



Assessment of model villages in farming perspective using Model Village Potential Index

SANGEETA BHATTACHARYYA¹ and KUPPUSAMY PONNUSAMY²

ICAR-National Dairy Research Institute, Karnal, Haryana 132 001

Received: 17 August 2016; Accepted: 16 September 2016

ABSTRACT

Indian villages shelter more than two third of population and ensures the country's food and nutritional security through its agricultural activities. Hence both government and non government agencies undertake number of interventions to develop the villages. But what is the after effect of such intervention on a village as a whole? It is well known that research institutes and Krishi Vigyan Kendras (KVKs) under the Indian Council of Agricultural Research system adopt villages to disseminate technologies and other research outputs and in a way try to develop model villages fit to be replicated by other villages. A study was conducted at ICAR-NDRI to assess such Model Villages, adopted by IARI and NDRI in Haryana and Ramakrishna Ashram KVK in West Bengal. The villages were assessed mainly from farming perspective as agriculture is the backbone of Indian villages. But along with farming; infrastructural, economic, social and environmental parameters were also assessed through Model Village Potential Index because all are interlinked. The village Gilechant in West Bengal surpassed the other selected villages in infrastructural score (63/85), farming score (68/86) and environmental score (4/7). Except Budhakhera in Haryana, other villages had same economic scores (23/28). Budhakhera and Gilechant had equal social scores (21/29). The scores on all five indicators cumulatively yielded the Model Village Potential Index value 68.14 for Budhakhera, 71.83 for Kalvehri, 71.36 for Badarpur Saeed and 76.53 (highest) for Gilechant indicating the successful efforts of Ram Krishna Ashram KVK, West Bengal in developing this village into a Model Village.

Key words: Assessment, Farming perspective, Indicators, Model village, Model village potential index

India has 640867 villages. More than two-third (68.84%) of Indian population lives in villages, of which 65 per cent is dependent on agriculture for their livelihood (Census 2011, GoI). Development programmes, technological advancements and government interventions have brought about transformations in rural India in areas of infrastructure, education, health, sanitation and employment. The gender gap in literacy has come down from 24.6% to 19.8% in the rural areas and from 13.4% to 9.8% in the urban areas during 2001 to 2011 and even the sex ratio in rural areas is better than in urban areas (Ponnusamy *et al.* 2015). But still a lot remains to be done.

Villages have been the fundamental units of human civilization since time immemorial. The Father of the Nation Mahatma Gandhi had dreamt of Gram Swaraj and Model Villages. The Government is trying its best to realise the

dream of Mahatma Gandhi once again by initiating Sansad Adarsh Gram Yojana (SAGY) launched on 11 October 2014 in which every Member of Parliament has to adopt a village in his constituency and develop it into an Adarsh Gram. It envisages integrated development of the village across multiple areas such as agriculture, health, education, sanitation, environment, livelihoods etc. (GoI 2014). Also the Indian Council of Agricultural Research (ICAR) initiative Mera Gaon Mera Gaurav is aimed to promote direct interface of scientists with the farmers to hasten the lab to land process. The objective of this scheme is to provide farmers with required information, knowledge and advisories on regular basis by adopting villages (PIB 2015). In the context of such importance being attached to develop Model Villages, the present study had been undertaken to assess the villages adopted by various institutes which aimed to make these villages progressive in their own way. The objective was to evaluate the selected villages using the Model Village Potential Index in farming perspective.

MATERIALS AND METHODS

The present study was undertaken in four villages, viz. two adopted villages (Budhakhera and Kalvehri) of National Dairy Research Institute (NDRI) in Karnal

¹Ph D Research Scholar (e mail: sangeeta.bhattacharyya2012@gmail.com), Division of Agricultural Extension, ICAR-Indian Agricultural Research Institute, New Delhi 110 012, ²Principal Scientist (email: ponnusamyk@hotmail.com), Division of Dairy Extension, ICAR-National Dairy Research Institute, Karnal, Haryana 132 001.

district of Haryana state, one adopted village (Badarpur Saeed) of Indian Agricultural Research Institute (IARI) in Faridabad district of Haryana state and one adopted village (Gilechant) of the NGO run KVK, Ramakrishna Ashram KVK (RAKVK) in South 24 Parganas district of West Bengal state because these institutes are pioneers in fields of dairy, agriculture and rural development interventions respectively giving emphasis to the role of farming sector in development of Model Villages. Since the study focussed on establishing the criteria for development of Model Villages in farming perspective, such villages were purposively selected where development interventions in farming has been or is being done in order to assess the ranks of these villages as Model Villages. Other aspects apart from farming were also studied because farming needs other supporting factors. A Model Village Potential Index (MVPI) was developed based on five broad indicators of a Model Village (Ponnusamy *et al.* 2015) with fifty six sub indicators under them which were standardized and given weightage through expert consultation. The five broad indicators are (Ponnusamy *et al.* 2015): 1. Infrastructural Indicators. 2. Economic Indicators. 3. Farming Indicators. 4. Social Indicators. 5. Environmental Indicators.

Eighty experts were consulted for assignment of weightages to the five broad indicators to know their relative importance in determining a Model Village. Fifty of the experts responded. The experts comprised extension scientists, field personnel and line department officials in the fields of Agriculture, Veterinary and Fisheries who had first hand knowledge of situation at village level. The weightages were as such: Farming – 25%, Infrastructure – 24%, Economic- 21%, Social- 16%, Environment- 14%. The researcher formulated 56 sub indicators under the broad indicators and these sub indicators were tested for their relevancy by expert consultation on a three point continuum scale, viz Most Relevant, Relevant and Least Relevant. Relevancy percentages of the sub indicators were calculated as such:

$$RP(\%) = \frac{(MR \times 3 + R \times 2 + LR \times 1)}{\text{Total no. of experts} \times 3} \times 100$$

where, RP = Relevancy percentage, MR = Number of experts giving most relevant, R = Number of experts giving relevant, LR = Number of experts giving least relevant.

Those indicators which had relevancy percentage of above 70% were included in the final study. Thus indicators and sub indicators were standardized. With the help of the indicators a semi structured interview schedule was developed and data were collected from the purposively selected four villages through Participatory Rural Appraisal. It followed an *ex post facto* research design. Key Informant interviews were held to collect information from a wide range of people including community leaders, professionals, or residents who had first-hand knowledge about the community. Three key informant interviews were conducted in each village with 10 respondents in each interview adding to a total of thirty key informants from each village

thus constituting the total sample size of 120. The key informants (purposive sampling) ranged from Panchayat members, school teachers, anganwadi workers, progressive farmers, small holder farmers to women who were members of Self Help Groups. The scores on five broad indicators cumulatively yielded the final MVPI scores which indicated the potential of each village to be called as a Model Village. The formula of MVPI is as follows:

$$MVPI = (I_w + Ec_w + F_w + S_w + En_w) / N \times 100$$

where, I_w = Weighted Infrastructural score (weightage given by experts=0.24), Ec_w = Weighted Economic score (weightage given by experts=0.21), F_w = Weighted Farming score (weightage given by experts=0.25), S_w = Weighted Social score (weightage given by experts=0.16), En_w = Weighted Environmental score (weightage given by experts=0.14), N = Maximum obtainable score.

The Maximum Score on a particular sub indicator was obtained through summing up of the maximum scores of all the questions asked in interview with regard to that particular sub indicator. For example the indicator drinking water facilities has 4 sub parts each with three options having 1,2,3 as scores corresponding to it: (i) Percentage of households having drinking water source in their houses: <50%(score1), 50%-75%(score2), >75%(score3). (ii) Percentage of households receiving piped water supply: <50%(score1), 50%-75%(score2), >75%(score3). (iii) Percentage of households having water filters: <50%(score1), 50%-75%(score2), >75%(score3). (iv) Quality of drinking water in the village: Poor(score1), Good(score2), Very good(score3).

Thus a village can score a maximum of 3 in all 4 parts leading to a Maximum Obtainable Score of 12 in the particular indicator of drinking water facilities in a village. In this way the Maximum Score of all indicators have been obtained.

The scores obtained by each village on five broad parameters Infrastructural, Economic, Farming, Social and Environmental were in way ranking of these 5 parameters for a particular village. To judge the agreement among the ranks given to the five broad parameters of Model Village by the key informants of a particular village, Kendall's Coefficient of Concordance or Kendall's W was calculated for each of the four villages. The statistical significance of W was also checked. The formula for Kendall's W is as follows

$$W = \frac{12S}{m^2(n^3 - n)} \text{ where}$$

$$S = \sum_{i=1}^n (R_i - \bar{R})^2$$

S is a sum-of-squares statistic over the row sums of ranks R_i , and \bar{R} is the mean of the R_i values.

W ranges from 0 to 1 with W values nearing 1 meaning there is greater level of agreement among the responses of key informants. To test the significance of W, chi square statistic is used.

RESULTS AND DISCUSSION

The data in Table 1 on infrastructural facilities in the four villages depicts that all the three villages in Haryana possessed similar infrastructure facilities in terms of roads, water supply, electricity, education and health and communication. The village Gilechant slightly surpassed them in successful usage of community centre by holding regular meetings and discussing issues of social interest about village welfare. This village was also better in securing higher education for their children and health facilities were also adequate with two Anganwadis and one Primary Health Centre, whereas Kalvehri and Badarpur Saeed did not have Primary Health Centres in their villages and people had to travel to nearest town, Karnal for availing medical facilities. It was observed from table that all the four selected villages have the further scope in expanding drinking water, electricity, school enrolment and health facilities in order to realise the dream of fully fledged model villages.

Table 1 Scores on infrastructure parameters of the villages (n=120)

Indicator	Budhakhera	Kalvehri	Badarpur Saeed	Gilechant	Maximum score
Type of roads and their accessibility	9	8	9	8	9
Drainage and sanitation	4	4	4	5	6
Drinking water facilities	9	9	8	6	12
Electricity	11	12	11	10	15
Type of houses (kutchi/pucca)	3	3	3	3	3
Village community centre and its usage	1	1	1	2	2
School and enrolment	8	9	10	12	15
Health facilities	7	5	6	8	11
Communication facilities	8	9	8	9	12
TOTAL	60	60	60	63	85

The data in Table 2 on economic indicators of the villages shows that except Budhakhera, rest of the villages had better scoring of economic indicators. Budhakhera lacks in self sufficiency (as it has scored 8 out of 12 in self sufficiency criteria where a score above 10 can be considered to be nearing self sufficiency with respect to foodgrain, milk, vegetables, egg and meat requirements being fulfilled

Table 2 Scores on economic parameters of the villages (n=120)

Indicator	Budhakhera	Kalvehri	Badarpur Saeed	Gilechant	Maximum score
Proportion of account holders in bank	3	2	3	3	3
Proportion of APL and BPL families	3	3	3	3	3
Presence of SHGs	0	1	1	1	1
Proportion of insurance holders	1	2	2	1	3
Proportion of credit/debit card holders	3	3	3	3	3
Proportion of population approaching money lenders	1	2	1	1	3
Self sufficiency in village	8	10	10	11	12
Total	19	23	23	23	28

within the village itself or they have to purchase them from outside the village) to some extent because the village is rapidly coming under the influence of urbanisation and land acquisition by Municipality of Karnal for business or residential purposes which have reduced the agricultural land in the village to a considerable extent (Directorate of Town and Country Planning, Haryana, 2016). People are purchasing or leasing in land outside the village to carry on agriculture. It is ironical to see that farm households were found to purchase the foodgrains for home consumption from outside as that of urban dwellers.

The scores obtained by the villages on farming (Table 3) indicate that Gilechant village in West Bengal scored better than other three villages with respect to practices like intercropping, fishery, apiary and poultry and also usage of organic fertilizers and pesticides thus facilitating the village far ahead of other three villages where farming system is not so diversified and sustainable in nature. The village is usually progressive where there is a farmer participation in technology transfer process (Ponnusamy and Ambasankar 2006). Gilechant had farmers practising not only agriculture but also relying on other sources of allied sources of income like ornamental bird rearing, poultry farming, fishery and apiary unlike the farmers in villages of Haryana where there was prevalence of large farmers but unsustainable

farming methods like rice-wheat cropping and no other diversified farming options, usage of chemical fertilizers with very less of organic ones and also usage of chemical pesticides to prevent pest attack. But Gilechant had farmers

Table 3 Farming scores of the villages (n=120)

Indicator	Budha- khera	Kal- vehri	Badarpur Saeed	Gilechant	Maxi- mum score
<i>Agriculture</i>					
Crop rotation	3	3	3	3	3
Intercropping	1	1	1	3	3
Mixed farming	3	3	3	3	3
IPM	1	1	1	1	3
Organic pesticide usage	1	2	1	3	3
Green manuring	1	1	1	1	3
Usage of farm implements	11	13	15	11	15
Electric pump sets or motors	3	3	3	3	3
Availability of irrigation water	3	3	3	3	3
Cooperative farming	0	0	0	0	1
Total	27	30	31	31	40
<i>Livestock</i>					
Pucca sheds for animals	1	2	2	3	3
Practice of AI	3	3	3	3	3
Practice of deworming	2	3	3	3	3
Vaccination	3	3	3	3	3
Balanced feeding	3	3	3	3	3
Fodder production	9	10	9	6	12
Backyard poultry/ apiary/fishery	0	0	0	1	1
AI facilities and services	2	2	3	3	3
Veterinary health centre and services	2	0	0	2	3
Milk Cooperative Society	0	1	0	1	1
Total	25	27	26	28	35
<i>Other parameters</i>					
Nearest market for marketing farm produce	5	5	5	6	6
Processing centre	0	0	0	0	1
FIGs/Farmers' club	0	1	0	0	1
Visit by agriculture personnel	1	2	2	3	3
Total	6	8	7	9	11
Grand total	58	65	64	68	86

who relied heavily upon organic fertilizers and even used Integrated Pest Management techniques to control pests. So if sustainable farming is emphasized to ensure safe food and also nutritional security to our future generations, the performance of Gilechant in this aspect is commendable.

The social scores of the villages (Table 4) were collected on a range of indicators so as to give maximum score to best performing village that is having least prevalence of social vices. From this perspective Budhakhera village inspite of being located in Haryana where discrimination against women is quite prevalent, had no purdah and dowry system. Dowry was given only when demanded. This may be due to profound influence of urbanisation and modernisation on the village. The other two villages, viz. Kalvehri and Badarpur Saeed had equal scores. Kalvehri had highest tobacco and alcohol consumers while Badarpur Saeed had purdah and dowry system. Gilechant had incidences of communal clash and more of alcohol and tobacco consumers (as evident from the scores obtained in 2nd and 6th indicator of Table 4) but the status of female population of the village was very impressive as women ran their own small enterprises, did small jobs and in some households women were in fact only sources of income. This had placed the village Gilechant in a better position on Model Village Continuum.

Table 4 Social development of the villages (n=120)

Indicator	Budha khera	Kalvehri	Badarpur Saeed	Gilechant	Maximum score
Female marriage age	3	3	3	3	3
Incidents of clashes in the village	3	3	3	2	3
Female participation, literacy and entrepreneurs- hip	4	4	3	7	9
Consumption of alcohol and tobacco	7	3	6	5	9
Prevalence of purdah system	1	1	0	1	1
Communal conflict	1	1	1	1	1
Sex discrimination	0	1	1	0	1
Prevalence of dowry system	1	1	0	1	1
Prevalence of untouchability	1	1	1	1	1
Total	21	18	18	21	29

The data in Table 5 depicts that the villages of Kalvehri and Badarpur Saeed had no ecofriendly structures but Budhakhera tried its best to maintain a pollution free

Table 5 Environmental status of the villages (n=120)

Indicator	Budha khera	Kalvehri	Badarpur Saeed	Gilechant	Maximum score
Presence of check dams	0	0	0	1	1
Presence of percolation pits	0	0	0	1	1
Rain water harvesting	0	0	0	0	1
Renewable energy source (solar/bio gas)	0	0	0	0	1
Pollution free village pond	1	0	0	1	1
Forest coverage	0	0	0	1	1
Community grazing land	0	0	0	0	1
Total	1	0	0	4	7

village pond. On the other hand Gilechant had check dams and percolation pits and also forest cover which shows the concern of the villagers for water and soil conservation. As the village constantly faces the natural calamities so it has been recommended by RAKVK scientists to practise soil and water conservation techniques to deal the problems of flooding and soil salinity and water crisis during summer.

Now scores given by key informants to the five broad parameters of their respective villages were tested for agreement between them (for example one key informant of Budhakhera had ranked infrastructure at 1st place while another ranked farming at rank 1 or best among the 5 parameters). Hence a test for agreement of responses and its significance was desirable. The null hypothesis can be: H_0 : There is no significant difference between the ranks given to the five parameters by key informants of a particular village. H_1 : There is significant difference between the ranks given to the five parameters by key informants of a particular village.

Table 6 indicated that there was high level of agreement among the key informants while ranking the five parameters in their villages as all the values of W have come above 0.7 except in Badarpur Saeed where moderate agreement was noticed with $W = 0.643$. Again, significant difference also was noticed among the ranks given by key informants in all four villages as chi-square value of W was well above critical value of chi-square at 4 (n-1) degrees of freedom and at 0.05 level of significance.

Now that the ranks given were in agreement and statistically significant, it meant that the scores obtained by the villages in all indicators under five parameters genuinely reflected the condition of the villages. Hence the Model Village Potential Index value was calculated for each of the village to assess their rank or position on the Continuum

Table 6 Kendall's W for agreement of responses of key informants in each village (n= 30*4=120)

Particulars	Budhakhera	Kalvehri	Badarpur Saeed	Gilechant
No. of key informants (m)	30	30	30	30
No. of parameters (n)	5	5	5	5
Kendall's W	0.838	0.735	0.643	0.894
Interpretation	High level of agreement	High level of agreement	Moderate level of agreement	High level of agreement
Chi-square (x^2)	100.56	88.2	77.16	107.28
Level of significance (α)	0.05	0.05	0.05	0.05
Critical value of $x^2_{(4)}$	9.49	9.49	9.49	9.49
Inference	W is significant	W is significant	W is significant	W is significant

of Model Village Index.

$$\text{MVPI for Budhakhera} = (36.39 / 53.4) 100 = 68.14$$

$$\text{MVPI for Kalvehri} = (38.36 / 53.4) 100 = 71.83$$

$$\text{MVPI for Badarpur Saeed} = (38.11 / 53.4) 100 = 71.36$$

$$\text{MVPI for Gilechant} = (40.87 / 53.4) 100 = 76.53$$

The findings suggest that Gilechant well responded to the rural development initiatives of RAKVK and thus secured the highest position on the Progress Continuum of Model Village. Some of the indicators in which Gilechant performed best may be given adequate thrust by planners, policy makers, extension functionaries across the country for improving other villages to a higher status. Next place on the continuum was occupied by Kalvehri where certain initiatives related to women SHGs were still being undertaken by NDRI to make the rural women skilled in producing value added dairy products. This showed that niche market opportunities as available in urban and peri-urban areas need to be harnessed by developing the capacity of women SHGs through training and proper incentive mechanisms. Next position was occupied by Badarpur Saeed where appreciable development initiatives and Transfer of Technology projects were undertaken by IARI through Contact Farmer Approach. This indicated that model farmer centric approach by developing the capacity of educated unemployed youths will bring appreciable dividends in terms of adoption of scientific farming practices, enhanced productivity and profitability and livelihood opportunities for youths in the village. Lastly Budhakhera is the one where earlier initiatives by NDRI had resulted in phenomenal enhancement of milk production in village. But due to extreme influence of urbanization, owing to its proximity to the town, people sold off their lands and animals to adopt

an urban lifestyle thus resulting to its lowest position on the Model Village Continuum. In this context, the youth and women should be imparted skill oriented training on various aspects related to peri-urban agriculture having immense potential for entrepreneurial venture.

The implications of the study are many among which one is the MVPI which was developed under the study to fulfill the long standing requirements of set of possible indicators to judge the performance of villages adopted by different agencies. Second, the ranks on the continuum were given not only to indirectly judge the performance of best adopting agency but was also used to judge the progress of a village towards being a Model Village. Third, the various indicators with their respective scores determined the areas where the village was lacking specifically and need improvement. This indicates that holistic perspective is needed for developing villages in all respects with major emphasis on farming (Ponnusamy 2004).

The policy implications are that, the indicators once standardised and an index developed to rank villages on a continuum, it will become very easy for various governmental and non-governmental change agencies to use this index to rank their respective villages where some interventions have been undertaken by them. Apart from the progress rate of any agency, fellow villagers with the help of some extension personnel or any other field level functionary can also use the index to see the score of their villages to assess the progress in rural livelihood made by them. The scores will reflect the areas of success and failure which will help in further policy making and action. At the outset of Prime Minister's initiative of Sansad Adarsh Gram

Yojana (SAGY), the level of progress in SAGY villages can be gauged using the MVPI and suggest strategies to tune the process with development perspective.

REFERENCES

- Census of India. 2011. Rural urban distribution of population, Directorate of Census Operations Census of India 2011-Provisional Population Totals, Government of India, New Delhi. http://censusindia.gov.in/2011-prov-results/paper2/data_files/india/Rural_Urban_2011.pdf
- Directorate of Town and Country Planning. 2016. License for setting up Affordable Group Housing Colony in Budhakhhera. Haryana. <https://tcepharyana.gov.in/Licences/pdf%202016/2%20of%202016.pdf>
- Ponnusamy K. 2004, Technology assessment in agriculture. *Yojana* **48** (July): 37–9.
- Ponnusamy K and Ambasankar K. 2006 Technological interventions for socio-economic enrichment of dairy farmers. *Indian Journal of Dairy Science* **59**(1): 33–6.
- Ponnusamy K, Bhattacharyya S and Jain D K. 2015. Strategising development of model village with animal husbandry orientation. (In) *Compendium of National Conference on 'Push to the livestock farming through knowledge empowerment of the farmers*, held on 18 to 20 November 2015 organized by Society of Veterinary and Animal Husbandry Extension at Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab (India), pp 19–28.
- Government of India. 2014. Sansad Adarsh Gram Yojana Guidelines, Department of Rural Development, Ministry of Rural Development, New Delhi, India.
- Press Information Bureau. 2015. Mera Gaon Mera Gaurav. Government of India, New Delhi. <https://pibindia.wordpress.com/tag/mera-gaon-mera-gaurav/>