Socio Economic Status Index to Assess the Impact of National Food Security Mission Interventions on Beneficiary Farmers

G. Chaitra*, N. S. Shivalinge Gowda and S. V. Suresha

Department of Agriculture Extension, College of Agriculture, College of Agriculture, UAS, GKVK, Bangalore, India

*Corresponding author

A B S T R A C T

India has been facing an alarming threat of food insecurity ever since the independence when majority of the agriculture policies and plans emphasized on reducing the problem of hunger, food security, malnutrition and poverty. Despite half of the population working in agriculture and a splendid growth in the agricultural sector leading to high economic development of the country, still malnutrition, hunger and poverty prevail in India, exceedingly. Additionally, the multiplying population of the country and the increasing pressure on land does not seem to keep pace with the agricultural production. In order to combat the challenge of deficit food availability in the country which is a prime objective of Indian agricultural policy, the Government of India launched National Food Security Mission (NFSM) in 2007-08 which consists of crop focused interventions contributing towards increasing the productivity of crops thereby it also contributing towards increasing socio economic status of beneficiary farmers. Therefore, it was felt necessary to assess the impact of NFSM interventions on socio economic status of the beneficiary farmers. Based on the review of literature and discussion with experts, five dimensions of Socio Economic Status were identified. The relevancy rating was obtained from 60 judges in the concerned area. Based on the relevancy percentage and relevancy coefficient the indicators were considered for inclusion in the socio economic status index. To compute the scale values for each of the identified dimension their relative importance in the socio economic status was worked out by adopting normalized ranking method.

Introduction

Soon after becoming an Independent nation, India opted for planned economic development. Rapid economic growth to improve the standards of living of all, through appropriate distributive mechanisms was an important principle of Indian Planning. In the first fifteen years, the government of India focused on reducing the food grain prices to make it affordable for one and all. Later, the Green Revolution of 1960's introduced the country to a myriad of high yielding seeds, chemical and organic fertilizers and advanced technology to boost the productivity of the land. It ameliorated the food supply globally and improved the efficiency of agricultural labor. However, Indian agriculture had a

setback due to the drought in 1960, increasing 16 percent of the country's dependence on imports of cereals (Acharya, 2009). Indian agriculture flourished in the subsequent years, becoming the second largest producer of agricultural output. Though India could not completely eliminate the problem of hunger and poverty, its experience and accomplishment in reduction of poverty and food insecurity through various policies has been commendable.

Despite half of the population working in agriculture and a splendid growth in the agricultural sector leading to high economic development of the country, still malnutrition, hunger and poverty prevail in India, exceedingly. Additionally, the multiplying population of the country and the increasing pressure on land does not seem to keep pace with the agricultural production. In order to combat the challenge of deficit food availability in the country which is a prime objective of Indian agricultural policy, the Government of India launched National Food Security Mission (NFSM) in 2007-08 at the beginning of 11th Five Year Plan (FYP).

The National Food Security Mission (NFSM) is a crop focused intervention aimed to increase the availability of food gains in the country. The resolution to launch the mission was adopted by the National Development Council in May, 2007 with the specific objective of increase the production of rice by 10 million tonnes, wheat by 8 million tonnes and pulses by 2 million tonnes by the end of eleventh five year Plan (2001-12).The Mission is being continued during 12th Five Year Plan with new target of additional production of 25 million t onnes of food grains comprising of 10 million tonnes rice, 8 million tonnes of wheat, 4 million tonnes of pulses and 3 million tonnes of coarse cereals by the end of XII Plan.

Since there are various interventions in NFSM which are directly and indirectly contribute to the socio economic status of the farmers who are availing the benefits of NFSM. Therefore, the study was focused to assess the impact of NFSM interventions on socio economic status of farmers by developing a Socio Economic Status index.

Operationalization of Socio Economic Status Index

It is operationalized as the position or status, which the individual beneficiary farmer occupies with reference to the prevailing average standards in terms of standard of living, quality of life, assets and liability status, financial position and crop production and marketing as a result of adopting NFSM interventions.

Materials and Methods

The present Index was developed by following the procedure as given below

Step 1: Identification of dimensions

Socio economic status was identified as a part of dependent variable. Based on a thorough review of literature related to socio economic status, five dimensions were identified viz.,

Standard of Living,
Quality of Life
Assets and Liability Status
Financial Position and
Crop Production and Marketing

Further the different indicators were framed under each component.

Step 2: Collection of indicators

A large number of draft indicators on each dimension of socio economic status were

collected based on review of literature, discussion with concerned specialists and their opinion. These indicators were carefully edited, revised and restructured wherever it was required.

Step 3: Relevancy weightage

The components were mailed to 90 experts in the field of agricultural extension and other related fields to critically evaluate the relevancy of each component in the four point continuum viz., Most Relevant (MR), Relevant (R), Somewhat Relevant (SWR) and Not Relevant (NR) with the score of 4, 3, 2 and 1 respectively. A total of 72 judges returned the questionnaires duly completed and 60 were considered for further processing eliminating the faulty, incomplete or partially completed questionnaires. From the data gathered, Relevancy Percentage, Relevancy Weightage and Mean Relevancy Score were worked out for all the indicators by using the formula

$$\text{R.W.} = \frac{\text{MR} \times 4 + \text{R} \times 3 + \text{SWR} \times 2 + \text{NR} \times 1}{\text{No. of judges responded x Maximum score}} \times 100$$

$$\text{MRS} = \frac{\text{MR} \times 4 + \text{R} \times 3 + \text{SWR} \times 2 + \text{NR} \times 1}{\text{No. of judges responded}} \times 100$$

R.W– Relevancy weightage
MRS – Mean Relevancy Score

Out of 32 indicators identified based on review of literature, discussion with concerned specialists to measure the socio economic status of NFSM beneficiaries. Taking into consideration the overall values which was given by the judges, the items having relevancy percentage of equal and more than 70.00 per cent, relevancy weight age of equal and more than 0.70 were considered for the inclusion in further analysis. Thus, 26 indicators were considered finally for further processing and were

suitably modified as per the comments of experts wherever required. The indicators further considered are presented in Table 1.

Step 4: Computation of scale values

In order to compute the scale values for each of the identified dimensions based on the relevancy percentage, the socio economic status was worked out by adopting normalized ranking method recommended by Guilford (1954).

A list of experts was prepared and considered for seeking opinion. The judges were requested to give rank order based on the relative importance of the dimensions. After receiving ratings from the judges, they were used in calculation of scale values. Ranking the components was done based on their relative importance. Ranks were converted to rank values using the formula:

Ri= (n-ri+1)

Where,

Ri = Rank values
n = Number of dimensions
ri = Ranks given by judges to five dimensions

$$P = \frac{(Ri - 0.5)\,100}{n}$$

Where,

P= Centile position
Ri = Rank value
n = Number of indicators

The calculation of scale values was done by working out the 'P' based on the formula recommended by Guilford (1954), working out 'C' scale values based on hull table (Hull, 1928), calculating 'Rj' value and finally determining the scale values (Rc) (Table 2).

$Rj=\sum fjiC$

$Rc= 2.357*Rj – 7.01$

Where

Rc= scale value
C= Values determined to each centile value

The table 3 consisting dimension wise scale value of the socio economic status and is found to be 6.11 for Standard of Living, followed by Financial Position (6.03), Crop Production and Marketing (5.76), Quality of Life (3.79) and Assets and Liability Status (2.18). Hence, Standard of Living was found to be in the first position followed by other components.

Step 5: Measurement procedures of indicators

As the index developed was composite in nature, the indicator measures include both quantitative and qualitative procedures. Under each indicator, suitable sub indicators and variables are identified and levels of measurement were fixed for variables.

Step 6: Schedule development

For all the indicators, a schedule was prepared to elicit appropriate variability for socio economic status. A pilot study was conducted with 32 respondents in non sample area *i.e* Chitradurga district to test the reliability and validity of index.

Step 7: Testing for reliability

Reliability was measured with test-retest (coefficient of stability) method. The test retest measures the correlation between scores on two administrations (A1 and A2) of the same form of test, separated by time period. This would give the coefficient of stability of

the test. In the pilot survey the respondents were interviewed twice with the questionnaire of 26 indicators and respective statements at an interval of 15-20 days. The coefficient of correlation (r) was calculated between scores from two administrations.

$$R_{(A1)(A2)} = \frac{(X_{A1})\,(X_{A2})\,/\,(N-X_{A1})\,(X_{A2})}{(S_{A1})\,(S_{A2})}$$

Where, A1 and A2 are two different administrations of the index, X is the score of variables and S is the variance. The correlation coefficient (r) between two administrations with time gap was found to be higher (0.79).

Spearmen Brown Prophecy formula was employed to study the reliability of the original length from the value of coefficient of stability.

$$r_{11} = 2*r\,/\,1+r$$

The reliability coefficient was found to be 0.955 which is higher than the standard of 0.70 indicating higher reliability of the index.

Step 8: Validity of the index

The data were subjected to statistical validity, which was found to be 0.930, for index, which is higher than the standard of 0.70. Hence, the validity co-efficient was also found to be most appropriate.

$$\text{Validity} = \sqrt{r_{11}}$$

Where r_{11}= test reliability

Step 9: Calculation of Socio Economic Status Index

After data collection, the data obtained for the variables under study was normalized to bring the indicators to the same standard by

transforming them to pure dimensionless numbers. The functional relationships between the indicators were established before the normalization of indicators whether they have positive or negative relationship.

Table.1 Relevancy percentage, relevancy weightage and mean relevancy score of indicators of socio economic status

Sl. No.	Dimensions and Indicators	RP	RW	MRS
	I Standard of Living			
1	Food Security	73.33	0.73	2.93
2	Habitat Security	72.08	0.72	2.88
3	Educational Security	77.5	0.77	3.10
4	Health Security	77.5	0.78	3.10
5	Ecological Security	74.17	0.74	2.97
6	Accessibility to Living Amenities	75.41	0.75	3.01
	II Quality of Life			
7	Social Status	72.08	0.72	2.88
8	Social Empowerment	79.16	0.79	3.16
9	Transformation over a period of time	80.83	0.81	3.23
10	Social Migration	77.08	0.77	3.08
11	Personal Growth	74.17	0.74	2.97
	III Assets and Liability Status			
12	Possession of farm related assets	77.91	0.77	3.11
13	Material Possession	72.08	0.72	2.88
14	Indebtedness	79.58	0.79	3.18
15	Credit Repayment Source	73.75	0.74	2.95
16	Habit of Saving	74.6	0.74	2.98
	IV Financial Position			
17	Source of Income	77.08	0.77	3.08
18	Land Value	77.08	0.77	3.08
19	BC Ratio	76.25	0.76	3.05
20	Investment Pattern	78.33	0.78	3.13
21	Expenditure Pattern	72.91	0.72	2.91
22	Employment Potential	75.41	0.75	3.01
	V Crop Production and Marketing			
23	Economic Yield	79.16	0.79	3.16
24	Marketing Channel	81.25	0.81	3.25
25	Marketed Surplus	79.58	0.79	3.18
26	Marketable Surplus	76.25	0.76	3.05

Table.2 Calculation of scale values for dimensions of socio economic status based on the judges rating

ri	Ri	D1	D2	D3	D4	D5	Total	P	C
1	5	15	13	5	15	12	60	**90.000**	8
2	4	8	7	4	19	22	60	**70.000**	6
3	3	22	3	16	12	7	60	**50.000**	5
4	2	13	20	10	5	12	60	**30.000**	4
5	1	2	17	25	9	7	60	**10.000**	2
$\sum fji$		60	60	60	60	60	300		
Rj=$\sum fjiC$		334	275	234	332	325	1500		
R=Rj/$\sum fji$		5.57	4.58	3.9	5.53	5.42	5.00		
Rc*		6.11	3.79	2.18	6.03	5.76	4.78		

Table.3 Scale values of socio economic status

Sl. No.	Components	Final Scale Values	Rank
1	Standard of Living	6.11	I
2	Financial Position	6.03	II
3	Crop Production and Marketing	5.76	III
4	Quality of Life	3.79	IV
5	Assets and Liability Status	2.18	V

For the indicator which has positive functional relationship with their respective dimensions, the normalization was done using equation.

$$Y_{ij} = \frac{X_{ij} - Min\ (X_{ij})}{Max\ (X_{ij}) - Min\ (X_{ij})}$$

Let Y be the index foe the ith indictor related to j[th] dimension

For the indicator which has negative functional relationship with their respective dimensions, then normalization was done using equation.

$$Y_{ij} = \frac{Max\ (X_{ij}) - X_{ij}}{Max\ (X_{ij}) - Min\ (X_{ij})}$$

The normalized indicators were weighted using Iyengar – Sudarshan Method (1982) in which they linked weight to variance across the indicators. More precisely they postulated that

$$w_j = \frac{C}{\sqrt{Var(Y_{ij})}}$$

Where, C is a normalizing constant that follows

$$C = I \sum_{i=1}^{M} \frac{1}{\sqrt{var}} (Y_{ij}) I^{-1}$$

The normalized indicators are then multiplied with the assigned weights to construct the indices separately for each dimension of Socio Economic Status Index viz., Standard of living, Quality of life, Assets and liability status, Financial position, Production and marketing. Finally, the composite index for socio economic status was calculated using linear aggregation method as,

SESI = SoL + QoL + ALS + FP + CPM

Where,

SESI is the Socio Economic Status index
SoL is the Standard of Living
QoL is the Quality of Life
ALS is the Assets and Liability Status
FP is the Financial Position
CPM is the Crop Production and Marketing

The overall Socio Economic Status index was categorized into three group namely low, medium and high based on mean and standard deviation.

In conclusion as the index consists of almost all the components of socio economic status, which serves as a handy tool to assess the socio economic status of the beneficiary farmers also, in turn it helps the researchers studying on impact of development programmes on socio economic status of the farmers. But, the developed index suffers from the limitation of not using it in case of development programmes which are not based on crop based interventions. In that case crop based indicators could be excluded to assess the socio economic status of beneficiary farmers.

References

Gullford, J. P., 1954. Psychometric methods. Tata McGraw. *Hill Publishing Co. Ltd*. New Dehli.

Acharya, S. S., 2009, Food security and Indian Agriculture: policies, production performance and marketing environment. *Agricultural Economics Research Review*, 22(1): 1-19.

Lijo Thomas, C., Sundaramoorthy and Girish Kumar Jha., 2013, The impct of National Food Security Mission on Pulse Production scenario in India: An Empirical Analysis. *Int. J. Agricult. Stat. Sci.*, 9(1): 213-223.

Agricultural Finance Corporation Limited., 2014, Report on Impact evaluation of National Food Security Mission, New Delhi.

Deepak Shah., 2012, Impact of National Food Security Mission on Pulse Crops in Maharashtra: An Empirical Assessment. *Ind. Jn. of Agri. Econ*. 67: (3).