Constructing Indices using Socio-Economics Parameters: A Study of Farmers in Vidarbha

[1] Sandeep Singh Saini, [2] Jay Paranjape, [3] Kshitij Patil
[4] Savya Sachi Pandey

[1] Maharashtra Institute of Technology, Department of Economics, Pune
[2] Maharashtra Institute of Technology, Department of Economics, Pune
[3] Maharashtra Institute of Technology, Department of Economics, Pune
[4] Maharashtra Institute of Technology, Department of Economics, Pune

Abstract: Agriculture in India dates back to the Indus Valley Civilization and since then has played an important role in the economic growth of the country. Indian agriculture comprises a huge variety of crops, the leading among these being rice and wheat. The Vidarbha region is located in Maharashtra and high output of BT cotton and oranges is obtained from Vidarbha. The Bhandara district is investigated in this study by gathering primary data from three villages namely, Dhanla, Charba, and Chicholi, and constructing socio-economic indices using the same. The present study presents the socio-economic condition of farmers in the Vidarbha region. Certain Sustainable Development Goals (SDGs) have been included in the research to evaluate the development of the samples. The study reveals that the surveyed regions have a varying standard of living and quality of living ranging between moderate and fairly above average and the z-test suggests that the government policies have been fairly fruitful in uplifting the socio-economic conditions of the farmers. The research concludes that the government policies have significantly affected the socio-economic conditions of the farmers but not to the expected level.


1. INTRODUCTION

Vidarbha is an easternmost region of the state of Maharashtra, comprising Nagpur Division and Amravati Division, is also known as "The California of India" having an area of 97,409 sq. km. Around 3.4 million cotton farmers live in Vidarbha, and about 95 percent of these are facing tremendous debt. Most areas in Vidarbha need basic social facilities, including drinking water, power, health care, etc. The Vidarbha region accounts for 31.6 percent of the overall area, with 21.3 percent of the Maharashtra population. The agricultural pillar here consists of cotton, soya, pigeon peas, chickpeas and most of these plants depend on the rain. Despite the dependency of the farmers on rain, there are almost no other means to irrigate the crops other than seasonal rains which is crucial from the agricultural perspective.

About 140,000 hectares of the region are under cotton cultivation and almost equal under soybean. Farmers generally go for soybean in order to gain better prices as cotton prices are low. These different peculiarities of the farmers in Vidarbha make the study of socio-economic conditions.

1.1. Area of Study

The primary research to analyse the socio-economic condition of the farmers of Vidarbha was conducted in the *Charba, Dhanla, and Chicholi*villages in the Bhandara district of Maharashtra, India, where the farmers are located.
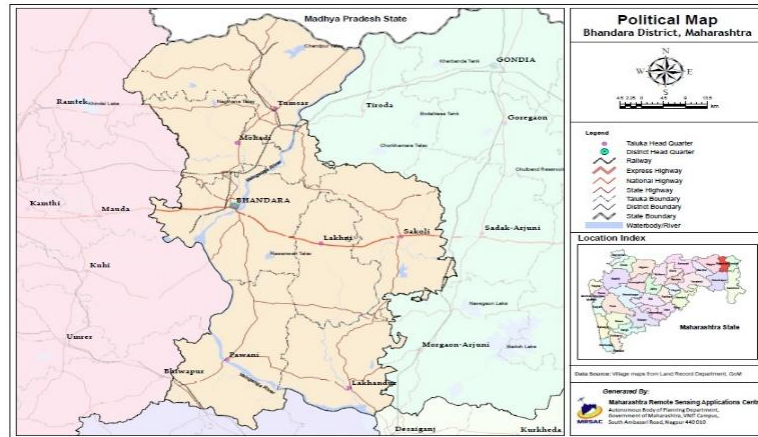
Source: Image taken from Google Map

1.2.   Overview

Evidence shows that the digital divide and literacy gap make marginal and small farmers vulnerable because they are unable to use the resources available to them. This is almost the same case in Vidarbha, where farmers face several issues such as middlemen interference, low yielding crops, and are also far behind other farmers in other states. This is the major issue that also leads to suicide, which is at an all-time high. Pink bollworm pest outbreaks wreaked havoc on cotton belt farmers, causing their original investment to plummet.

Source: Clicked by the Researcher

1.3.   Present Status

Many policies, such as reversing land reforms in order to grant enormous areas of land to corporations, have considerably exacerbated the agricultural crisis and the situation of farmers in Vidarbha. In addition, the Maharashtra government has launched a zero-farmer suicide welfare program dubbed "convergence of agriculture intervention in agriculture" in an attempt to avoid farmer suicide. According to the agriculture minister, a survey would be conducted in all suicide-prone farming regions such as Vidarbha, Marathawada, and North Maharashtra under the plan. In addition, Vidarbha has received the least benefit from the government's loan forgiveness program. Rising production costs, dropping prices, declining productivity, food security, and effective crop insurance are still major issues. Instead of resulting in improved yields of disease-free crops, the state's promotion of BT cotton seeds has raised economic pressure on farmers.

Year	Fund Outlay in the Budget (in ₹ crores)	Percent Change in Fund Outlay (Base Year: 2012-13)
2012-13	17,649	--
2013-14	18,229	3.28%
2014-15	10,705	-42.63%

2015-16	23,694	34.25%
2016-17	50,184	184.34%
2017-18	56,589	220.63%
2018-19	77,752	340.54%

Source: https://www.indiabudget.gov.in

1.4.   Research Objectives

- To study the socio-economic condition of the farmers in the Vidarbha region of Maharashtra.
- To study the development of the Vidarbha region with the help of the selected SDGs to analyse the development in comparison to global standards.
- Analyse the impact of various government policies in the upliftment of the socio-economic conditions of the farmers.
- Suggest policy measures to alleviate the problems faced by the farmers of Vidarbha and improve their socio-economic condition.

2.   LITERATURE REVIEW

Walker, Singh, and Asokan in their study analysed an important determinant of farmers' participation i.e. the potential for crop insurance to reduce the income variability. Also with the help of their study, they found that crop insurance is not effective in smoothing fluctuations in income.

Prashant Amrutkar in his study of Vidarbha focussed on the problem of regionalism and mentioned the main reason behind it i.e. the unequal development of regions and regional identity. The main study of this paper focuses on different aspects like the political and economic compulsions giving demands for separate statehood, problem creating the demand before the union of India, and the nature of backlog of Vidarbha. The pros and cons of the demand for statehood are made a focal point in this paper.

Ranganathan and Gaurav in their study of six Vidarbha districts focusing on the components of farm revenue risk. This study decomposes the changes in revenue risk over 20 years of cotton cultivation in six districts of the Vidarbha region into changes in price risk, yield risk, etc. This study tells that there has been increased riskiness in cotton revenues which also indicates the direction for effective future policies.

Parasuraman and Rajaretnam in their study assessed the agricultural practices and livelihoods. Also using the data generated from a survey on a sample of 6990 households, this paper analyses the relationships between agriculture, food security, and nutrition for children, adolescents, and married women of reproductive age.

Mohanty in his study about the Regional Disparity in Agriculture Development of Maharashtra talked about the main reason forthe inability of the Marathwada and Vidarbha regions to compete effectively for a larger share of the state's resources. This study also explains why western Maharashtra has developed, which is linked to the establishment of the Maratha-Kunbi peasantry as a cohesive political class that controlled state politics both during and after colonial administration.

Agriculture Contingency Plan for District, NAGPUR gives a brief about the major Horticulture crops, sowing window for different crops, the major contingency the district is prone to. It also assesses the rainfall in Nagpur to estimate and predict the next drought-hit area. It also throws light on the different cultivation styles and tells the best way for a different climate.

Hawkes and Ruel in their study directly connected the contribution of agriculture production to improve nutrition. It has taken into consideration the recent changes in the global environment which affects the relationship between agriculture and nutrition which is established by them. Its key results in the end are how nutrition can be obtained with the help of effective agriculture programs for the poor.

Maharashtra Agricultural Competitiveness Project (MACP) analyses the various relevant information which inturn will help to create sustainable and replicable businesses for farmers in the district of Bhandara. This study takes into consideration the "Market Strategy Supplement" and further adds into it including the analysis of emerging crops of the district. According to the results, the primary crops which were found are paddy, Bengal gram, red gram, and wheat.

Agricultural Practices Sustainability in Vidarbha shows how various factors including green revolution, soil fertility, etc. have affected the sustainability of the agricultural practices in Vidarbha. After using the high yield variety of seeds, chemicals, and fertilizers the production of crops has increased by almost double. But this has led to a rather fatal decline in the soil fertility with each crop and the quality of the crop has started affecting the health due to the content of chemicals and fertilizers. It further paves a path to analyze the root causes of distress caused to the farmers and provides a guideline to carry out our research in developing a suitable action plan to help lift the farmers out of their situations.

Kathryn Sebby in her study threw light on the Green Revolution of 1960 to address the issue of malnutrition in the developing world. She concluded that the lack of an agrarian system in India made it difficult for Green

Revolution to impact everyone positively, she also mentioned that those with more money can afford the seeds and chemicals necessary to compete in the Green Revolution market vice versa in case of poor therefore poor were in debt and resort to money lenders to purchase on credit.

Tata Institute of Social Sciences in their study conducted a survey in 71 villages distributed in 6 districts of the Vidarbha region which are highly distressed. They covered various livelihood aspects like household background, population characteristics, education, etc. Results have been formed in such a way so that the distress among the farming community in Vidarbha can be minimized and livelihood can be enhanced.

3. RESEARCH GAP

The majority of research undertaken in the Vidarbha area focuses on farmer suicides. Only a few studies have been conducted on the socio-economic parameters of farmers in Vidarbha. The researchers believed that determining the fundamental cause of the difficulties that continue in Vidarbha's agriculture sector was of paramount significance. In the Vidarbha region, there was comparatively less study onanalysing the availability of different government schemes and the fulfillment of their objectives. Researchers strive to get a comprehensive view of the farmers' current position by considering all conceivable aspects, such as the influence of various policies and practices on their conditions. No research was done on Vidarbha focusses on how well is Vidarbha developing, researchers have thus tried to bridge the gap by taking three Sustainable Development Goals (SDGs) set by the UN. The analysis of socio-economic conditions and the standard and quality of living of the weaver households is the research gap identified.

4. RESEARCH HYPOTHESIS

The average income of a farmer is estimated at Rs 77,976 per year, according to the Dalwai committee report. With an interim conjecture that the government policies have been effective in uplifting the socio-economic conditions.

Researchers framed the following hypotheses.

Null Hypothesis(H_0): Government policies have not significantly affected the socio-economic conditions of farmers. (μ=77976)

Alternate Hypothesis(H_1): Government policies have significantly affected the socio-economic conditions of farmers. ($\mu \neq$77976)

5. RESEARCH METHOD

In this research, the *Quality of Living* and *Standard of Living* indices have been used as the proximate measures to analyse the socio-economic conditions of the farmers in some parts of the Vidarbha region.

The Farmer household quality of living index (HQ_L):
Quality of Living = f (HI, BI, AI)
HI: Housing Index
BI: Basic Amenities Index
AI: Asset Index

The Farmer household standard of living index (HS_L):
Standard of Living = f (HyI, LI, SI)
HyI: Hygiene Index
LI: Literacy Index
SI: Social Security Scheme Index

6. RESEARCH METHODOLOGY

- To study the socio-economic condition of the farmers of the Vidarbha region, primary research was conducted for the year 2018-19 through a structured questionnaire. The aspects of the questions asked arein Annexure 1.
- The data was collected from Charba, Dhanla, and Chikali village in Bhandara district using Purposive, Simple random, Snowball, and Convenience samplingtechniques.
- A total of 67 households were surveyed from 3 villages namely Dhanla, Charba, Chicholi of Bhandara district, Maharashtra. Three distinct samples were collected,
  $n_1+n_2+n_3$= 67
  n_1 is of size 23 collected from the village Dhanla
  n_2 is of size 22 collected from the village Charba
  n_3 is of size 22 collected from the village Chicholi

- The data collected has been processed using tools such as MS Excel and SPSS, then presented using a data visualization tool like Tableau.
- The Household Quality of Living Index (HQ_L) and Household Standard of Living Index (HS_L) has been calculated.
- Hypothesis testing is done using a z-test as the sample sizes are sufficiently large, i.e. (n_1, n_2, n_3) >50.

7. RESULTS AND DISCUSSIONS:

7.1. Socio-Economic State

7.1.1. Age distribution of Farmers:

The survey, as shown in **(table no. 01)**, indicates that the maximum frequency of villagers engaged in farming belongs to the 36- 45 age group.

But the survey in **(graph 01)** suggests, that only 57percent of the total population of the farmers solely depended on agriculture for their income which indicates that farming alone is not an economically feasible solution in this region.

7.1.2. Gender wise distribution:

The primary data collected gives us a fair idea about thegender-wise distribution in the surveyed villages.

The survey population suggests that there is a dominance of male farmers in agriculture for the three villages as shown in **(table no. 02)**.

7.1.3. Literacy Level

The study showed that the majority of the population in the surveyed villages were educated up to the 10th-12th grades.

The data in **(table no. 03)** suggests that in all the three villages surveyed, basic education was made easily available as the percentage of educated people outweighs the uneducated population quite easily. This could be possible due to the opening up of primary schools and colleges in the rural areas of the Vidarbha region.

7.1.4. Income level of Farmers in Vidarbha

In the data collected researchers can see a wide distribution of income amongst the farmers which have been explained with the help of the Lorenz curve.

On calculating the mean income of the surveyed households, the values came out to be as follows

For Dhanla; mean income = Rs 336,521.73

For Charba; mean income = Rs 140,000.00

For Chicholi; mean income = Rs 199,090.90

The inequality in distribution can be clearly seen through these numbers.

According to the survey, the data collected is depicted in **(table no. 04)**:

8. SCHEMES FOR FARMERS

Researchers tried to analyse various government schemes and see their impact on the three villages chosen for study. Following are some of the policies and campaigns of the government which were analysed.

Crop Loans and Pradhan Mantri Fasal Bima Yojana (PMFBY)

The crop loan scheme is meant to provide short-term working capital to farmers every year before the sowing season. Around 75percentof farmers in Dhanla, 66percentof farmers in Charba, 66percentof farmers in Chicholi have active crop loans.

The Pradhan Mantri Fasal Bima Yojana was launched in 2016 and is meant to provide support to farmers in case of crop failure.

The sad part about this scheme is that although it is beneficial there is no awareness about it and implementation has not been very successful.

While conducting the survey, every farmer was asked if his crops were insured, and to our surprise, only 2 out of the total 48 farmers surveyed said they had an active insurance plan against crop damages.

Banks have been instructed to enroll all farmers who take out crop loans. Due to this, the bankers have to keep charging premiums from the farmers even if they do not wish to take up the insurance.

The insurance does not serve its purpose as in case of crop damages the farmers don't know how to file for a claim, as they are totally unaware of the procedures to be followed.

e-National Agricultural Market and the APMCs

The eNAM scheme was launched in 2016 by the Central Government to help farmers and give them the platform of selling their produce outside local mandis at fair prices.

No farmer from Dhanla, Charba, or Chicholi uses the eNAM platform to sell their agricultural produce. Barely any farmer knew about the platform, and according to VyankatBhujangrao (a farmer from Dhanla who was surveyed), he does not trust the platform, there is no guarantee that someone will come and pick the agricultural produce up, and thus he prefers selling in the traditional Mandis or in other locations.

An Agricultural Produce Market Committee (APMC) is a marketing board established bystategovernments of India, one main function of which is basically to provide a platform for farmers to sell their produce. The farmers get MSP (Minimum Support Price) if they sell directly to the APMC. The closest APMC to the study region is located in Bhandara. But most of the farmers prefer selling in local Mandis or to retail agents as they get a higher price than the MSP.

Swacch Bharat Mission

It is a nationwide campaign launched in 2014, for the cleanliness of the country and improving sanitation conditions. Although this campaign is not specifically for farmers, still benefited the whole village, as almost every house in the village got a toilet inside the house sponsored by the government. The aim was to improve the sanitary condition of rural people. But the efficacy of the campaign is not as much as expected, as on talking to the ex-sarpanch of Chicholiresearchers got to know that people in the village still think having a toilet inside the house is not good and some families use the toilet to store food grains.

Irrigation schemes-

Only 80percent of the total farmers surveyed directly associated irrigation with their well-being as rains are mostly unpredictable and cannot be relied upon. Thus, irrigation is of great importance.

Gosikhurd Project

It is also known as the Indira Sagar Irrigation Project, which is a project in the Godavari Basin, in Bhandara district on the river Wainganga. It was launched under the 7th Five Year Plan when by former Prime Minister Rajiv Gandhi, the project aims to irrigate 2.5 lakh hectares of land. It will mainly irrigate Bhandara, Chandrapur, and Nagpur districts. Once the work of the canal is completed a huge portion of Vidarbha will be freed from depending on rains for agriculture.

Pench Dam

It is a dam constructed on the river Pench, for the purpose of irrigation, and supplies water to Nagpur and Bhandara districts. About 100 thousand hectares of land are irrigated by the Totladoh dam on the Pench river. In 2017 irrigation could not happen due to the lack of water in the dam, and Nagpur is also dependent on the dam for drinking water. Again, in January 2019, Nagpur faced a problem as there was less water storage in Pench that year due to less rainfall. On the contrary in September 2019, the Totladoh dam got full following heavy rainfall in Madhya Pradesh, and the water crossed the 95percent mark, thus the need for water was resolved. As it can be clearly seen, relying totally on the Pench for irrigation can prove to be harmful as the water levels depend on the annual rains.

Irrigation through the Gosikhurd Project and Pench Dam will be more beneficial as dependency on one particular will not exist.

9. DEVELOPMENT ANALYSIS WITH THE HELP OF SDGS

SDGs (Sustainable Development Goals) are designed by the United Nations with an aim to accomplish these goals by 2030, worldwide. Three SDGs namely Gender Equality, Reduced Inequalities (taking income as proxy), and Good Health and Well Being have been considered to look at the development of the three villages surveyed in terms of global levels.

9.1. Gender Equality Analysis

For analyzing gender equality, the contribution of income by women in comparison to theirpopulation percentage has been studied.

9.1.1. Dhanla

Out of the 23 people surveyed, 5 were females.
Thus,percentpopulation of females= 22percent
Total income of those 5 females = Rs 385,000
Total income of the village= Rs 5,440,000
Contribution of females in the total income= 7percent

Thus, 22percent of the total population contributes only to 7percent of the total income, this imbalance can be attributed to lesser opportunities for females, or all the females have lesser land holdings, and assets, thus their income is low. On further investigation, it can be seen that the females own assets like tractors and cattle. The researchers also observed that out of the 5 females interviewed, all of them had bank accounts, but 4 of them had bank accounts in the name of their husbands. Thus, suggesting there is low gender equality in Dhanla.

9.1.2. *Charba*
Out of the 22 people surveyed, 5 were females.
Thus,percentpopulation of females= 23percent
Total income of those 3 females= Rs 665,000
Total income of the village= Rs 3,080,000
Contribution of females in total income= 22percent
Thus, 23 percent of the female population contributes to almost 22percent of total income. Thus, females have decent opportunities and gender equality exists.

9.1.3. *Chicholi*
Out of 22 people surveyed, 7 were females.
Thus,percentpopulation of females= 32percent
Total income of 7 females= Rs 1,555,000
Total income of the village= Rs 4,380,000
Contribution of females in total income= 35percent
Thus, 32 percentof females contribute to 35percent income. Researchers also observed that the head of the village (Sarpanch) is a female.
Out of the 7 females interviewed, 6 of them had a bank account registered in their own name. Thus, they are self-dependent.
In Chicholi, there exists not only gender equality, but the women there are empowered, have equal opportunities, and independent

9.2. Reduced Inequalities
The income inequalities in the 3 villages have been calculated separately with the help of the Lorenz Curveand the Gini Index.
The Lorenz Curve is a graph on which the cumulative percentage of total national income is plotted against the cumulative percentage of the corresponding population.
The Gini Index tells the degree of inequality of distribution of income in a particular region.
$$0 \leq \text{Gini Index} \leq 1$$
The closer the Gini Index is to 0, the lower is the inequality of distribution of income and vice versa.

For Dhanla-
The Gini index for Dhanla is 0.360, this value is depicted on **(graph no. 2)**, which is a high Gini Index among the other regions in the study. This higher Gini index is because there is a gap between the high-income earning farmer and the low-income earning farmer in this village. For any policy to be effective there should be as little inequality as possible, so everyone gets near equal benefits from the policy change.
Thus, even though Dhanla may seem to be a village of the rich farmers (incomes of Rs 8 lakh and 10 lakh), the poorest farmer of the village only earns Rs 50,000 annually, which is equivalent to Rs 139 per day, which is even less than the minimum wage of a laborer per day.

For Charba-
The Gini index (0.182), as seen in **(graph no. 03)**, for Charba is fairly low in comparison to the other two, thus it can be said that there exists an equal distribution of wealth among the sample surveyed. This condition is favorable for any village to be in, but on further investigation by the researchers, it can be perceived that the equal distribution is just because there is not much difference between the low-income earners and high-income earners in this village. Thus, looking at the overall income of the village, Charba is a poor village as compared to other regions in the study.

For Chicholi-
The Gini index of Chicholi (0.297) is quite low like that of Charba, thus there is an equal distribution of income in this village, which indicates that the gap between the low-income earning farmers and the high income earned by farmers is comparatively lower. This data is shown in **(graph no. 04)**.

10. GOOD HEALTH AND WELL BEING

Overall analysis was conducted for health parameters and well-being of the farmers of the three villages (as the villages are within a radius of 10 km of each other distance from health care centers is not vastly different for each village).

10.1. Health Care Facilities

* Chicholi has a private health care center, situated in the middle of the village.
* Various government health care centers are nearby but do not include proper hospital facilities.
* The closest multi-specialty hospital is 9.1 km from Dhanla.
* It is a good sign that a proper hospital is within 10 km from the village.

10.2. Other Observations

* There was no death due to Malaria or AIDS, in either of the 3 villages, in the last 5 years.
* The high rate of consumption of tobacco in all 3 villages, can prove harmful to the future of the farmers, as there will be more expenses in case of cancer or any other tobacco-related disease detected and due to deterioration of health, earning capacity will be lowered
    i. Dhanla- 72percent of the people surveyed consume tobacco
    ii. Charba- 60percent of the people surveyed consume tobacco
    iii. Chicholi- 67percent of the people surveyed consume tobacco
* It can be seen that more than half of the people in every village consume tobacco, which is a very bad scenario in terms of adverse effects on health.
* Awareness about the illeffects of tobacco needs to be spread, so the health of the farmers improves.

11. SOCIAL WELL BEING

11.1. Quality of living index (Q_L)
a. Housing Index

In the research, the types of houses included helped us calculate the standard of living of the
farmers. The thatched house is the one which is walled and roofed by tree barks or leaves, while the tiled houses are those that have brick walls but tree barks and leaves as roofs, and the terraced houses have proper brick walls and a proper roof. The survey shows that a majority of people still live in the tiled house category of houses indicating that farming alone is not an economically viable solution. This data is depicted in (**table no. 05**).

b. Basic Amenities Index
i. Electricity Index

The electricity index was calculated based on the availability of electricity in the surveyed households as shown in (**table no. 06**). The research indicates that a majority of households have access to electricity, and about 8 percent and 30percent of households still do not have access to electricity indicating poverty.

ii. Sanitation Facilities

The survey accounts for the toilets built inside the house and the indices have been calculated in (**table no. 07**). The villages surveyed have been declared as Nirmal Village by the government. Most of the households have toilets because of the Swacch Bharat Mission launched by the Prime Minister.

iii. Water supply Index

All three surveyed villages have a supply of potable water. This said, not all households get water from the government. Some households have tapped into the local supply of groundwater through bore wells in Charba. The index is calculated based on whether the households get a supply of clean drinking water and the data is shown in (**table no. 08**).

c. Asset Index

The asset index is calculated based on the availability of assets categorized as tractors and cattle and is shown in (**table no. 09**). The higher number of households with no assets does not necessarily indicate poverty as most of them borrow the assets on loan.

11.2.   Standard of Living Index (HS$_L$)
a.   Hygiene Index
   i.   Presence of Toilet in House
   The absence of toilets in some of the households indicates poor socio-economic conditions. This data is depicted in **(table no. 10)**.
   ii.   Potable water index
   The index is calculated based on whether the households get a supply of clean drinking water from the government. This data is depicted in**(table no. 11)**.

b.   Literacy index
Researchers have considered the literacy index in the calculation of the standard of the living index because literacy level is a good indicator of skilled employment level.
The percentage of the literate is calculated based on how many farmers received formal education and how many of them received higher education. The index suggests that basic primary education is made available to all the villages, this is indicated by the high percentage of the educated population in all three villages. This data is depicted in **(table no. 12)**.

c.   Social security schemes index:
These are the various schemes and policies launched by the government in order to help farmers across the country.

   i.   Bank account index
   The bank account index is calculated based on the number of people having a bank account against the number of people not having one. This data is depicted in **(table no. 13)**.

   ii.   Crop Loan index:
   The crop loan index and the Insurance index would be one and the same. This is because the government has made it mandatory for everyone who has a bank account to pay the premium and get insurance. This data is depicted in **(table no. 14)**.

The degree or extent of Quality of Living and Standard of Living is evaluated based on the criteriagiven in **(table no. 15)**. The researchers have assumed the index range for Quality of Living and Standard of Living to be in the range of 0 to 4. Any value between 0 to 1 is considered to be Low, the value between 1 to 3 to be considered moderate, and the Quality of Living and Standard of Living is considered to be high for any value above 3.

Dhanla:
- The household quality of living index is the summation of the housing condition availability of water and electricity.
- The household quality of living index of the surveyed villages came out to be 1.80 which lies in the moderate category. This indicates that there exist moderately low socio-economic conditions of the farmers.
- The standard of living index is the summation of the hygiene index, literacy index, and social security index.
- The HS$_L$ of Dhanla is high (3.26) indicating that the village has comparatively bettersocio-economic conditions.

Charba:
- The HQ$_L$ and the HS$_L$ of Charba came out to be 1.59 and 2.98 respectively.
- The household quality of living index is 1.59, which lies in the moderate range indicating that the socio-economic conditions in Charba are moderate.
- The standard of living index is 2.98, which is borderline good and moderate.
- The village is fairly isolated from the mainland as compared to the other 2 villages both the indices of this village belong to the moderate range.
- This limits the opportunities for the farmers in this village to diversify their sources of income and as a result, the mean income of theseregions can also be seen to be at a lower threshold.

Chicholi:
*   The HQ_L and the HS_L for Chicholi are 1.52 and 2.84 respectively
*   The household quality of living index lies in the moderate range indicating fairly low moderate socio-economic conditions in this village.
*   The standard of living is borderline moderate, this can be attributed to the fact that Chicholi is fairly connected to the highway as compared to the other two villages, allowing the farmers to diversify their source of income.

12. HYPOTHESIS TESTING

Hypothesis: Government policies have not significantly affected the socio-economic conditions of farmers. ($\mu=77976$)

Samples: -
Sample 1 collected from village 1(Dhanla)~n_1=23
Sample 2 collected from village 2(Charba)~n_2=22
Sample 3 collected from village 3(Chicholi)~n_3=22

Researchersdiscovered that n_1, n_2, n_3>50

Hence, researchers use a z-test to check the significance of the pre-stated hypothesis. A left-tailed test should be performed.

The hypothesis testing is done for the three samples separately to analyse the viability of government policies in the respective samples.

For Dhanla (n_1= 23)
23 families from Dhanla engaged in farming were surveyed at random. The sample mean income ($\bar{x}$) came out to be Rs 336,521.73

Since the population standard deviation is not known researchers calculated the modified sample standard deviation (s_1) which came out to be Rs 167,576.70
Researchers carried out the test at a 5percent significance level

Thus, the computed value of z at 5percent level of significance (z_c) =2.2239

The tabulated value of z at 5percentlevel of significance (z_t) = $\pm$1.96 (for a two-tailed test)

Therefore, z_c>z_t (at 5percent significance)

Researchers can see that at a 5percent level of significance z_c lies in the critical region of the distribution curve.

Thus, H_0 is rejected at a 5percent level of significance *viz.* the proposition that the government policies have not significantly affected the socio-economic conditions of farmers is rejected.

For Charba (n_2= 22)
22 families from Charba engaged in farming were considered as a sample and the primary data was collected. The mean sample income ($\bar{x}$) came out to be Rs 140,000.

Here, researchers do not know the population standard deviation hence, researchers calculate themodified sample standard deviation (s_2) = Rs 121,928.94

The z-test is carried out at a 5percent significance level

The computed value of z at 5percent level of significance (z_c) = 1.3295

The tabulated value of z at 5percent level of significance (z_t) = $\pm$1.96 (two-tailed test)

Therefore, $z_c < z_t$ (at 5percent significance)

Researchers can see that at a 5percent level of significance z_c lies in the critical region of the normal distribution curve.

Thus, the proposition that the government policies have not significantly affected the socio-economic conditions of farmers cannot be rejected.

Reason-Researchers have assumed income as a proxy for analyzing the effect of government policies, and since this village has a relatively low level of income, the village seems to be unaffected by government policies.

For Chicholi (n_3= 22)
22 families from Charba engaged in farming were considered as a sample and the primary data was collected. The mean sample income ($\bar{x}$) came out to be Rs 199090.90

Again, researchers do not know the population standard deviation hence, researchers calculate the modified sample standard deviation (s_3) = Rs 150005.05

The z-test is carried out at a 5percent significance level

The computed value of z at 5percent level of significance (z_c) = 2.0237

The tabulated value of z at 5percent level of significance (t_t) = $\pm$1.96 (two-tailed test)
Therefore, $z_c > z_t$ (at 5percent significance)

Researchers can see that a 5percent level of significance lies in the critical region of the z- distribution curve.

Thus, H_0 is rejected at a 5percent level of significance *viz.* the proposition that the government policies have not significantly affected the socio-economic conditions of farmers is rejected.

13.   FINDINGS:
The result for the indices is shown in table no. 16
* HQ_L and HS_L of Dhanla are 1.79 and 3.26 respectively showing that the socio-economic conditions are fairly above average.
* HQ_L and HS_L of Charba are 1.59 and 2.98 respectively showing that thesocio-economic conditions are moderate to high.
* HQ_L and HS_L of Chicholi are 1.51 and 2.84 respectively showing that the socio-economic conditions are fairly above average.
* The following z variates calculated at 95percent Confidence interval; this proves that government policies have significantly affected socio Economic Conditions of farmers.
* Dhanla: z_c= 2.22
* Chicholi: z_c= 2.02
* Except for Charba, where due to low levels of income the null hypothesis cannot be rejected. But looking at other parameters it can be seen that the village has benefited from Swacch Bharat Mission, there is a desirable level of gender equality, thus only as incomes of the farmers have not significantly risen, the null hypothesis cannot be rejected.
* z_c(Charba)= 1.33

14.   POLICY RECOMMENDATIONS
On the basis of our research following policies have been recommended-
* Setting up a crop loan structure that provides timely credit to the farmers and is more transparent regarding the insurance norms.
* According to the researchers, Minimum support prices must be maintained to support farmers. When determining minimum support prices, entire agricultural expenses and farmer gain should be considered.

- Establishing more Krishi Vigyan Kendras (KVKs) so that farmers in remote areas also have access to information and guidance regarding agricultural activities.
- The importance of Information and Communication Technology (ICT) should be inculcated in the farmers, so as to provide vast agricultural marketing options to the farmers.
- Spread awareness amongst farmers regarding input subsidies and provide them the knowledge of the process of availing the subsidies.
- Try and make farmers and their families self-sufficient by introducing them to various businesses related to agriculture (animal husbandry, poultry farming,etc.) enabling them to diversify their source of income.
- Farmers in India are clearly enslaved by debt, and Vidarbha is no different. To help these farmers get out of debt, researchers believe that banks should provide them with low-interest loans that would allow them to continue their farming operations on more favourable terms. When low-interest loans are accessible to these farmers, they will be able to employ better crops, fertilizers, and better production techniques. These measures will increase agricultural production and, as a result, agricultural income for the farmers.

15.   LIMITATION OF THE STUDY

The study's principal shortcomings are related to the sample area selection. Because various regions have distinct challenges and require different methods to overcome these difficulties, the findings of this study are not relevant to other parts of Maharashtra.

16.   SCOPE FOR FURTHER RESEARCH

There is still room for further research in this area. A large sample may be obtained by randomly selecting samples from several Maharashtra districts. Furthermore, an all-India study on the aforementioned issue can be conducted, as well as a comparison study based on the socio-economic position of farmers in various states. The indices constructed can also provide a brief overview of the living parameters of the farmers in India.

17. CONCLUSION

Since independence, agriculture has been India's backbone. Although the contributions of agriculture as a sector in the GDP have decreased, it is still a major employment provider for the rural households of the country. Agriculture is a vital sector for which the Indian government has launched a substantial number of policies over the years. The study's findings will aid in understanding the socio-economic situations of farmers in the Vidarbha region. The study examines farmers' living standards using both primary and secondary data collected by the researchers. Through thestudy, researchers saw that although the policy measures had certain positive effects on the villages the impact was not as much as expected. Certain flaws in the policies as well as the orthodox mindset of the people combined with the bandwagon effect quite common in villages act as hindrances in the successful implication of these policies. According to the indicesconstructed, it was discovered that all the three villages (namely Dhanla, Charba, Chicholi) from Bhandara district have moderate but improving socio-economic conditions as there is growing awareness about existing policies and upcoming policies which will benefit the farmers over a period of time. Regarding SDGs, the three villages are performing fairly well except in certain parameters like the high consumption rate of tobacco and the absence of basic necessities like toilets in some households. The z variates computed showed that the government policies have significantly affected the income levels of Dhanla, and Chicholi, although this is not the case with Charba, it has surely benefitted from government schemes. Awareness level regarding the government policies was observed to be low and the government should focus on spreading awareness about various policy measures which will benefit the farmers.

APPENDICES

Table 01

Age	Frequency	Percentage%
15-25	1	1.492537313
26-35	11	16.41791045
36-45	21	31.34328358
46-55	17	25.37313433
56-65	10	14.92537313
66-75	7	10.44776119
Total	*67*	*100*

Table 02

Gender	*Chicholi*		*Charba*		*Dhanla*	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
Male	15	68.18	17	77.28	18	78.26
Female	7	31.82	5	22.72	5	21.74

Table 03

Education level	*Dhanla*			*Charba*			*Chicholi*		
	Uneducated	**Educated**	**%**	**Uneducated**	**Educated**	**%**	**Uneducated**	**Educated**	**%**
Primary	-	8.00	36.36	-	8.00	38.10	-	7.00	35.00
10th	-	9.00	40.91	-	10.00	47.62	-	6.00	30.00
12th	-	3.00	13.64	-	3.00	14.29	-	7.00	35.00
Higher	-	3.00	13.64	-	1.00	4.76	-	2.00	10.00
Total	*3.00*	*20.00*	*90.91*	*6.00*	*16.00*	*76.19*	*6.00*	*16.00*	*80.00*
Percentage	*13.04*	*86.96*		*27.27*	*72.73*		*27.27*	*72.73*	

Table 04

Income Level	*Chicholi*		*Charba*		*Dhanla*	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**
0-100000	5.00	22.73	13.00	59.09	7.00	30.43
100000-200000	7.00	31.82	2.00	9.09	6.00	26.09
200000-300000	5.00	22.73	4.00	18.18	3.00	13.04
300000-400000	1.00	4.55	2.00	9.09	2.00	8.70
400000-500000	1.00	4.55	0.00	0.00	0.00	0.00
>500000	3.00	13.64	1.00	4.55	5.00	21.74

Table 05

Housing Index						

Type of House	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Thatched	4	0.1739	7	0.3182	3	0.1364
Tiled	12	0.5217	9	0.4091	15	0.6818
Terraced	9	0.3913	6	0.2727	4	0.1818

Table 06

Electricity Index						
	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Available	21	0.9130	15	0.6818	17	0.7727
Not Available	2	0.0870	7	0.3182	5	0.2273

Table 07

Sanitation Index						
Toilet	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	21	0.9130	19	0.8636	17	0.7727
No	2	0.0870	3	0.1364	5	0.2273

Table 08

Water Supply Index						
Water Supply	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	19	0.8261	17	0.7727	18	0.8182
No	4	0.2222	5	0.3333	4	0.2667

Table 09

Asset Index						
Tractors/Cattle	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	12	0.5217	12	0.5455	12	0.5455
No	11	0.4783	10	0.4545	10	0.4545

Table 10

Toilet	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	21	0.9130	19	0.8636	17	0.7727
No	2	0.0870	3	0.1364	5	0.2273

Table 11

Water Supply	Dhanla (23)		Charba (22)		Chicholi (22)	
	Frequency	Index	Frequency	Index	Frequency	Index

Yes	19	0.8261	17	0.7727	18	0.8182
No	4	0.2222	5	0.3333	4	0.2667

Table 12

Education level	Dhanla			Charba			Chicholi		
	Uneducated	Educated	% of educated	Uneducated	Educated	% of educated	Uneducated	Educated	% of educated
Primary	-	8.00	36.36	-	8.00	38.10	-	7.00	35.00
10th	-	9.00	40.91	-	10.00	47.62	-	6.00	30.00
12th	-	3.00	13.64	-	3.00	14.29	-	7.00	35.00
Higher	-	3.00	13.64	-	1.00	4.76	-	2.00	10.00
Total	**3.00**	**20.00**	**90.91**	**6.00**	**16.00**	**76.19**	**6.00**	**16.00**	**80.00**
Percentage	*13.04*	*86.96*		*27.27*	*72.73*		*27.27*	*72.73*	

Table 13

Bank Account	*Dhanla (23)*		*Charba (22)*		*Chicholi (22)*	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	16	0.6957	13	0.5909	12	0.5455
No	7	0.3043	9	0.4091	10	0.4545

Table 14

Crop Loan	*Dhanla (23)*		*Charba (22)*		*Chicholi (22)*	
	Frequency	Index	Frequency	Index	Frequency	Index
Yes	14	0.6087	14	0.6364	11	0.5000
No	9	0.3913	8	0.3636	11	0.5000

Table 15

HQ_L or HS_L index range	
> 3	High/Good
1 < Index < 3	Moderate
< 1	Low/Poor

Table 16

Index Range	*Dhanla*	*Charba*	*Chicholi*
HQ_L	**1.80**	**1.59**	**1.52**
HS_L	**3.26**	**2.98**	**2.84**

Graph 01

Lorenz Curve

Line of Equality   Lorenz Curve
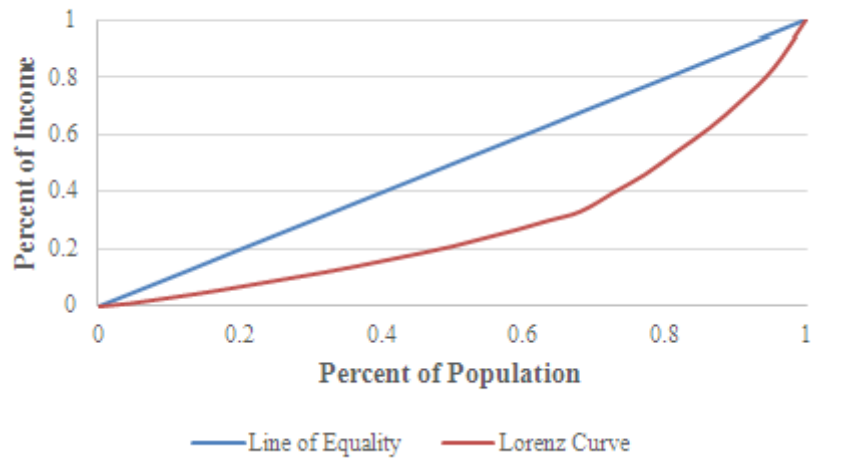
Graph02

Age wise distribution of households engaged in farming

Graph 03

Lorenz Curve

Graph 04

Lorenz Curve
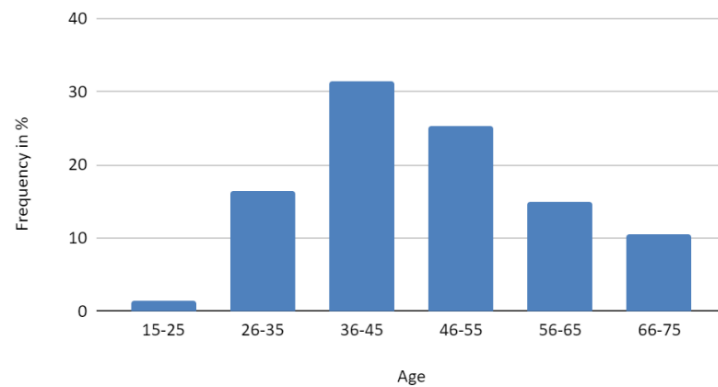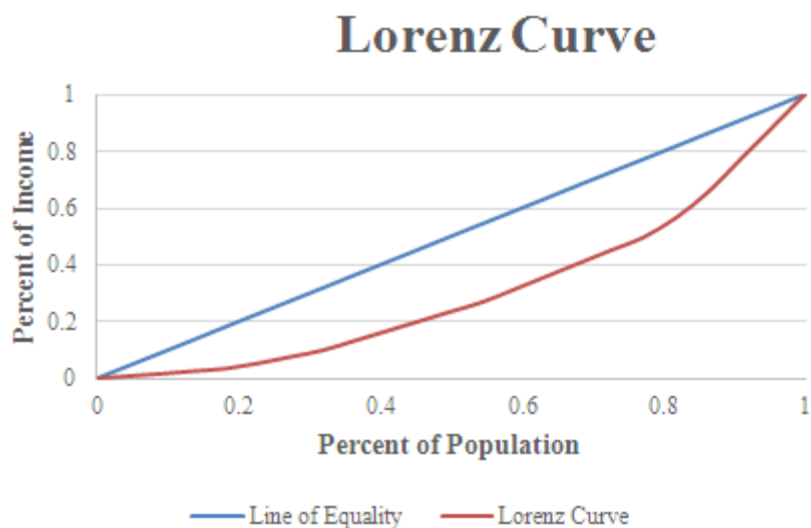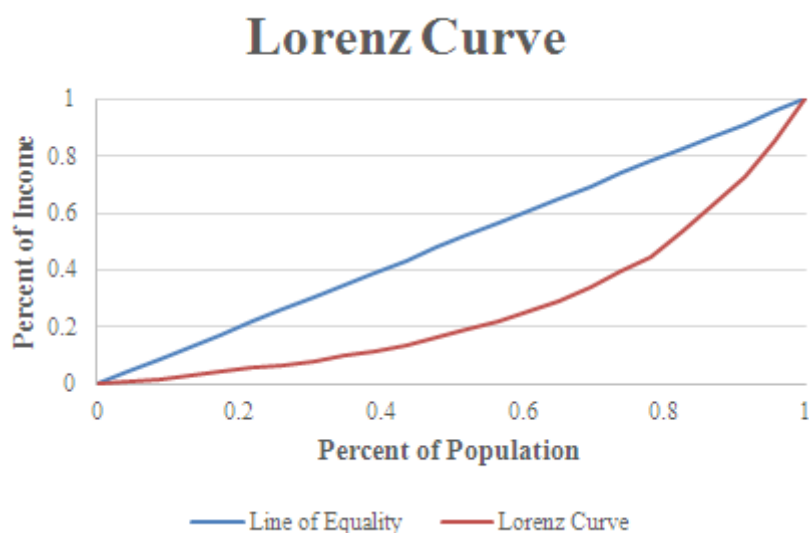
BIBLIOGRAPHY

[1]. Ranganathan, T., and Gaurav, S. (2013). An Inquiry into the Composition of Farm Revenue Risk: The Case of Six Vidarbha Districts. Economic and Political Weekly, 48(26/27), 125-128.
[2]. Amrutkar, P. (2009). The Backwardness And Demand ForaStatehood Of Vidarbha. The Indian Journal of Political Science, 70(2), 521-528.
[3]. Walker, T., Singh, R., and M. Asokan. (1986). Risk Benefits, Crop Insurance, and Dryland Agriculture. Economic and Political Weekly, 21(25/26), A81-A88.
[4]. Mohanty, B. (2009). Regional Disparity in Agricultural Development of Maharashtra. Economic and Political Weekly,44(6), 63-69.
[5]. Rajaretnam, T, S Parasuraman and R Sunil (2010). Vidarbha Baseline Survey of Rural Livelihoods. Tata Institute of Social Sciences, Mumbai.
[6]. Hawkes, C and M T Ruel (2006). Understanding the Links between Agriculture and Health: Agriculture and Nutrition Linkages – Old Lessons and New Paradigms, Focus 13, Brief 4 of 16. International Food Policy Research Institute.
[7]. Sebby, K. (2010). The Green Revolution of the 1960s and Its Impact on Small Farmers in India.
[8]. M L Roy, S Mondal and R P Meena (2008). Socio-economic status analysis of Gram Panchayat members in Burdwan district of West Bengal, Ind. J. Ext. Science, 3,1, pp. 54-56.

[9]. J P S Chauhan (1979). A study on some socio-personal, economic and entrepreneurial characteristics in relation to entrepreneurial role performance of milk producers of Karnal city (M.Sc Thesis), Kurukshetra University, Kurukshetra, India.

[10]. Aggarwal, R.C. and Shah, S.L (1989). Impact Of New Technology on the Levels of Income, Patterns of Income Distribution and Savings of Farmers in Central Uttar Pradesh. Indian Journal of Agriculture Economics.

[11]. Chand, Ramesh (1990). Minimum Support Price In Agriculture. Economic and Political Weekly Vol XXXVIII No 29.

[12]. Dhaliwal, Sarjit (latest). Farm Suicides Can Trouble SAD-BJP. the Tribune April 23, 2009.

[13]. Kunjukunju, Benson (2004). The Impact of Credit on Income of the Rural Borrowers-A Study in Kerala. Indian Cooperative Review.

[14]. Laxminarayan, H (1992). Inter Size Group and Inter-State Variations in Distribution of Agricultural Assets. Economic and Political Weekly.

[15]. Sinha, Siddhartha (2000). Agriculture Insurance In India. Economic And Political Weekly Vol 39 No 25

[16]. Suryaprakash, S and Banakar, Basavaraj (1988). Borrowing and Utilization Pattern of Crop Production Credit in Karnataka: A Case Study. Indian Journal of Agricultural Economics.

[17]. Tewari, L, and Birthal, P. Gulati.A, and Joshi, P.K (1995). Agriculture Diversification In South Asia. Economic and Political Weekly Vol 39, No 24.

[18]. Vasavi, A (1998). Agrarian Distress in Bidar Market, State and Suicides. Economic and Political Weekly Vol 37, No. 12.

[19].

Annexure 1

Constructing Indices using Socio-Economic Parameters- A Study of Farmers in Vidarbha

Household Survey Questionnaire

Name of the Investigator: Mr.Sandeep Singh Saini, Mr. Jay Paranjape, Mr. Kshitij Patil, Mr. Sava Sachi Pandey (B.Sc. Economics, Maharashtra Institute of Technology, Pune)

Name ofVillage _____   Date: _____

Name of Block _____

Name of District _____

1.   IdentificationParticular

a)   Name of the village _____
b)   Name of the person _____
c)   Age ___
d)   Address _____
e)   Children _____
f)   Religion _____
g)   Caste _____
h)   Tenancy Status:Owner of the Land/Tenant of the Land/Agriculture Laborer/Landless.

2.   Details of Family Members

Name	Sex	Age	Marital Status
Education Level	Current Income	Household: Farm/ Non-Farm	Employment Status

3.   Land Holdings
a)   Amount of land in Possession (in Sq Ft/ Acre)
b)   Owned Land Agriculture, Non-Agriculture, Irrigation, Non-Irrigation, Net-Income Generated (Rs. Pa)
c)   Type of Labor used: Own Labor/ Family Labor/ Hired Labor
d)   Do you Cultivate any government / Public Land: Yes/No?

4.   Cropping Patterns and Crop Yield for Total Land Cultivated:

Crops	Land (in acre)	Yield Rate	Total (in Qt)	Amount Sold (in Qt)
Paddy				
Chilli				
Cotton				
Wheat				

5.   Housing Details
a)   Do you own a house: Yes/No?
b)   Type of House: Pakka /Kachhha/Thatched/Asbestos/Tyles
6.   Housing Facilities
a)   Separate kitchen: Yes/ No
b)   Bathroom with in house: Yes/ No
c)   Source of Kerosene/Electricity/Generator/Invertor
d)   Source of Water Supply
7.   Possession of Material Assets
        Tv, Radio, Refrigerator, Cycle, Vehicle, Stove, Cooking Gas, others
8.   Details of Credit facilities
a)   Have you borrowed money: Yes/ No? If yes, then from where: Bank/co-operatives/private money lenders/others (specify)
b)   Cause of borrowing:
        i.   Agricultural investment
        ii.   Business
        iii.   House construction
        iv.   Marriages
        v.   Education/others.
9.   Is there any Increase in Income in the previous year: Yes/ No?
10.   Source of Irrigation
a)   Tube wells
b)   Canals
c)   Others
11.   Any Subsidies?
12.   Supply of Electricity/ Power
13.   Satisfied with MSP?
14.   Crop Loan from which Bank?
15.   Activities started with loans?
16.   Means of Agriculture
a)   Tractor
b)   Oxen
c)   Any other
17.   The kind of personal and general problems you faced regarding Agriculture. State in detail.
18.   Rate the following factors on a scale of 1 to 5 on how they influence the socio-economic status of Farmers with 1 for least preference and 5 for highest preference

i.	Size of landholding	1	2	3	4	5
ii.	Means ofagriculture	1	2	3	4	5

iii.	Tenancystatus	1	2	3	4	5
iv.	Reasons for loans	1	2	3	4	5
v.	Alternate Employment opportunities	1	2	3	4	5
vi.	Level ofliteracy	1	2	3	4	5
vii.	Maritalstatus	1	2	3	4	5
viii.	Alternate sources ofincome	1	2	3	4	5
ix.	Sources ofirrigation	1	2	3	4	5
x.	Culturalheritage	1	2	3	4	5

Sandeep Singh Saini, et. al. "Constructing Indices using Socio-Economics Parameters: A Study of Farmers in Vidarbha." *IOSR Journal of Humanities and Social Science (IOSR-JHSS),* 26(11), 2021, pp. 16-34.