P-ISSN: 2618-0723
E-ISSN: 2618-0731

NAAS Rating: 5.04
www.extensionjournal.com

International Journal of Agriculture Extension and Social Development

Volume 8; Issue 1; January 2025; Page No. 490-495

Received: 02-11-2024
Accepted: 07-12-2024

Indexed Journal
Peer Reviewed Journal

# Assessing sustainable livelihood security of integrated farming system practicing farmers in Karnataka: Focus on index development

**[1]Pradeep Kumar TL, [2]SB Goudappa, [3]Shashidhara KK, [4]Sidram BY, [5]BS Reddy and [6]Umesh MR**

[1] Ph.D. Scholar, Department of Agricultural Extension Education, University of Agricultural Sciences, Raichur, Karnataka, India

[2]Dean (Students Welfare), University of Agricultural Sciences, Raichur, Karnataka, India

[3]Associate Professor and Head, Department of Agricultural Extension Education, University of Agricultural Sciences, Raichur, Karnataka, India

[4] Associate Professor, Department of Agricultural Extension Education, CoA, Bhimarayanagud, Karnataka, India

[5] Associate Professor and Senior Farm Superintendent, Zonal Agricultural Research Station, Kalaburagi, Karnataka, India

[6] Senior Scientist, Department of Agronomy, AICRP on Sunflower, MARS, University of Agricultural Sciences, Raichur, Karnataka, India

**DOI:** https://doi.org/10.33545/26180723.2025.v8.i1h.1570

**Corresponding Author:** Pradeep Kumar TL

**Abstract**

The agricultural sector is the backbone of Indian economy. Over 58.00 percent of rural Indians depending on agriculture for their livelihood and agriculture contributing 18.20 percent to the country's gross domestic product (2024). In this study, a sustainable livelihood security index of integrated farming system module practicing farmers was developed using standardized procedures with seven dimensions i.e., food and nutritional security, economic security, physical security, social security, ecological and environmental security, resource use efficiency and psychological security. Consisting a total of 29 items. The validity of sustainable livelihood security index was validated using face and content validity. Consequently, reliability of the sustainable livelihood security index was also verified using Cronbach's Alpha. Thus, the study found that the sustainable livelihood security index reliability was 0.931 (α).

**Keywords:** Sustainable livelihood security, integrated farming system, relevancy, reliability, validity and index

## 1. Introduction

The impressive agricultural growth of the nation since independence, India has seen remarkable agricultural growth, with food grain production reaching a record 329.68 million tonnes (Anon., 2023b) [1]. The Indian Agricultural Research and Extension System has helped farmers improve yields, but their economic vulnerability persists due to challenges like resource depletion, climate change, and production risks (Shivaji, 2014) [9]. Other issues, such as limited technology adoption, low farm income, and post-harvest challenges, also hinder progress. To achieve Sustainable Development Goals (SDGs) such as no poverty, zero hunger, and food security, addressing these challenges is critical for the nation's agricultural future (Paroda, 2017) [5].

In India, land holdings are becoming increasingly fragmented and uneconomical, with pressure on agriculture intensifying (Vinay *et al.*, 2017) [10]. The country faces a growing challenge to meet the food demands of its expanding population, projected to reach 1.37 billion by 2030 and 1.6 billion by 2050. To meet future food grain needs of 289 and 349 million metric tons, respectively, land under cultivation is expected to decline, with over 20 percent potentially being used for non-agricultural purposes by 2030. From an average landholding size of 2.28 hectares in 1970-71, it has dropped to 1.16 hectares in 2010-11, and is expected to shrink further to 0.12 hectares by 2050.

The concept of sustainability in integrated farming systems focuses on meeting present needs without compromising future resources, encompassing economic, ecological, and social dimensions. Integration of farm enterprises is seen as key to the rapid development of agriculture in India, ensuring productivity, consistent growth, and income stability. Sustainable livelihood security involves secure access to resources and income-generating activities, providing reserves to manage risks and contingencies. Outcomes include food, economic, ecological, physical, psychological, and social security. This study aims to develop an index to measure sustainable livelihood security for farmers practicing integrated farming systems.

## 2. Methodology

The methodology section deals with the systematic procedure followed in achieving the part of the research

objective, that is the development of sustainable livelihood security Index to Study the sustainable livelihood security of Integrated farming system module practicing farmers in North-Eastern Dry Zone of Karnataka.

An "index" refers to a composite measure or indicator that used to represent a complex concept, construct, or phenomenon. It is a quantitative tool designed to simplify and summarize multiple variables or items into a single score or value, making it easier to analyze and interpret data. As sustainable livelihood security is a complex phenomenon involving various dimension *viz*., food and nutritional security, economic security, physical security, social security, ecological and environmental security, resource use efficiency and psychological security. Index construction involves a systematic process of selecting, weighting and combining individual variables or items to create a more manageable and meaningful measure. Thus, index construction is suitable tool to study the sustainable livelihood security of IFS practicing farmers.

### 2.1 Construct of the research

A concept is a term that expresses an abstract idea generalizing from particulars and summarizing related observations. The term "construct" is a concept with additional meaning evolved for scientific purposes, in other words a construct is a combination of concepts (Ray and Mondal, 1999) [7].

Sustainable livelihood security is operationally defined as "the ability of the farmers to earn by practicing IFS and spend their income on all basic and other necessaries which are essential for decent living. Further, it refers to the ability of the farmers to protect their capabilities, assets and activities which are essential for their livelihood". To address the research problem sustainable livelihood security of IFS module practicing farmers was taken as the major construct.

### 2.2 Dimensions to measure the construct

Seven major dimensions related to Sustainable livelihood security were identified based on review of literature and discussion with experts in the field of agricultural extension education, agricultural economics and agronomy. The identified dimensions are Food and Nutritional Security, Economic Security, Physical Security, Social Security, Ecological and Environmental Security, Resource use efficiency/ Input recycling and Psychological Security. Hence, several items were framed under these concepts to design the sustainable livelihood security index.

### 2.3 Operationalization of the concepts

**2.3.1 Food and Nutritional security:** Food and nutritional security of livelihood is operationally defined as when all the individuals have reliable access to sufficient quantities of affordable and nutritious food to lead a healthy life by practicing integrated farming system.

**2.3.2 Economic security:** The economic security of sustainable livelihood security is defined as the degree to which farmers have a monetary stability between income, expenditure, debt and savings at a given point of time through adoption of Integrated farming systems.

**2.3.3 Physical Security:** Physical security of sustainable livelihood sustainability referred to the accessibility of material goods and services for healthy and secured living of farmers because of adoption of Integrated farming system at the given point of time.

**2.3.4 Social security:** The social security of sustainable livelihood security is the degree to which farmers feel good and happy with the societal interactions because of adoption of integrated farming systems.

**2.3.5 Ecological Security:** Ecological security of livelihood sustainability describes the relationship that exists between people and the natural elements of the environment and the impacts that they have upon one another.

**2.3.6 Input recycling:** Recycling of farm resources reduces input costs, enables low reliance on external inputs, improves quality of produce and ultimately ensures farm sustainability.

**2.3.7 Psychological security:** Psychological security of an individual is operationally defined as the development from the organized pattern of attitude and behaviours which makes an individual distinctive.

### 2.4 Collection and structuring of index items

After identifying relevant dimensions for measuring sustainable livelihood security, 80 items were initially collected from various sources, including research articles, conferences, and farmer discussions. Following evaluation by an advisory committee, 52 items were retained across seven dimensions. These items were sent to 120 extension specialists from institutions like ICAR, State Agriculture Universities, and KVKs for critical evaluation using a three-point scale (Most Relevant, Relevant, Less Relevant). Responses from 62 experts were analysed to determine relevancy scores, and the mean relevancy score for each item was calculated.

$$\text{Relevancy Percentage (RP)} = \frac{(MR\times3 + R\times2 + LR\times1)}{\text{Maximum possible score (i.e., } 62\times3=186)} \times 100$$

$$\text{Relevancy Weightage (RW)} = \frac{(MR\times3 + R\times2 + LR\times1)}{\text{Maximum possible score (i.e., } 62\times3=186)}$$

$$\text{Mean Relevancy Score (MRS)} = \frac{(MR\times3 + R\times2 + LR\times1)}{\text{Number of Judges responded (i.e., } 62)}$$

## 3. Results and Discussion

### 3.1 Selection of index items

Using the relevancy weightage formulae, the relevancy weightage of each dimension was calculated and all the dimensions had the relevancy weightage of more than 0.75. So, all the seven dimensions are found as valid to be included in the composite Index and it is presented in Table.1.

**Table 1:** Relevancy weightage for selection of dimensions for Sustainable Livelihood Security Index

| Sl. No. | Dimensions | Relevancy Weightage |
|---|---|---|
| 1 | Food and Nutritional Security | 0.887 * |
| 2 | Economic Security | 0.870 * |
| 3 | Physical Security | 0.817 * |
| 4 | Social Security | 0.827 * |
| 5 | Ecological and Environmental Security | 0.876 * |
| 6 | Resource use efficiency/ Input recycling | 0.833 * |
| 7 | Psychological Security | 0.811 * |

*Selected dimension

Using the mean relevancy score formulae, the mean relevancy score was calculated for verifying of each item for the Sustainable Livelihood Security Index of IFS module practicing farmers. The values of relevancy score of each item were given in Table. 2.

**Table 2:** Relevancy Weightage, Mean Relevancy Score and Relevancy Percentage for selection of items for Sustainable Livelihood Security Index of Integrated Farming System Module practicing farmers

| Sl. No. | Dimensions and Items | Relevancy Weightage | Mean Relevancy Score | Relevancy Percentage |
|---|---|---|---|---|
| **I** | **Food and Nutritional Security** | | | |
| 1 | IFS facilitates in securing daily food requirement throughout the year for my family | 0.88 | 2.66 * | 88.70 * |
| 2 | IFS provides affordable nutritious food to all the family members | 0.87 | 2.61 * | 87.09 * |
| 3 | IFS based food items enables in achieving nutritional security | 0.79 | 2.38 | 79.56 |
| 4 | IFS ensures in availability of balanced diet | 0.82 | 2.46 * | 82.25 * |
| 5 | Food grains supplied through public distribution system is a means of livelihood security (-) | 0.66 | 1.98 | 66.12 |
| 6 | IFS contributes to the major portion of family food consumption | 0.81 | 2.45 * | 81.72 * |
| 7 | Diversification of IFS practices meets nutritional requirement to the household | 0.81 | 2.45 * | 81.72 * |
| 8 | IFS enables to meet fuel requirement for cooking | 0.73 | 2.19 | 73.11 |
| II | **Economic Security** | | | |
| 9 | IFS gives more net profit per unit area as compared to conventional farming | 0.88 | 2.66 * | 88.70 * |
| 10 | It generates continuous income throughout the year | 0.88 | 2.66 * | 88.70 * |
| 11 | IFS creates employment opportunity to the all family members | 0.83 | 2.50 * | 83.33 * |
| 12 | Irrespective of climate/season, the income from the farm is ensured | 0.76 | 2.30 | 76.88 |
| 13 | IFS has the potential to improve the financial situation of farming | 0.77 | 2.32 | 77.41 |
| 14 | Minimization of Cost of production is achieved by IFS | 0.79 | 2.38 | 79.56 |
| 15 | IFS adequately protect against risk and uncertainties of the farm yield or sudden loss of any one enterprise | 0.79 | 2.38 | 79.56 |
| 16 | Higher income generation is assured due to practicing of IFS | 0.74 | 2.24 | 74.73 |
| 17 | Dependency on single crop has been reduced by practicing IFS | 0.87 | 2.61 * | 87.09 * |
| 18 | IFS positively influences upon my asset creation | 0.74 | 2.22 | 74.19 |
| 19 | IFS improved credit worthiness of the farmers | 0.83 | 2.50 * | 83.33 * |
| III | **Physical Security** | | | |
| 20 | IFS facilitates for access and utilization of modern ICT tools | 0.74 | 2.22 | 74.19 |
| 21 | It has enabled me to include physical resources i.e., farm pond etc on the farming | 0.81 | 2.45 * | 81.72 * |
| 22 | IFS has become an instrument in renovation of old house | 0.80 | 2.41 * | 80.64 * |
| 23 | I have purchased tractor / farm machineries for farm activities | 0.82 | 2.48 * | 82.79 * |
| 24 | IFS supports improved spending on my children education | 0.76 | 2.30 | 76.88 |
| 25 | I have purchased two wheeler / four wheeler after the adoption of IFS | 0.67 | 2.30 | 67.74 |
| 26 | My land holding has been increased | 0.71 | 2.14 | 71.50 |
| 27 | I expanded my livestock population in a desired way | 0.81 | 2.45 * | 81.72 * |
| IV | **Social Security** | | | |
| 28 | IFS improves the social status of the family by generating more income | 0.81 | 2.43 * | 81.18 * |
| 29 | Gender discrimination can be reduced through IFS, because most of the IFS practicing farmers managed by female members | 0.76 | 2.29 | 76.34 |
| 30 | IFS indirectly helps in improving the education status of the family | 0.76 | 2.29 | 76.34 |
| 31 | Social participation as an office bearer/ member in FPO/ milk cooperative societies/ any SHG will ensure the social security for the family | 0.72 | 2.17 | 72.58 |
| 32 | Enhance standard of living of farmers | 0.82 | 2.48 * | 82.79 * |
| 33 | IFS prevents migration of rural youth to cities / urban areas | 0.87 | 2.62 * | 87.63 * |
| 34 | IFS helps in promoting rural leadership | 0.79 | 2.37 | 79.03 |
| 35 | I started interacting with progressive / innovative farmers after practicing IFS | 0.86 | 2.59 * | 86.55 * |
| 36 | I started participating in Krishimelas, exhibitions and campaigns etc to acquire information about new technologies suitable for practicing / adopting IFS | 0.81 | 2.45 * | 81.72 * |
| 37 | I have become a member of cooperative society after the adoption of IFS | 0.73 | 2.20 | 73.65 |
| V | **Ecological and Environmental Security** | | | |

| | | | | |
|---|---|---|---|---|
| 38 | IFS facilitates to improve soil health | 0.88 | 2.64 * | 88.17 * |
| 39 | IFS encourages sustainable and ecologically sound agriculture system | 0.87 | 2.62 * | 87.63 * |
| 40 | Practicing of integrated farming reduces vulnerability to adverse climatic conditions | 0.89 | 2.67 * | 89.24 * |
| 41 | IFS practice improves the farm biodiversity | 0.95 | 2.85 * | 95.16 * |
| 42 | Different farming system promotes the complementary interaction of different farm components | 0.79 | 2.37 | 79.03 |
| VI | **Resource use efficiency/ Input recycling** | | | |
| 43 | IFS helps in efficient utilization of farm resources | 0.94 | 2.83 * | 94.62 * |
| 44 | Waste recycling of farm plants and animals can be done effectively in IFS | 0.86 | 2.58 * | 86.02 * |
| 45 | Irrigation management can be done effectively in IFS, since it encourages water conservation | 0.81 | 2.43 * | 81.18 * |
| 46 | Reduction in the usage of inorganic / chemical inputs | 0.88 | 2.64 * | 88.17 * |
| VII | **Psychological Security** | | | |
| 47 | Practicing diversified farming helps in improving knowledge and skills in practicing farming | 0.87 | 2.61 * | 87.09 * |
| 48 | Experience in diversified farming gives psychological security to practice new ideas on farming | 0.87 | 2.62 * | 87.63 * |
| 49 | Being recognized as innovator / early adopter after practicing IFS | 0.74 | 2.22 | 74.19 |
| 50 | IFS changed the perspective of looking farming differently | 0.82 | 2.48 * | 82.79 * |
| 51 | IFS improved my competency level of becoming an agripreneure. | 0.81 | 2.45 * | 81.72 * |
| 52 | Adoption of IFS has increased confidence in availing credit from the banks | 0.81 | 2.43 * | 81.18 * |
| | Total Score | 42.01 | 126.04 | 4201.61 |
| | Mean | 0.80 | 2.42 | 80.80 |

Accordingly, statements having relevancy percentage of equal and more than 80.80 percent, relevancy weight age of equal and more than 0.80 and mean relevancy score of equal and more than 2.42 were considered for the inclusion in item analysis. Thus, 32 statements were retained out of 52 statements and these statements were considered for further processing and suitably modified as per the comments of experts wherever applicable.

**4. Item analysis**

The purpose of items analysis was to select such items, which can very well discriminate between two criteria. The 32 items selected through the judge's opinion were administered to the 30 IFS module practicing farmers in non-sampling area. The IFS practicing farmers were asked to indicate their degree of agreement or disagreement with each item on a five-point continuum, *viz.*, Very Greater Extent (VGE), To a Great Extent (GE), To a Moderate Extent (ME), To a Least Extent (LE) and To a Very Least Extent (VLE), with scores of 5, 4, 3, 2 and 1, respectively, for positive statements and vice versa for negative statements. The selected 32 items were then subjected to item analysis to demarcate the items based on the extent to which they can differentiate the respondents into high and low score groups based on the level of Sustainable livelihood security of IFS practicing farmers.

**4.1 Final selection of items**

The responses of the IFS practicing farmers in the non-sample area were recorded and the summated score for the total items of each items of each respondent was obtained. For each respondent, the maximum possible score for 32 items was 160 and the minimum was 32. The scores of the farmers were arranged in descending order. The 25.00 percent from the highest scores (high group) and the 25.00 percent from the lowest scores (low group) were taken for the item analysis. These responses were subjected to item analysis for the selection of the items that constitute the final scale. The critical ratio, i.e., the t-value, which is a measure of the extent to which a given item differentiates between the high and low groups of farmers for each item, is calculated by using the following formula:

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

Where

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

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

Where,

XH= Individual scores in the high group $\bar{X}$L=Individual scores in the low group

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

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

n =Number of respondents in each group

**4.2 Selection of items for inclusion in final index**

After computing the 't' value for all the items under study, 32 items with the highest 't' vale equal to or greater than 1.75 were selected for the final study. The thumb rule of rejecting items with a 't' value less than 1.75 was followed. Thus, 29 items were retained with 't' values equal to or greater than 1.75, which is presented in Table.3

**Table 3:** t-value for analysis of items in Sustainable livelihood security index for IFS module practicing farmers

| Sl. No. | Dimensions and Items | t value |
|---|---|---|
| **I** | **Food and Nutritional Security** | |
| 1 | IFS facilitates in securing daily food requirement throughout the year for my family | 2.049 * |
| 2 | IFS provides affordable nutritious food to all the family members | 4.965 * |
| 3 | IFS ensures in availability of balanced diet | 3.416 * |
| 4 | IFS contributes to the major portion of family food consumption | 2.646 * |
| 5 | Diversification of IFS practices meets nutritional requirement to the household | 3.862 * |
| **II** | **Economic Security** | |
| 6 | IFS gives more net profit per unit area as compared to conventional farming | 2.049 * |
| 7 | It generates continuous income throughout the year | 3.000 * |
| 8 | IFS creates employment opportunity to the all family members | 2.393 * |
| 9 | Dependency on single crop has been reduced by practicing IFS | 4.583 * |
| 10 | IFS improved credit worthiness of the farmers | 3.682 * |
| **III** | **Physical Security** | |
| 11 | It has enabled me to include physical resources i.e., farm pond etc on the farming | 5.166 * |
| 12 | IFS has become an instrument in renovation of old house | 3.862 * |
| 13 | I have purchased tractor / farm machineries for farm activities | 5.591 * |
| 14 | I expanded my livestock population in a desired way | 3.989 * |
| **IV** | **Social Security** | |
| 15 | IFS improves the social status of the family by generating more income | 2.758 * |
| 16 | Enhance standard of living of farmers | 1.527 |
| 17 | IFS prevents migration of rural youth to cities / urban areas | 3.416 * |
| 18 | I started interacting with progressive / innovative farmers after practicing IFS | 4.583 * |
| 19 | I started participating in Krishimelas, exhibitions and campaigns etc to acquire information about new technologies suitable for practicing / adopting IFS | 2.646 * |
| **V** | **Ecological and Environmental Security** | |
| 20 | IFS facilitates to improve soil health | 4.583 * |
| 21 | IFS encourages sustainable and ecologically sound agriculture system | 2.758 * |
| 22 | Practicing of integrated farming reduces vulnerability to adverse climatic conditions | 3.416 * |
| 23 | IFS practice improves the farm biodiversity | 4.583 * |
| **VI** | **Resource use efficiency/ Input recycling** | |
| 24 | IFS helps in efficient utilization of farm resources | 2.965 * |
| 25 | Waste recycling of farm plants and animals can be done effectively in IFS | 3.416 * |
| 26 | Irrigation management can be done effectively in IFS, since it encourages water conservation | 3.055 * |
| 27 | Reduction in the usage of inorganic / chemical inputs | 2.049 * |
| **VII** | **Psychological Security** | |
| 28 | Practicing diversified farming helps in improving knowledge and skills in practicing farming | 2.646 * |
| 29 | Experience in diversified farming gives psychological security to practice new ideas on farming | 3.813 * |
| 30 | IFS changed the perspective of looking farming differently | 1.528 |
| 31 | IFS improved my competency level of becoming an agripreneurs. | 4.733 * |
| 32 | Adoption of IFS has increased confidence in availing credit from the banks | 1.527 |

## 5. Standardization of index

The reliability and validity was ascertained for standardization of the index.

### 5.1 Reliability

It is more important to test the reliability of the instrument for sound measurement. If the quality of reliability is satisfied by an instrument, then while using it we can be confident that the transient and situational factors are not interfering (Kothari and Garg, 2014) [4].

In the present study the reliability of the index was determined using 'Cornbach's alpha'. Cronbach's alpha is a measure used to assess the reliability, or internal consistency, of a set of scale or test items. It is computed by correlating the score for each scale item with the total score for each observation, and then comparing that to the variance for all individual item scores. The formula for Cronbach's alpha is

$\alpha = N.\hat{C} / \bar{v} + (N-1).\hat{C}$

Where, N = the number of items.

$\bar{c}$ = average covariance between item-pairs.

$\bar{v}$ = average variance.

| Index | Reliability Statistics | | |
|---|---|---|---|
| | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | No. of Items |
| SLI | 0.931 | 0.931 | 32 |

In the present study, the structured items are employed to 30 respondents in the non-sample area. The resulting α coefficient of reliability for the vulnerability index of farmers is 0.931, which made evident that the internal consistency of Vulnerability index is 'Better'. Hence, it is clear from the above results that the constructed index is reliable as the value of reliability coefficient (α coefficient) is greater than 0.6.

**5.2 Validity:** Validity of a research instrument assesses the

extent to which the instrument measures what it is designed or intended to measure (Robson, 2011) [8]. The face and content validity were chosen to validate the tool. The face validity of the tool is established through the statement of each item and it was clearly self-evident. The content validity of the tool is established through the experts' judgement. From the calculations done for carrying out the relevancy test, the content validity of the tool is established. So, the instrument was said to be valid for measuring the sustainable livelihood security of IFS module practicing farmers.

**6. Administering the index:** The final index was administered to ifs module practicing farmers and they were asked to respond on a five point continuum, *viz*., very greater extent(vge), to a great extent (ge), to a moderate extent (me), to a least extent (le) and to a very least extent (vle), against 29 items. The final sustainable livelihood security index consists of seven dimensions, 29 items.

The details of positive and negative items used in the final index were given in the table below. The scoring order for the responses was 5, 4, 3, 2 and 1, respectively, for positive items and vice versa for negative items.

| Magnitude | Positive items | Negative items |
|---|---|---|
| Item Number | 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28 and 29 | 00 |
| Total | 29 | 00 |

The results were presented in frequency and percentage. Sustainable livelihood security was categorized into low, medium, and high levels by summing scores within each dimension. The overall security index was calculated by adding all item scores. To rank the index, statement-wise scores were multiplied by weights, and the weighted scores were summed. The highest weight was multiplied by the total sample size and divided by the sum of weighted scores to calculate the relative importance index. The sustainable livelihood security index ranged from 0 to 1.00.

## 7. Conclusion

The Sustainable Livelihood Security Index developed for IFS module practicing farmers successfully measures key aspects of livelihood security across seven dimensions. The index was validated through expert judgment, relevancy tests, and reliability analysis, with a high Cronbach's alpha coefficient of 0.931 indicating strong internal consistency. The final 29 selected items, based on item analysis and t-values, accurately capture the diverse factors influencing the sustainability of livelihoods in integrated farming systems. The index provides a robust tool for assessing and comparing the livelihood security of farmers, with potential applications for policy formulation and resource allocation. By categorizing farmers into different levels of security, it offers insights into areas requiring intervention for improved well-being. The tool's validity and reliability ensure its applicability in future research and field studies. Ultimately, it contributes to better understanding and enhancing the sustainable livelihood security of farmers engaged in integrated farming systems.

## 8. References


1. Anonymous. Agricultural statistics at a glance 2023. Ministry of Agricultural and Farmer's Welfare; c2023. p. 152.
2. Chandana ST, Praveena PLRJ, Lakshmi T, Subramanyam D, Ravindra Reddy B. Sustainable livelihood security of integrated farming systems practicing farmers through different enterprise combinations in Andhra Pradesh. Indian J Ext Edu. 2023;59(1):101-106.
3. Kerlinger FN. Foundations of behavioral research. 2nd ed. 14th reprint. Surjeet Pub., Delhi, India; c2012. p. 1741.
4. Kothari CR, Garg G. Research methodology: Methods and techniques. 3rd ed. New Age International Publishers; c2014.
5. Paroda RS. Strategy paper on Indian agriculture for achieving sustainable development goals. Trust for Achievement of Agricultural Sciences. 2017;12(2):29-34.
6. Ramya HR. Integrated farming systems in selected agro-climatic zones of Karnataka: A socio-economic analysis [Ph.D. thesis]. Karnal (Haryana): NDRI; c2021.
7. Ray, Mondal. Research methods in social sciences and extension education. Calcutta: Naya Prakash; c1999. p. 23.
8. Robson C. Real world research: A resource for users of social research methods in applied settings. 2nd ed. Sussex: John Wiley and Sons Ltd; c2011.
9. Shivaji D. A comprehensive study on integrated farming systems for sustainable rural livelihood security in backward districts of Maharashtra [Ph.D. thesis]. Karnal (Haryana): NDRI; c2014.
10. Vinay Kumar HM, Shivamurthy M, Govindagowda V, Biradar GS. Assessing decision-making and economic performance of farmers to manage the climate-induced crisis in coastal Karnataka. Climate Change Springer. 2017;142(1):143-153.