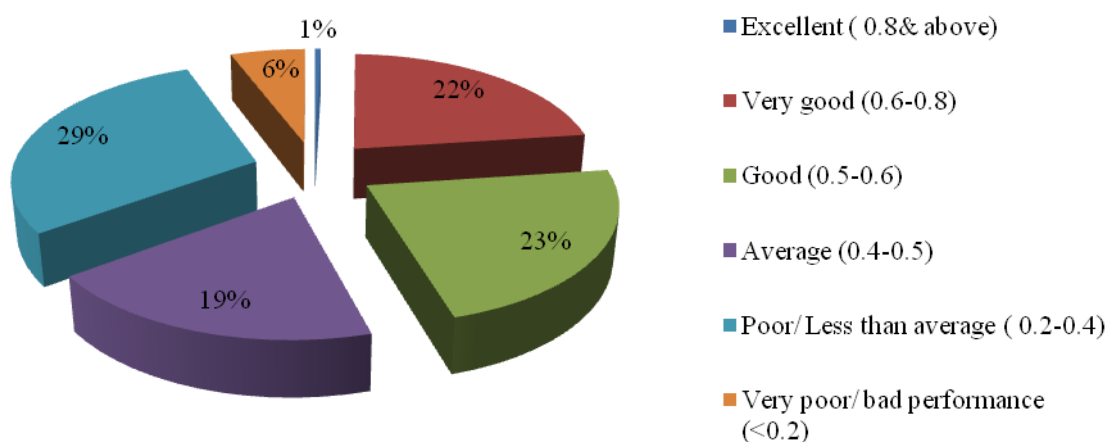
Table- 1

Distribution of farmers according to score in API

Indicator	Agricultural Performance index	Indicator	Number of farmers	% of farmers
Mean observation	0.468	Excellent ( 0.8& above)	2	1%
Max. observation	0.854	Very good (0.6-0.8)	101	22%
Min. observation	0.071	Good (0.5-0.6)	102	23%
		Average (0.4-0.5)	87	19%
		Poor/ Less than average ( 0.2-0.4)	132	29%
		Very poor/ bad performance (<0.2)	26	6%
		Total	450	100

Source: Calculated by scholar from 450 samples.

Fig-2



Distribution of farmers according to score in API

### Findings in API

- [1] The mean value of Agricultural Performance Index is 0.468 in Barak Valley which shows moderate achievement regarding entire agrarian system. The maximum or the best performer scored 0.854 who is sample-56 belonging to Dullabcherra ADO circle. The minimum one is the 0.071 or sample-302 in Motinagar ADO and 0.072 i.e. sample-83 in Sadarashi ADO. Those who have scored more than 0.800 index value belongs to the excellent group and they are only 6 in the study area i.e. only 1% of the total households. Agricultural performance is indicative of all aspects of agricultural development land fertility or labor efficacy or technology or marketing. Thus the API in Barak Valley shows the medium or moderate performance.
- [2] 101 farmers or 22% farmers in Barak Valley denote that they belong to good performer's club. Most of them have performed well in technology achievement or marketing of the crop. Their performance lies in between 0.600 to 0.800 index value.
- [3] 23% farmers or a total of 102 samples performed 0.500 to 0.600 group known as good. Moreover the average performers with index value in between 0.400 to 0.500 are 19% of the farmers or a total of 87 in

number. They form a sizable section of farmers in Barak Valley who produce and market the largest amount of crop in Barak Valley. Those producers with high index value of 0.700 or 0.750 or more than 0.800 are very few in number. On the other hand those who performed at lower index value can not contribute much to the total crop or marketable surplus. Thus farmers with average or medium index value are more in number and contribute the most to the agricultural output of the Valley.

- [4] However the farmers with index value of 0.200 to 0.400 are not less in number. They form 29% of the farming community of the Valley and a total of 132 in my study area. They are regarded as poor performers or unable to utilize the resource properly. Their farm land is overcrowded and output per worker is low. Not only labor productivity the performance in technology adoption or marketing of crops has been low. The lower index indicates that there is misuse and non utilization of resource properly, moreover the steps to remove their inability are also very poor.
- [5] 6% performers are there whose index result is below 0.200 which is low enough to be included in the efficiency analysis. They performed badly and are mostly marginal farmers who struggle everyday to earn two square meals for their family.

### 3.2 Multidimensional Poverty Index in Barak Valley

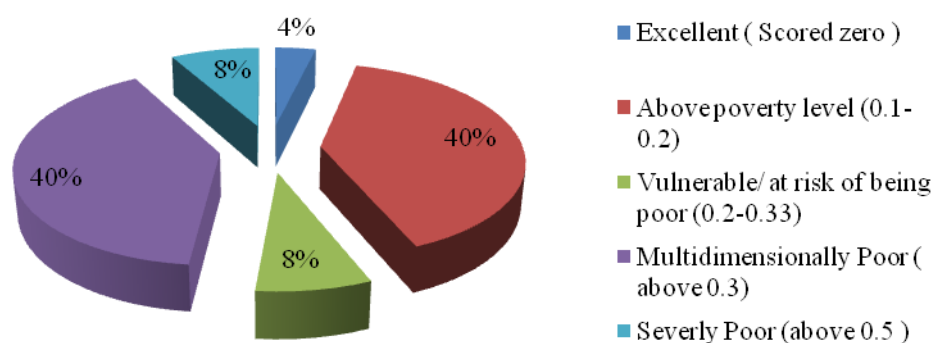
Table- 2

Distribution of farmers according to score in MPI

Indicator	Multidimensional Poverty Index	Sample	Indicator	Number of farmers	Percentage of farmers
Mean observation	0.250		Excellent ( Scored zero )	17	4%
Max. observation	0.886	s-338	Above poverty level (0.1-0.2)	180	40%
Min. observation	0.00	s-446	Vulnerable/ at risk of being poor (0.2-0.33)	35	8%
			Multidimensionally Poor ( above 0.3)	181	40%
			Severly Poor (above 0.5 )	37	8%
			Total	450	100

Source: Calculated by scholar from 450 samples

Fig-3



### Distribution of farmers according to score in MPI

- [1] Multidimensional poverty endeavors to include deprivation in all aspects of human life. The adoption of MPI in Barak Valley by the given guidelines shows that the mean performance is below the cut-off level. But it does not mean that the size of poverty stricken people are low rather the result shows that a huge portion of the people are poor. There are 218 (48%) farmers found multidimensional poor.
- [2] The mean performance of Barak Valley is 0.250 MPI while the maximum or the worst performer is s-338 with the index of 0.886 and the minimum or the best performer has achieved 0.00. The farmers who have scored zero or index value of 0.00 mean no deprivation at all. They have qualified in all ten indicators of deprivation. They are 17 in number or only 4% of the total samples under study. The best performer is mostly rich people, having big land holdings or better performer in wealth index, education and health index etc.
- [3] Those farmers who have scored in between 0.100 to 0.200 are regarded as safe or above poverty line. They are sizable in number in Barak Valley as 180 farmers or 40% of the total farmers. These farmers are well-off and they have deprivation in some of the indicators but qualified in most of the others. However it is clear that these 40% farmers are neither deprived in both the health indicators nor deprived in both the education indicators. Out of six indicators of living standard, hardly they may be deprived in 2/3 indicators.
- [4] Those farmers who have scored in between index value of 0.200 to 0.33 are vulnerable. Though they are not referred as poor yet deprivation score is such that they are close to risk. They constitute 8% of the farmers in my study area or 35 in all.
- [5] The farmers who are multi dimensionally poor scored more than index of 0.33. This cut-off has been set by experts earlier (2011- HDR). In Barak Valley the performance is really alarming. They are 181 in number which is huge or 40% of the total samples. Just imagine if 40% of the farmers are found multi dimensionally poor by the international standards out of 450, what could be the actual situation if the methodology is applied for entire population. All government claim about poverty reduction and schemes will be put before question.
- [6] There are farmers found during my survey that they are heavily affected by poverty. By MPI methods they scored more than 0.500 index value and thus fall in the category of 'severely poor'. They constitute 8% of the total farmers under study or 37 in number.

### 3.3 Indicator Wise Deprivation

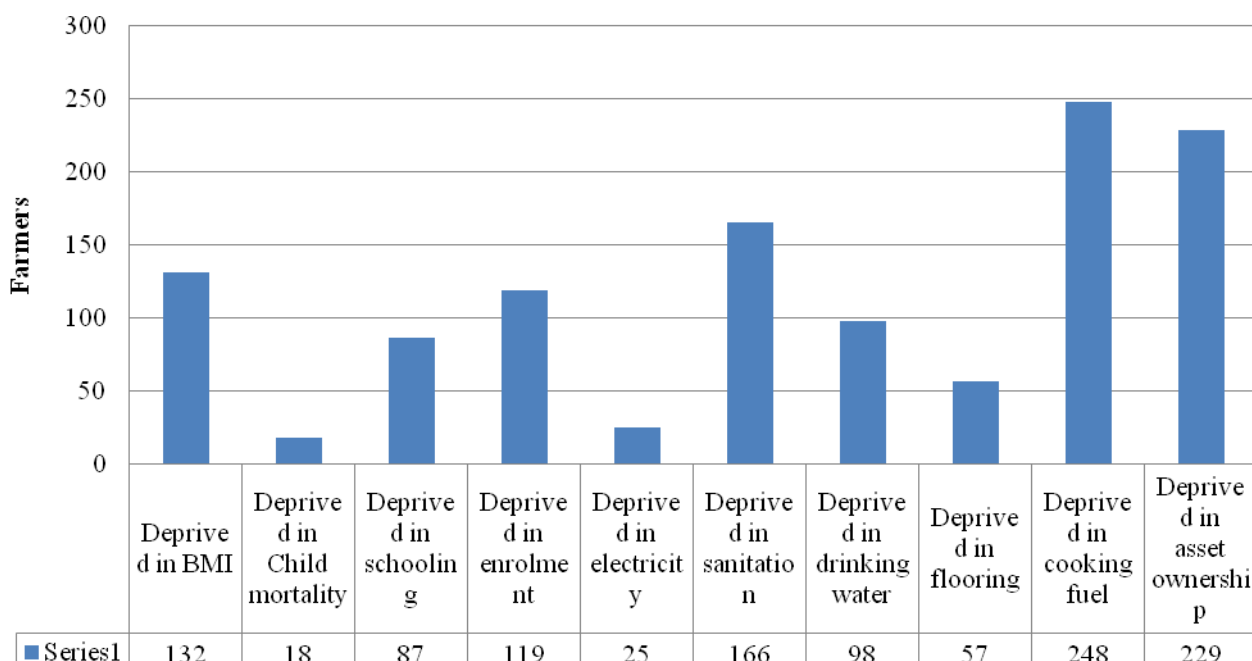
Table- 3

Number of farmers deprived in various indicators

Indicator	Number of farmers	% of farmers
Deprived in BMI	132	29%
Deprived in Child mortality	18	4%
Deprived in schooling	87	21%
Deprived in enrolment	119	26.4%
Deprived in electricity	25	5.5%
Deprived in sanitation	166	36.88%
Deprived in drinking water	98	21.77%
Deprived in flooring	57	12.66%
Deprived in cooking fuel	248	55.11%
Deprived in asset ownership	229	50.88%

Source: Calculated by scholar from 450 samples

Fig-4



Number of farmers deprived in various indicators

The number of farmers deprived in different indicators of poverty show that there is large variation in the performance in facets of multidimensional poverty index in Barak Valley for the sample farmers. The Body Mass Index is an important indicator of nutritional status of the people. If BMI is found below the cut-off level of  $18.5 \text{ kg/m}^2$ , they are regarded as poor. The number of farmers deprived in BMI is 132 or 29% of the total

farmers which shows an alarming level of nutritional intake of the farmers. Certainly it reduces the productivity of the labour and output in Barak Valley. Those famers who experienced child mortality in their family are 18 in number. Child mortality is found to decline if compared with the state. 4% of the farm household is deprived in this indicator. 21% of the farmers are deprived in schooling or 87 in total out of 450 farmers. The farmers' family in which no one has completed 5 years of schooling is 87. The number of farmers deprived in school enrolment is 119 or 26.4% of the total sample households. The criterion is that any school aged child who is not attending school up to class 8. The number farm households found to be deprived in electricity is 25 or 5.5% of the total. The number of farm family deprived in sanitation is very high with 166 or 36.88% of the total. According to MDG guideline, a household is considered to have access to improved sanitation if it has some type of flush toilet or latrine, or ventilated improved pit or composting toilet, provided that they are not shared. The number of farmers deprived in access to safe drinking water is 21.77% of the total or 98 in number. The criteria of safe drinking water according to MDG is- a household has access to clean drinking water if the water source is any of the following types: piped water, public tap, borehole or pump, protected well, protected spring or rainwater, and it is within a distance of 30 minutes' walk (roundtrip). The number of farmers deprived in flooring of the house is 57 or 12.66% of the total. Someone is poor in flooring if the household has a dirt, sand or dung floor. The poor household is one which cooks with dung, wood or charcoal and the number of farmers deprived in cooking fuel is really alarming as the figure is 248 out of 450 farmers or 55.11%. Thus access to cooking fuel is still in deplorable condition is this Valley. The number of farmers deprived in asset ownership is 229 or 50.88% of the total which shows the level of asset poverty for the farmers. The criterion is- a deprived household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.

### 3.4 Determinants of Agricultural Performance Index, Multidimensional Poverty Index and Human Development in Barak Valley

Table- 4

Agricultural Performance Index & its Factors [Results of Regression Analysis]

Regression Model \ Direct Linkage	R	R Square	Adjusted R Square	Std. Error of the Estimate	F-Dist.	Sig.	Constant	B
API & LFI	.521	.271	.269	.140027	166.506	.000	.195	.550
API & MI	.910	.828	.828	.067951	216.130	.000	.231	.488
API & TAI	.799	.638	.637	.098701	788.809	.000	.190	.547
API & LPI	.713	.509	.508	.114936	464.086	.000	.210	.792
API & WI	.847	.718	.717	.085205	114.113	.000	.033	.894
API & EI	.508	.258	.256	.138240	155.611	.000	.277	.311
API & Schooling	.859	.737	.737	.082214	125.903	.000	.148	.430
API & HI	.907	.823	.822	.05236	208.113	.000	.083	.826
API & MPI	-.451	.203	.202	.174947	114.330	.000	.513	-.539
Indirect Linkage								
LPI & HI	.850	.700	.695	.12620	327.20	.071	.052	.135
LPI & Schooling	.575	.330	.329	.10367	220.766	.000	.122	.023
LPI & WI	.596	.355	.354	.10169	246.982	.000	.013	.497
TAI & Schooling	.669	.448	.446	.17789	363.38	.000	.170	.050
TAI & WI	.736	.541	.540	.16209	528.713	.000	.106	1.158
MI & Schooling	.802	.642	.642	.182956	804.934	.000	.044	.076
MI & WI	.727	.529	.528	.21005	502.601	.000	.294	1.163

The Agricultural Performance Index in Barak Valley is 0.468 which is moderate and we have analysed earlier about the performance of Barak Valley with our sample farmers. Now the determinants of Agricultural Performance Index in Barak Valley is analysed with help of regression analyses where a number of predictors have been found to determine or influence API largely. These predictors are both agrarian and social in nature.



Thus a bunch of agrarian, economic and social indicators have been considered to study the Agricultural Performance Index. Both Direct and Indirect factors are found to make effect on API. They are-fertility of the land, marketing, technology, wealth, education, health, labour productivity, poverty etc, all variables except poverty have positive linkage with API. The result of each variable is discussed below with help of a summary table.

### **3.4.1 Summary Interpretation of Direct Linkage Factors & Dependent variable- API**

- [1] API & LFI- The coefficient of multiple correlations(R) is .521, indicating a good positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .271 indicates that for the sample, 27% of the variation in Agricultural Performance can be explained by the variation in Land Fertility Index. But this may be an overestimate for the population from which the sample is drawn, so we use the Adjusted R Square as a better estimate for the population i.e .269. Finally the Std. Error of the Estimate is 0.140027. The value of F dist. 166.506 is the quotient of Mean Square Regression and the Mean Square Residual - MSR and MSE respectively and highly significant.
- [2] API & MI-We find that the coefficient of multiple correlations(R) is .910, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .828 indicates that for the sample, 82% of the variation in Agricultural Performance can be explained by the variation in Market Index. The Adjusted R Square for the population is .828. Finally the Std. Error of the Estimate is 0.067951. The value of F dist. 216.130 is highly significant.
- [3] API & TAI-The coefficient of multiple correlations(R) is .799, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .638 indicates that for the sample, 63% of the variation in Agricultural Performance can be explained by the variation in Technology Achievement Index. The Adjusted R Square for the population is .637. Finally the Std. Error of the Estimate is 0.098701. F dist. is 788.809 and highly significant.
- [4] API & LPI-The coefficient of multiple correlations(R) is .713, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .509 indicates that for the sample, 50% of the variation in Agricultural Performance can be explained by the variation in Labour Productivity Index. The Adjusted R Square is .508. Finally the Std. Error of the Estimate is 0.114936. The F dist. is 464.086 and highly significant.
- [5] API & WI-The coefficient of multiple correlations(R) is .847, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .718 indicates that for the sample, 71% of the variation in Agricultural Performance can be explained by the variation in Wealth Index. The Adjusted R Square is .717. Finally the Std. Error of the Estimate is 0.085205. The F dist. is 114.113 and highly significant.
- [6] API & EI-The coefficient of multiple correlations(R) is .508, indicating a good positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .258 indicates that for the sample, 25% of the variation in Agricultural Performance can be explained by the variation in Education Index. The Adjusted R Square is .256. Finally the Std. Error of the Estimate is 0.138240. The F dist. is 155.611 and highly significant.
- [7] API & Schooling-The coefficient of multiple correlations(R) is .859, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .737 indicates that for the sample, 73% of the variation in Agricultural Performance can be explained by the variation in Schooling. The Adjusted R Square is .737. Finally the Std. Error of the Estimate is .082214. The F dist. is 125.903 and highly significant.
- [8] API & HI-The coefficient of multiple correlations(R) is .907, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .823 indicates that for the sample, 82% of the variation in Agricultural Performance can be explained by the variation in Health Index. The Adjusted R Square is .822. Finally the Std. Error of the Estimate is .05236. The F dist. is 208.113 and highly significant.
- [9] API & MPI-The coefficient of multiple correlations(R) is -.451, indicating a good negative linear relationship. The coefficient of determination  $r^2$  (R Square) of .203 indicates that for the sample, 20% of the variation in Multidimensional Poverty can be explained by the variation in Agricultural Performance. The F dist. is 114.330 and highly significant.

### **3.4.2 Summary Interpretation of Indirect Linkage Factors**

- [1] LPI & HI- The coefficient of multiple correlations(R) is .850, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .700 indicates that for the sample, 70% of the variation in Labour Productivity can be explained by the variation in Health Index. But this may be an overestimate for the population from which the sample is drawn, so we use the Adjusted R Square as a better estimate for the population i.e .695. Finally the Std. Error of the Estimate is 0.12620. The value of F

dist. 327.20 is the quotient of Mean Square Regression and the Mean Square Residual -MSR and MSE respectively and highly significant.

- [2] LPI & Schooling-We find that the coefficient of multiple correlations(R) is .575, indicating a good positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .330 indicates that for the sample, 33% of the variation in Labour Productivity can be explained by the variation in schooling. The Adjusted R Square for the population is .329. Finally the Std. Error of the Estimate is 0.10367. The value of F dist. 220.766 is highly significant.
- [3] LPI & Wealth-The coefficient of multiple correlations(R) is .596, indicating a good positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .355 indicates that for the sample, 35% of the variation in Labour Productivity can be explained by the variation in Wealth Index. The Adjusted R Square for the population is .354. Finally the Std. Error of the Estimate is 0.10169. The value of F dist. 246.982 is highly significant.
- [4] TAI & Schooling-The coefficient of multiple correlations(R) is .669, indicating a good positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .448 indicates that for the sample, 44% of the variation in Technology Achievement Index can be explained by the variation schooling. The Adjusted R Square is .446. Finally the Std. Error of the Estimate is 0.17789. The F dist. is 363.63 and highly significant.
- [5] TAI & WI -The coefficient of multiple correlations(R) is .736, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .541 indicates that for the sample, 54% of the variation in Technology Achievement Index can be explained by the variation in Wealth Index. The Adjusted R Square is .540. Finally the Std. Error of the Estimate is 0.16209. The F dist. is 528.713 and highly significant.
- [6] MI & Schooling-The coefficient of multiple correlations(R) is .802, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .642 indicates that for the sample, 64% of the variation in Market Performance can be explained by the variation in schooling. The Adjusted R Square is .642. Finally the Std. Error of the Estimate is 0.182956. The F dist. is 804.934 and highly significant.
- [7] MI & WI-The coefficient of multiple correlations(R) is .727, indicating a strong positive linear relationship. The coefficient of determination  $r^2$  (R Square) of .529 indicates that for the sample, 52% of the variation in Market Performance can be explained by the variation in Wealth Index. The Adjusted R Square is .528. Finally the Std. Error of the Estimate is .21005. The F dist. is 502.601 and highly significant.

#### **IV. CONCLUSION**

Thus we find that there exists a vital relation between factors of human development and agricultural development. 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. Both issues are interlinked heavily to raise the growth rate, reduce the poverty and improve the human development situation. Economic development in true sense of the term requires the reinforcing effect of both agrarian and human development policies.

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