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### A scale to measure the impact of Maharashtra project on climate resilient agriculture

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#### Abstract

This study aimed to develop a scale for measuring impact of PoCRA project on its beneficiaries using Likert's summated rating scale methodology. Ninety seven statements were initially enlisted based on literature review and expert discussions. Relevancy ratings were sought from 200 scientists and extension specialists affiliated with the Indian Council of Agricultural Research (ICAR) and State Agricultural University (SAU). one hundred Twenty Seven responded within two month, leading to the isolation of 26 statements in the initial screening. The first stage of screening focused on identifying statements with relevancy weightage scores exceeding 0.66, relevancy percentages surpassing 60 per cent, and mean relevancy scores exceeding 2.00 This process resulted in the final selection of 65 statements after modifications and additions based on expert comments. These statements underwent item analysis with 40 beneficiaries from non-sample areas, ultimately narrowing down to a final set of 65 statements based on 't' values ( $>1.75$ ) from the analysis. The reliability of the scale was determined through a split-half method, resulting in an 'r' value of 80.66. This indicates the scale's high reliability and validity. The instrument developed to measure impact of PoCRA on its beneficiaries

**Keywords:** Agriculture, climate, resilience PoCRA, scale construction

#### Introduction

Agriculture in Maharashtra is highly vulnerable to climate variability, with smallholder farmers in Vidarbha and Marathwada particularly at risk. Climate change, coupled with high production costs, low profitability, market fluctuations, water scarcity, and declining soil productivity, has significantly impacted agricultural output in these regions. Recurrent droughts have further depleted groundwater and degraded soil health, reducing productivity and affecting smallholder livelihoods.

To address these challenges, the Government of Maharashtra, with World Bank support, launched the Project on Climate Resilient Agriculture (Nanaji Deshmukh Krishi Sanjeevani Prakalp) in 2018–2019. The project aims to enhance farmers' adaptive capacity through the promotion of climate-resilient practices, carbon sequestration via tree planting and orchards, and the dissemination of climate-friendly technologies through farm school demonstrations, study tours, and skill-building programs. By integrating environmental sustainability with economic upliftment, the project seeks to enable smallholder farmers in selected districts to effectively adapt to climate change.

#### Objective

To develop and standardize a scale to measure the Impact of

PoCRA project on its beneficiary

#### Materials and Methods

The present study was conducted to assess the impact of the Maharashtra Project on Climate Resilient Agriculture (PoCRA). The study was carried out in three purposively selected districts—Aurangabad, Osmanabad, and Jalna—from the Marathwada region during 2022–2023. From these districts, two tehsils were selected, and from each PoCRA-implemented tehsil, 40 beneficiaries were randomly chosen, resulting in a total sample of 240 respondents.

To construct the impact scale, Likert's (1932) method for developing a summated rating scale was employed. The following sections provide a detailed account of the procedures undertaken, outlining the process of standardizing the scale for measuring the impact of the PoCRA project.

#### Results and Discussion

##### Identification and selection of various components

Seven components—social change, economic change, changes in asset possession, educational change, employment generation, psychological change, and technological change—were identified to assess the impact of the PoCRA project. These components were selected based on a review of the literature and discussions with

extension experts.

### Collection and editing of items

Initially, 97 statements reflecting the impact of the PoCRA project on beneficiary farmers were prepared based on a review of the literature, articles, and publications, and in consultation with specialists in extension, economics, and agricultural field officers. These statements were then edited according to the criteria suggested by Thurstone (1946) <sup>[9]</sup>, Likert (1932), and Edward (1957) <sup>[11]</sup>. Following this process, 81 statements were retained, all of which were found to be clear, non-ambiguous, and non-factual.

### Selection of the judges

These 81 statements were then reviewed by an expert panel to assess their relevancy. To facilitate this, a questionnaire

containing all the items was prepared and distributed to 200 judges, including Assistant Professors, Associate Professors, Professors, Scientists, and Extension personnel from State Agricultural Universities, deemed universities, and national institutes such as MANAGE and ICAR, along with clear instructions for evaluation. The questionnaires were sent by post with self-addressed stamped envelopes, emailed, and also personally handed over to the experts.

The experts were asked to evaluate each statement for relevancy using a three-point scale: "Most Relevant" (MR) scored 3, "Relevant" (R) scored 2, and "Not Relevant" (NR) scored 1. They were instructed to critically examine each item to determine its appropriateness for measuring the impact of the PoCRA project.

### Judges contacted and responses received

| Sr. No. | Particulars                                         | Number of judges contacted | Number of appropriate responses received |
|---------|-----------------------------------------------------|----------------------------|------------------------------------------|
| 1.      | Dean, Director                                      | 10                         | 03                                       |
| 2.      | Principal Scientist (ICAR)                          | 8                          | 04                                       |
| 3.      | Senior Scientist and Head                           | 20                         | 12                                       |
| 4.      | Faculty and Training Coordinator (EEI North Region) | 03                         | 01                                       |
| 5.      | Professor                                           | 30                         | 14                                       |
| 6.      | Associate Professor                                 | 40                         | 20                                       |
| 7.      | Assistant Professor                                 | 80                         | 68                                       |
| 8.      | SMS                                                 | 09                         | 05                                       |
|         | Total number of judges                              | 200                        | 127                                      |

**Table 1:** Relevancy Weightage, Relevancy Percentage and Mean Relevancy Score

| Statements |                                                                                                                                                      | Relevancy |       |       | Selection/Rejection |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|-------|---------------------|
|            |                                                                                                                                                      | (MR)      | (R)   | (NR)  |                     |
| <b>A</b>   | <b>Social Change</b>                                                                                                                                 |           |       |       |                     |
| 1          | PoCRA project raise the standard of living of the beneficiaries                                                                                      | 0.68      | 68.24 | 2.04  | Selected            |
| 2          | Educational status of the children's improved due benefits of to PoCRA project                                                                       | 0.60      | 60.89 | 1.82  | Rejected            |
| 3          | PoCRA project is an innovative approach in providing services to the farmers                                                                         | 0.84      | 84.51 | 2.53  | Selected            |
| 4          | PoCRA project is a boon for the upliftment of the small and marginal farmers                                                                         | 0.72      | 72.70 | 2.18  | Selected            |
| 5          | PoCRA project helps to improve social status of beneficiaries                                                                                        | 0.66      | 66.40 | 1.99  | Rejected            |
| 6          | PoCRA project helps to the beneficiaries for adoption of new agricultural technology                                                                 | 0.84      | 84.25 | 2.52  | Selected            |
| 7          | Only educated farmers were aware about the benefits of PoCRA project                                                                                 | 0.77      | 77.01 | 2.33  | Selected            |
| 8          | Participation of beneficiaries in social and political programmes has increased due to PoCRA project                                                 | 0.71      | 71.65 | 2.14  | Selected            |
| 9          | Cosmopolitanism of beneficiaries has increased due to social participation under PoCRA project                                                       | 0.76      | 76.44 | 2.29  | Selected            |
| 10         | PoCRA project enhance the development of technical network among beneficiaries                                                                       | 0.64      | 64.56 | 1.93  | Rejected            |
| 11         | PoCRA project has reduced migration of beneficiaries from rural area to urban area                                                                   | 0.78      | 78.21 | 2.34  | Selected            |
| 12         | PoCRA project has improved the social relationship of farmer with out side the society                                                               | 0.64      | 64.82 | 1.94  | Rejected            |
| 13         | PoCRA project has increases the involvement of farmers in social activities                                                                          | 0.64      | 64.04 | 1.92  | Selected            |
| 14         | PoCRA has helped maximum farmers reach out to all other developmental departments.                                                                   | 0.75      | 75.06 | 2.25  | Selected            |
| <b>B</b>   | <b>Economic Change</b>                                                                                                                               |           |       |       |                     |
| 15         | The economic status of beneficiaries has increased due to extra income generated from intervention of PoCRA project.                                 | 0.82      | 82.67 | 2.48  | Selected            |
| 16         | PoCRA project enhance climate resilience and profitability of farmers                                                                                | 0.82      | 82.93 | 2.48  | Selected            |
| 17         | Increases in fruit and vegetable production due to PoCRA project                                                                                     | 0.77      | 77.69 | 2.33  | Selected            |
| 18         | More profit can be insured being beneficiaries of PoCRA project as compare to other government scheme due to its holistic approach                   | 0.65      | 65.87 | 1.97  | Rejected            |
| 19         | Sustainable income of beneficiaries has ensured due to PoCRA project scheme.                                                                         | 0.80      | 80.31 | 2.40  | Selected            |
| 20         | PoCRA project helped to improve the economic status of beneficiaries                                                                                 | 0.63      | 63.25 | 1.89  | Rejected            |
| 21         | PoCRA project beneficiary gets advance information regarding proper input management as result of that there is a curtail economic losses of farmers | 0.79      | 79.52 | 2.33  | Selected            |
| 22         | Proper irrigation management reduces the economic issues of farmer                                                                                   | 0.74      | 74.54 | 2.23  | Selected            |
| 23         | PoCRA project helps to improve personal and socio economic status of beneficiaries                                                                   | 0.64      | 64.04 | 1.92  | Rejected            |
| 24         | Income of big farmers has enhanced due to benefits of PoCRA project                                                                                  | 0.74      | 74.80 | 2.24  | Selected            |
| <b>C</b>   | <b>Change In Asset Spossession</b>                                                                                                                   |           |       |       |                     |
| 25         | Beneficiaries were able to purchase farm machineries and implement with help of PoCRA project                                                        | 0.79      | 79.26 | 2.37  | Selected            |
| 26         | PoCRA project beneficiaries were able to purchases agriculture land with the help of additional income                                               | 0.58      | 58.53 | 1.175 | Rejected            |

|          |                                                                                                                                      |      |       |      |          |
|----------|--------------------------------------------------------------------------------------------------------------------------------------|------|-------|------|----------|
|          | generation form various interventions                                                                                                |      |       |      |          |
| 27       | Additional income generation from PoCRA projects helps the beneficiaries to build the pakka house and farm structure                 | 0.76 | 76.90 | 2.30 | Selected |
| 28       | Beneficiaries are able to purchase furniture and household appliances due to additional income generation under PoCRA project        | 0.75 | 75.85 | 2.27 | Selected |
| 29       | Purchase of recreation facilities radio, TV, laptop, smart phone, A.C., air cooler is possible due to participation in PoCRA project | 0.71 | 71.91 | 2.15 | Selected |
| 30       | Beneficiaries able to purchase of cycle, motor cycle, four wheelers etc                                                              | 0.79 | 79.02 | 2.37 | Selected |
| 31       | Beneficiaries were able to purchase cow, buffalo, bullock pair, goat and sheep                                                       | 0.80 | 80.31 | 2.40 | Selected |
| 32       | Beneficiaries successfully installed pipeline for irrigation.                                                                        | 0.76 | 76.11 | 2.38 | Selected |
| 33       | PoCRA project increase the purchasing capacity of its beneficiaries                                                                  | 0.79 | 79    | 2.37 |          |
| <b>D</b> | <b>Educational Change</b>                                                                                                            |      |       |      |          |
| 34       | Educational standard of children has improved due to benefits from PoCRA project                                                     | 0.77 | 77.21 | 2.31 | Selected |
| 35       | Beneficiaries were able to send their children to city place for education due to PoCRA project                                      | 0.61 | 61.43 | 1.84 | Rejected |
| 36       | Expenditure on higher education of children were made able due to PoCRA project                                                      | 0.74 | 74.54 | 2.23 | Selected |
| 37       | PoCRA project helps to improve the educational level of beneficiaries                                                                | 0.58 | 58.52 | 1.75 | Rejected |
| 38       | Education generate self confidence among beneficiaries for deriving better benefit from PoCRA project scheme                         | 0.72 | 72.40 | 2.17 | Selected |
| 39       | Drop out percentage of child reduced after implementation of PoCRA project                                                           | 0.71 | 71.91 | 2.15 | Selected |
| 40       | Only literate beneficiaries can derive benefits of PoCRA project *                                                                   | 0.66 | 66.14 | 2.01 | Selected |
| <b>E</b> | <b>Change Employment Generation</b>                                                                                                  |      |       |      |          |
| 41       | PoCRA project scheme acts as a one of the professions of beneficiaries for agricultural and allied sector                            | 0.64 | 64.30 | 1.92 | Rejected |
| 42       | PoCRA project would generate new employment opportunities in agriculture and allied sector                                           | 0.82 | 82.15 | 2.46 | Selected |
| 43       | Employment opportunities were made available to beneficiaries throughout year due to implementation of PoCRA project                 | 0.80 | 80.57 | 2.41 | Selected |
| 44       | Problem regarding unemployment were solved under PoCRA project scheme                                                                | 0.72 | 72.44 | 2.17 | Selected |
| 45       | Training, demonstration conducted under PoCRA project help to develop entrepreneurship among the beneficiaries                       | 0.80 | 80.05 | 2.40 | Selected |
| 46       | PoCRA project has raised rural daily wage rate in rural areas.                                                                       | 0.72 | 72.96 | 2.18 | Selected |
| 47       | Women employment generation had increased due to PoCRA project                                                                       | 0.76 | 76.11 | 2.28 | Selected |
| 48       | *PoCRA project gives opportunity for employment to in adverse condition                                                              | 0.75 | 75.06 | 2.25 | Selected |
| 49       | *Enhancing positive self-image of farmers towards employment generation                                                              | 0.66 | 66.14 | 1.98 | Rejected |
| 50       | Goat rearing under PoCRA project act as an employment and income generation activity for rural people                                | 0.78 | 78.74 | 2.36 | Selected |
| <b>F</b> | <b>Psychological Change</b>                                                                                                          |      |       |      |          |
| 51       | Benefits of PoCRA project helps to improve decision making ability regarding crop production techniques                              | 0.85 | 85.30 | 2.55 | Selected |
| 52       | PoCRA project helps to increase the risk-taking ability regarding adoption of new technology                                         | 0.84 | 84.25 | 2.52 | Selected |
| 53       | Climate Resilient technologies reduces the fear of crop failure                                                                      | 0.82 | 82.15 | 2.46 | Selected |
| 54       | PoCRA project helps in improving the mental health of the beneficiary farmers                                                        | 0.62 | 62.46 | 1.87 | Rejected |
| 55       | PoCRA project helps building confidence in the beneficiary farmers                                                                   | 0.80 | 80.5  | 2.40 | Selected |
| 56       | PoCRA project helps to develop positive attitude towards agriculture and allied sector                                               | 0.82 | 82.42 | 2.47 | Selected |
| 57       | PoCRA project improved the adoption Rate of new agriculture technologies                                                             | 0.79 | 79.52 | 2.38 | Selected |
| 58       | PoCRA project help the beneficiaries to change from traditional agriculture to modern agriculture                                    | 0.82 | 82.15 | 2.46 | Selected |
| <b>G</b> | <b>Technological Change</b>                                                                                                          |      |       |      |          |
| <b>1</b> | <b>Drip Irrigation</b>                                                                                                               |      |       |      |          |
| 59       | Adoption of drip irrigation system under PoCRA project had increased the income                                                      | 0.82 | 82.67 | 2.48 | Selected |
| 60       | Drip irrigation system had increased the yield of various crop                                                                       | 0.95 | 95.80 | 2.87 | Selected |
| 61       | Successfully implementation of drip irrigation facilitates had improve the productivity and production in water scarcity area        | 0.85 | 85.03 | 2.55 | Selected |
| 62       | Drip irrigation system under PoCRA project help to reduce the labour requirement                                                     | 0.83 | 83.46 | 2.50 | Selected |
| 63       | It helps to increase the fertilizer use efficiency fertigation of various liquid fertilizer                                          | 0.82 | 82.93 | 2.48 | Selected |
| 64       | Drip irrigation conserve soil health                                                                                                 | 0.83 | 83.98 | 2.51 | Selected |
| 65       | With the help of drip irrigation farmers can take good production in light soil                                                      | 0.65 | 65.09 | 1.95 | Rejected |
| 66       | As per growth stages of plant required fertilizer dose can be used to due to drip irrigation                                         | 0.80 | 80.83 | 2.42 | Selected |
| 67       | Drip irrigation increases fertilizer use efficiency up to 80-90%                                                                     | 0.51 | 51.18 | 1.53 | Rejected |
| 68       | Drip irrigation have reduced sodium and chlorine percentage in water soluble fertilizer                                              | 0.76 | 76.64 | 2.29 | Selected |
| 69       | Drip irrigation system enhances water use efficiency                                                                                 | 0.85 | 85.30 | 2.55 | Selected |
| 70       | Drip irrigation help to control the weed population                                                                                  | 0.81 | 81.62 | 2.44 | Selected |
| 71       | Adoption of drip irrigation system under PoCRA project project had increase the cropping intensity in scarcity area                  | 0.84 | 84.77 | 2.54 | Selected |
|          | <b>Horticulture Plantation</b>                                                                                                       |      |       |      |          |
| 72       | Farmer with more holding of land can go for horticulture plantation                                                                  | 0.82 | 82.41 | 2.47 | Selected |

|    |                                                                        |      |       |      |          |
|----|------------------------------------------------------------------------|------|-------|------|----------|
| 73 | Horticulture crops are sustainable source of income                    | 0.81 | 81.62 | 2.44 | Selected |
| 74 | Some fruit crops are very sensitive to climate change                  | 0.59 | 59.78 | 1.58 | Selected |
| 75 | Dry land horticulture crops can be grown in water scarcity zone        | 0.82 | 82.67 | 2.48 | Selected |
| 76 | Horticulture crops gives more profit than traditional crops            | 0.80 | 80.31 | 2.40 | Selected |
| 77 | Cultivation of orchard have reduced soil erosion                       | 0.79 | 79.52 | 2.38 | Selected |
| 78 | Horticulture crops are more risky than traditional crop                | 0.85 | 85.56 | 2.56 | Selected |
| 79 | Horticulture crops are susceptible to climate Vulnerability            | 0.77 | 77.16 | 2.31 | Selected |
| 80 | Horticulture plantation are less labour intensive                      | 0.74 | 77.01 | 2.20 | Selected |
| 81 | Dry land horticulture crops are less susceptible for pest and diseases | 0.74 | 74.80 | 2.24 | Selected |

### Relevancy test

Based on the responses received from the 127 judges, the relevancy weightage, relevancy percentage and mean relevancy score were worked out for all the sixty-one items individually, using the formulae given by Edward (1957) <sup>[1]</sup> and the computed values are presented in Table 1.

#### i. Relevancy weightage

Following formula was used to work out the relevancy weightage of each statement.

$$RW = \frac{MRR \times 3 + RR \times 2 + NRR \times 1}{MOS (3 \times 127 = 381)}$$

Where,

RW = Relevancy Weightage

MRR = Most Relevant Response

RR = Relevant Response

NRR = Not Relevant Response

MOS = Maximum Obtainable Score

#### ii. Relevancy percentage

Relevancy percentage of each statement was computed by using the following formula.

$$RP = \frac{MRR \times 3 + RR \times 2 + NRR \times 1}{MOS (3 \times 127 = 381)} \times 100$$

Where,

RP = Relevancy Per centage

MRR = Most Relevant Response

RR = Relevant Response

NRR = Not Relevant Response

MOS = Maximum Obtainable Score

#### iii. Mean relevancy score

Mean relevancy score of each statement was computed by using the following formula.

$$MRS = \frac{MRR \times 3 + RR \times 2 + NRR \times 1}{\text{Number of judges (127)}}$$

Where,

MRS = Mean Relevancy Score

MRR = Most Relevant Response

RR = Relevant Response

NRR = Not Relevant Response

Using these three criteria, the statements were screened for their relevancy. Finally, the statements having, more than 0.66 relevancy weightage, more than 66.00 per cent relevancy percentage and more than 2 mean relevancy score were considered relevant to assess the impact. Thus, finally

65 statements were selected for further analysis.

### Calculation of 't' value (Item analysis)

These 65 statements were subjected to item analysis to delineate the items based on the extent to which they can differentiate the respondent with high impact than the respondent with low impact of PoCRA project. For this, 60 beneficiaries were selected from non-sample area i.e. from Adgaon, Ambarwadi, Brahmngoan, Dahegaon, Dhanora (Bk), Pachalegaon and from Jintur taluka and Arbujwadi, Khali, Khokalewadi, Undegoan of Gangakhed taluka of Parbhani district through direct interview. The beneficiaries were asked to indicate their degree of agreement and disagreement with each statement on the five-point continuum ranging from "strongly agree" to "strongly disagree". The scoring pattern adopted was 5 to 1, in which 5 weights to 'strongly agree', 4 to 'agree', 3 to 'undecided', 2 to 'disagree' and 1 to 'strongly disagree' response for positive statements and for negative statements the scoring pattern was reversed. Based upon the total scores, the beneficiaries were arranged in descending order. The top 25.00 per cent of the beneficiaries with their total scores were considered as the high group and the bottom 25.00 per cent were considered as the low group, so as these two groups provide criterion groups in terms of evaluating the individual statements as suggested by Edward (1957) <sup>[1]</sup>. Thus, out of 60 beneficiaries to whom the items were administered for the item analysis, 15 beneficiaries with highest and 15 beneficiaries with lowest scores were used as criterion groups to evaluate individual items.

The critical ratio i.e. the 't' value which is a measure of the extent to which a given statement differentiates between the high and low groups of the beneficiaries for each statement was calculated by using the formula suggested by Edward (1957) <sup>[1]</sup>.

$$t = \frac{\bar{X}_H - \bar{X}_L}{\sqrt{\frac{\sum (X_H - \bar{X}_H)^2 + \sum (X_L - \bar{X}_L)^2}{n(n-1)}}$$

Where,

$$(X_H - \bar{X}_H)^2 = X_H^2 - (\bar{X}_H)^2$$

$$(X_L - \bar{X}_L)^2 = X_L^2 - (\bar{X}_L)^2$$

$\bar{X}_H$  = mean score on given statement of the high group

$\bar{X}_L$  = mean score on given statement of the low group

$\sum X_H$  = summation of scores on given statement for high group

$\sum X_L$  = summation of scores on given statement for low group

$\sum X_H^2$  = sum of the squares of the individual score on a given statement for high group

$\sum X_L^2$  = sum of the squares of the individual score on a given statement for low group

n = number of beneficiaries in each group

After computing the 't' value for all the 65 statements, having 't' value equal to or greater than 1.75 were finally selected for inclusion in scale. The list of 65 statements and

their 't' value are presented in Table 2.

Thus, total 53 statements with greater than 1.75 't' values were selected for the measurement of reliability and the statement having 't' value less than 1.74 were deleted.

**Table 2:** List of total statements of scale with their "t" values

| A        | Social Change                                                                                                                                        | T value | Selection/Rejection |
|----------|------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------------------|
| 1        | PoCRA project raised the standard of living of the beneficiaries                                                                                     | 1.95    | Selected            |
| 2        | PoCRA project is an innovative approach which provided services to the farmers                                                                       | 2.75    | Selected            |
| 3        | The PoCRA project is a boon for the upliftment of the small and marginal farmers                                                                     | 3.06    | Selected            |
| 4        | PoCRA project helped the beneficiaries for adoption of new agricultural technology                                                                   | 1.84    | Selected            |
| 5        | Only educated farmers were aware about the benefits of PoCRA project*                                                                                | 2.44    | Selected            |
| 6        | Participation of beneficiaries in social and political programmes has increased due to PoCRA project                                                 | 2.18    | Selected            |
| 7        | Cosmopolitanism of beneficiaries has increased due to social participation under PoCRA project                                                       | 1.27    | Rejected            |
| 8        | PoCRA project has reduced migration of beneficiaries from rural area to urban area                                                                   | 2.47    | Selected            |
| 9        | PoCRA have helps maximum farmers to reach with all other developmental departments                                                                   | 1.66    | Rejected            |
| <b>B</b> | <b>Economic Change</b>                                                                                                                               |         |                     |
| 10       | The economic status of beneficiaries has increased due to extra income generated from intervention of PoCRA project.                                 | 3.4     | Selected            |
| 11       | PoCRA project enhanced climate resilience and profitability of farmers                                                                               | 3.74    | Selected            |
| 12       | Increased in fruit and vegetable production due to PoCRA Project                                                                                     | 2.31    | Selected            |
| 13       | Sustainable income of beneficiaries has ensured due to PoCRA project scheme.                                                                         | 2.50    | Selected            |
| 14       | PoCRA project beneficiary gets advance information regarding proper input management as result of that there is a curtail economic losses of farmers | -3.26   | Rejected            |
| 15       | Proper irrigation management reduce the economic issues of Farmer                                                                                    | 2.7     | Selected            |
| 16       | Income of big farmers has enhanced due to benefits of PoCRA project                                                                                  | 1.65    | Rejected            |
| <b>C</b> | <b>Change in Assets possession</b>                                                                                                                   |         |                     |
| 17       | Beneficiaries were able to purchase farm machineries and implement with help of PoCRA project                                                        | 2.50    | Selected            |
| 18       | Additional income generation from PoCRA projects helped the beneficiaries to build the pakka house and farm structure                                | 1.94    | Selected            |
| 19       | Beneficiaries are able to purchase furniture and household appliances due to additional income generation under PoCRA project                        | -4.88   | Rejected            |
| 20       | Purchase of recreation facilities radio, TV, laptop, smart phone, A.C., air cooler is possible due to participation in PoCRA project                 | 2.66    | Selected            |
| 21       | Beneficiaries able to purchase of cycle, motor cycle, four wheelers etc                                                                              | 0.69    | Rejected            |
| 22       | Beneficiaries were able to purchase cow, buffalo, bullock pair, goat and sheep                                                                       | 2.21    | Selected            |
| 23       | Beneficiaries successfully installed pipeline for irrigation.                                                                                        | 3.53    | Selected            |
| 24       | PoCRA project increased the purchasing capacity of its Beneficiaries                                                                                 | 3.32    | Selected            |
| <b>D</b> | <b>Educational Change</b>                                                                                                                            |         |                     |
| 25       | Educational standard of children has improved due to benefits from PoCRA project                                                                     | 1.79    | Selected            |
| 26       | Expenditure on higher education of children were made able due to PoCRA project                                                                      | 2.57    | Selected            |
| 27       | Education generate self confidence among beneficiaries for deriving better benefit from PoCRA project scheme                                         | 2.30    | Selected            |
| 28       | Drop out percentage of child reduced after implementation of PoCRA project                                                                           | 4.01    | Selected            |
| 29       | Only literate beneficiaries could derive benefits of PoCRA project *                                                                                 | 3.02    | Selected            |
| <b>E</b> | <b>Change in employment generation</b>                                                                                                               |         |                     |
| 30       | PoCRA project generated new employment opportunities in agriculture and allied sector                                                                | 1.91    | Selected            |
| 31       | Employment opportunities were made available to beneficiaries throughout year due to implementation of PoCRA project                                 | 1.24    | Rejected            |
| 32       | Problem regarding unemployment were solved under PoCRA projects                                                                                      | 3.06    | Selected            |
| 33       | Training, demonstration conducted under PoCRA project help to develop entrepreneurship among the beneficiaries                                       | 0.87    | Rejected            |
| 34       | PoCRA project has raised rural daily wage rate in rural areas.                                                                                       | 3.19    | Selected            |
| 35       | Women employment generation had increased due to PoCRA project                                                                                       | 3.30    | Selected            |
| 36       | *PoCRA project gives opportunity for employment to in adverse condition                                                                              | 2.64    | Selected            |
| 37       | Goat rearing under PoCRA project acted as an employment and income generation activity for rural people                                              | 1.85    | Selected            |
| <b>F</b> | <b>Psychological Change</b>                                                                                                                          |         | Selected            |
| 38       | Benefits of PoCRA project helped to improve decision making ability regarding crop production techniques                                             | 3.93    | Selected            |
| 39       | PoCRA project helped to increase the risk-taking ability regarding adoption of new technology                                                        | 2.66    | Selected            |
| 40       | Climate Resilient technologies reduced the fear of crop failure                                                                                      | 3.14    | Selected            |
| 41       | PoCRA project helped building confidence in the beneficiary farmers                                                                                  | -1.57   | Rejected            |
| 42       | PoCRA project helps to develop positive attitude towards agriculture and allied sector                                                               | 2.40    | Selected            |

|          |                                                                                                                                |       |          |
|----------|--------------------------------------------------------------------------------------------------------------------------------|-------|----------|
| 43       | PoCRA project improved the adoption Rate of new agriculture technologies                                                       | 2.58  | Selected |
| 44       | PoCRA project helped the beneficiaries to change from traditional agriculture to modern agriculture                            | 4.7   | Selected |
| <b>G</b> | <b>Technological change</b>                                                                                                    |       |          |
| <b>1</b> | <b>Protective irrigation</b>                                                                                                   |       |          |
| 45       | Adoption of drip irrigation system under PoCRA project had increased the income                                                | 3.56  | Selected |
| 46       | Drip irrigation system had increased the yield of various crop                                                                 | 2.49  | Selected |
| 47       | Successfully implementation of drip irrigation facilitates had improved the productivity and production in water scarcity area | 2.05  | Selected |
| 48       | Drip irrigation system under PoCRA project helped to reduce the labour requirement                                             | 2.40  | Selected |
| 49       | It helps to increase the fertilizer use efficiency fertigation of various liquid fertilizer                                    | -2.25 | Rejected |
| 50       | Drip irrigation conserved soil health                                                                                          | 1.81  | Selected |
| 51       | As per growth stages of plant required fertilizer dose could be used to due to drip irrigation                                 | 2.35  | Selected |
| 52       | Micro irrigation has reduced sodium and chlorine percentage in water soluble fertilizer                                        | 2.58  | Selected |
| 53       | Drip irrigation system enhanced water use efficiency                                                                           | 3.91  | Selected |
| 54       | Drip irrigation helped to control the weed population                                                                          | 2.85  | Selected |
| 55       | Adoption of drip irrigation system under PoCRA project project had increased the cropping intensity in scarcity area           | 2.61  | Selected |
|          | <b>Horticulture plantation</b>                                                                                                 |       |          |
| 66       | Farmer with more holding of land could go for horticulture plantation                                                          | 3.03  | Selected |
| 57       | Horticulture crops are sustainable source of income                                                                            | 2.61  | Selected |
| 58       | Some fruit crops are very sensitive to climate change                                                                          | -3.89 | Rejected |
| 59       | Dry land horticulture crops could be grown in water scarcity zone                                                              | 2.92  | Selected |
| 60       | Horticulture crops gave more profit than traditional crops                                                                     | 1.98  | Selected |
| 61       | Cultivation of orchard have reduced soil erosion                                                                               | 2.67  | Selected |
| 62       | Horticulture crops are more risky than traditional crop                                                                        | 0.79  | Rejected |
| 63       | Horticulture crops are susceptible to climate Vulnerability                                                                    | 2.48  | Selected |
| 64       | Horticulture plantation were less labour intensive                                                                             | 2.77  | Selected |
| 65       | Dry land horticulture crops are less susceptible for pest and diseases                                                         | 3.19  | Selected |

### Reliability: Test-retest method

A scale is said to be reliable when it consistently produces the same results when applied to measure the same phenomenon from time to time. For this study test-retest method of reliability was used. The final set of the 53 statements, which represent the impact of PoCRA project Scheme was administered on five-point continuum to a fresh group of 30 beneficiaries, which were not included in the actual sample. After a period of 15 days the same scale was again administered to the same beneficiaries and thus two sets of scores were obtained. The correlation coefficient for the both sets were worked out. The 'r' value 0.86 was significant at 0.01 level of probability indicating the scale was highly reliable for administration to the beneficiaries as the scale was stable and dependable in its measurement.

### Content validity

According to Kerlinger (1976) <sup>[5]</sup>, the content validity is representativeness or sampling adequacy of the content, the substance, the matter and the topics of measuring

instrument. This Content validity method was used in the present scale to determine the validity of the scale. As the content of the impact was thoroughly covered the entire universe of PoCRA project project based on literature and opinion of the panel of 127 judges who were expert in the field of extension education, economics was obtained to find whether the items suggested were relevant for inclusion in the scale. It was assumed that present scale satisfied the content validity, as the scale value difference for almost all the statements included had a very high discriminating value.

### Administration of scale

The final scale consisted 53 statements to measure the overall impact of PoCRA project Scheme presented in table No 3. The beneficiaries were asked to express their response on five-point continuum i.e. 'strongly agree', 'agree', 'undecided', 'disagree' and 'strongly disagree' by giving score 5, 4, 3, 2 and 1 for positive statements and 1, 2, 3, 4 and 5 for negative statements.

**Table 3:** list of final selected Statements

| Sr. No.  | Statements                                                                                                           | Responses |   |   |   |    |
|----------|----------------------------------------------------------------------------------------------------------------------|-----------|---|---|---|----|
|          |                                                                                                                      | SA        | A | U | D | SA |
| <b>A</b> | <b>Social Change</b>                                                                                                 |           |   |   |   |    |
| 1.       | PoCRA project raised the standard of living of the beneficiaries                                                     |           |   |   |   |    |
| 2.       | PoCRA project is an innovative approach which provided services to the farmers                                       |           |   |   |   |    |
| 3.       | PoCRA project is a boon for the upliftment of the small and marginal farmers                                         |           |   |   |   |    |
| 4.       | PoCRA project helped the beneficiaries for adoption of new agricultural technology                                   |           |   |   |   |    |
| 5.       | Only educated farmers were aware about the benefits of PoCRA                                                         |           |   |   |   |    |
| 6.       | Participation of beneficiaries in social and political programmes has increased due to PoCRA project                 |           |   |   |   |    |
| 7.       | PoCRA project has reduced migration of beneficiaries from rural area to urban area                                   |           |   |   |   |    |
| <b>B</b> | <b>Economic Change</b>                                                                                               |           |   |   |   |    |
| 1        | The economic status of beneficiaries has increased due to extra income generated from intervention of PoCRA project. |           |   |   |   |    |
| 2        | PoCRA project enhanced climate resilience and profitability of farmers                                               |           |   |   |   |    |

|    |                                                                                                                                      |  |  |  |  |
|----|--------------------------------------------------------------------------------------------------------------------------------------|--|--|--|--|
| 3  | Increased in fruit and vegetable production due to PoCRA project                                                                     |  |  |  |  |
| 4  | Sustainable income of beneficiaries has ensured due to PoCRA project scheme.                                                         |  |  |  |  |
| 5  | Proper irrigation management reduce the economic issues of Farmer                                                                    |  |  |  |  |
| C  | <b>Change In Assets Possession</b>                                                                                                   |  |  |  |  |
| 1  | Beneficiaries were able to purchase farm machineries and implement with help of PoCRA project                                        |  |  |  |  |
| 2  | Additional income generation from PoCRA projects helped the beneficiaries to build the pakka house and farm structure                |  |  |  |  |
| 3  | Purchase of recreation facilities radio, TV, laptop, smart phone, A.C., air cooler is possible due to participation in PoCRA Project |  |  |  |  |
| 4  | Beneficiaries were able to purchase cow, buffalo, bullock pair, goat and sheep                                                       |  |  |  |  |
| 5  | Beneficiaries successfully installed pipeline for irrigation.                                                                        |  |  |  |  |
| 6  | PoCRA project increased the purchasing capacity of its beneficiaries                                                                 |  |  |  |  |
| 1  | Educational standard of children has improved due to benefits from PoCRA project                                                     |  |  |  |  |
| 2  | Expenditure on higher education of children were made able due to PoCRA project                                                      |  |  |  |  |
| 3  | Education generates self confidence among beneficiaries for deriving better benefit from PoCRA project scheme.                       |  |  |  |  |
| 4  | Drop out percentage of child reduced after implementation of PoCRA project                                                           |  |  |  |  |
| 5  | Only literate beneficiaries could derive benefits of PoCRA project *                                                                 |  |  |  |  |
| 1  | PoCRA project generated new employment opportunities in agriculture and allied sector                                                |  |  |  |  |
| 2  | Problem regarding unemployment were solved under PoCRA project scheme                                                                |  |  |  |  |
| 3  | PoCRA project has raised rural daily wage rate in rural areas.                                                                       |  |  |  |  |
| 4  | Women employment generation had increased due to PoCRA project                                                                       |  |  |  |  |
| 5  | *PoCRA project gives opportunity for employment to in adverse condition                                                              |  |  |  |  |
| 6  | Goat rearing under PoCRA project acted as an employment and income generation activity for rural people                              |  |  |  |  |
| 1  | Benefits of PoCRA project helped to improve decision making ability regarding crop production techniques                             |  |  |  |  |
| 2  | PoCRA project helped to increase the risk-taking ability regarding adoption of new technology                                        |  |  |  |  |
| 3  | Climate Resilient technologies reduced the fear of crop failure                                                                      |  |  |  |  |
| 4  | PoCRA project helps to develop positive attitude towards agriculture and allied sector                                               |  |  |  |  |
| 5  | PoCRA project improved the adoption Rate of new agriculture technologies                                                             |  |  |  |  |
| 6  | PoCRA project helped the beneficiaries to change from traditional agriculture to modern agriculture                                  |  |  |  |  |
| 1  | <b>Protective Irrigation</b>                                                                                                         |  |  |  |  |
| 1  | Adoption of drip irrigation system under PoCRA project had increased the income                                                      |  |  |  |  |
| 2  | Drip irrigation system had increased the yield of various crop                                                                       |  |  |  |  |
| 3  | Successfully implementation of drip irrigation facilitates had improved the productivity and production in water scarcity area       |  |  |  |  |
| 4  | Drip irrigation system under PoCRA project helped to reduce the labour requirement                                                   |  |  |  |  |
| 5  | Drip irrigation conserved soil health                                                                                                |  |  |  |  |
| 6  | As per growth stages of plant required fertilizer dose could be used to due to drip irrigation                                       |  |  |  |  |
| 7  | Micro irrigation has reduced sodium and chlorine percentage in water soluble fertilizer                                              |  |  |  |  |
| 8  | Drip irrigation system enhanced water use efficiency                                                                                 |  |  |  |  |
| 9  | Drip irrigation helped to control the weed population                                                                                |  |  |  |  |
| 10 | Adoption of drip irrigation system under PoCRA project had increased the cropping intensity in scarcity area                         |  |  |  |  |
| 2  | <b>Horticulture Plantation</b>                                                                                                       |  |  |  |  |
| 1  | Farmer with more holding of land could go for horticulture plantation                                                                |  |  |  |  |
| 2  | Horticulture crops are sustainable source of income                                                                                  |  |  |  |  |
| 3  | Dry land horticulture crops could be grown in water scarcity zone                                                                    |  |  |  |  |
| 4  | Horticulture crops gave more profit than traditional crops                                                                           |  |  |  |  |
| 5  | Cultivation of orchard have reduced soil erosion                                                                                     |  |  |  |  |
| 6  | Horticulture crops are susceptible to climate Vulnerability                                                                          |  |  |  |  |
| 7  | Horticulture plantation was less labour intensive                                                                                    |  |  |  |  |
| 8  | Dry land horticulture crops are less susceptible for pest and diseases                                                               |  |  |  |  |

Thus, impact score of the beneficiaries were obtained by summation of score of all the statements included in the scale and they were grouped into three categories i.e. low, medium and high by using mean and standard deviation.

### Conclusion

The impact scale developed was found to be reliable and valid. Researchers can use the scale in future for measuring the impact of PoCRA project similar studies.

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