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How to Measure Livelihood Sustainability? Sustainable Livelihood Security Index (SLSI) Method

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SUMMARY

Sustainable Livelihood Security Index (SLSI) was proposed by M.S. Swaminathan to evaluate the criteria for attaining sustainable livelihood security. It is a composite index composed of three components viz., ecological security index (ESI), economic efficiency index (EEI), and social equity index (SEI) works as a powerful policy tool for identifying the necessary conditions for sustainable development. For constructing SLSI, there are six steps need to be followed i.e., Normalization of indicators, Calculating weights for the components, Calculating individual component index, Calculating overall SLSI and Distribution of SLSI. It was widely used as a potential tool for measuring sustainability and improving sustainability of the country.

INTRODUCTION

The origin of sustainability in development can be traced to the first UN conference on human development held in 1972 at Stockholm, when global consciousness on ecology, environment and poverty emerged. According to the oxford dictionary, Sustainability refers to the ability that maintained at a certain rate or level and it can be the capacity to enhance the state and existence of events over the long term. In other words, it explains as the ability to continue over a long period of time. The word "Sustainability" was derived from the roots of Latin word *i.e.*, *sustinere* which means to hold and "to sustain" indicates to maintain, support, uphold or persevere. Sustainable agriculture is defined as the skilled management of resources in agriculture so as to satisfy the changing human needs and at the same time to maintain and influence the environmental quality and conserving natural resources (FAO, 1991). According to chambers (1986) defined sustainable livelihood as "level of wealth and of stocks and flows of food and cash which provide for physical and social well-being and security against becoming poorer" As a result, they focused primarily on capability, equity and sustainability while Swaminathan (1991) came to the conclusion that a livelihood will be ecologically stable, economically effective, and socially equitable.

Elements of sustainability

Sustainability is applied not only to human sustainability on earth, but too many situations and contexts over many scales and time, from small local ones to the global balance of production and consumption. Based on the diagram of Sadler (1998) the elements of sustainability were classified into three dimensions *viz.*, Economic dimension, social dimension and environmental dimension is elicited in the fig. 1.

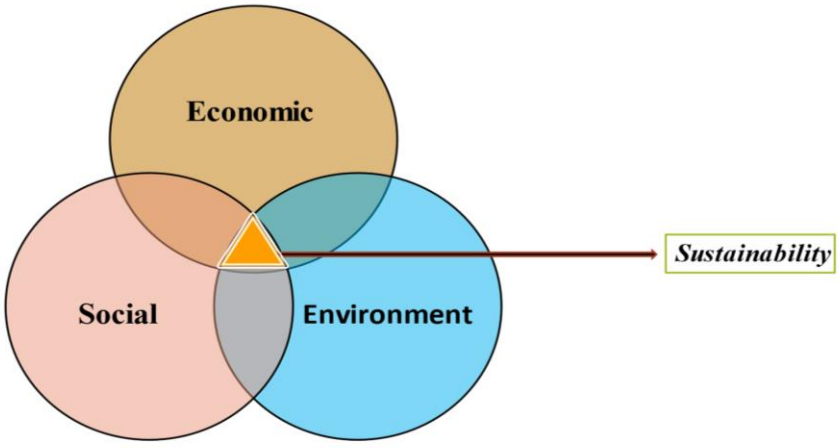

Fig. 1 Representation for the elements of sustainability using Venn diagram

Economic dimension: It represents a system of producing, distributing and consuming wealth which is generally defines as the means of satisfying the material needs of the people through money, property, possessions of monetary goods or anything economic value measurable in prices.

Social dimension: It represents a system of living or associating in groups or communities and considers the importance of maintaining and improving human living standards. It does not define wealth in terms of material possessions that can be bought, sold or stocked for the future but it suggests fair treatment regardless of gender and racial equality to the arts and humanities, recreational opportunities, happy personal life, lack of human exploitations. The social dimension emphasises communal rights and social welfare of all people rather than individual rights and material wealth.

Environmental dimension: It represents a system of providing integrity and preservation of ecosystem and it concerned with continued productivity and functioning a scientifically oriented outlook towards sustaining the biological and ecological conditions that make development possible. It recognizes that flora and fauna might have value outside their abilities to satisfy the social and economic need of individuals and societies.
The sustainability domain is the area in which an organization can operate and still maintain a consistent and suitable harmony among three main dimensions

Sustainability Livelihood Security Index

Sustainability Livelihood Security Index was abbreviated as 'SLSI' and it was proposed by M.S. Swaminathan to evaluate the criteria for attaining sustainable livelihood security. SLSI is simple, informative and easy to understand and it is the effective tool for evaluating of sustainability especially for assessment of agricultural sustainability.

Components of SLSI

SLSI is the composite index of its three components *viz*., ecological security index (ESI), economic efficiency index (EEI), and social equity index (SEI) works as a powerful policy tool for identifying the necessary conditions for sustainable development (Fig. 2).

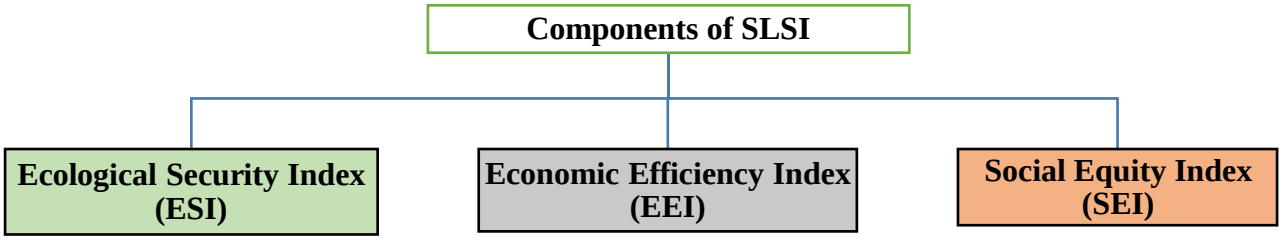

Fig. 2 Components of sustainability livelihood security index

Ecological Security Index (ESI)

It refers to the establishment of an environment in which a community's physical surrounds meet the demands of its residents without reducing the stock of its natural resources. The capacity of the ecosystems to maintain their essential functions and process to retain their biodiversity in full measure over a longer time. It can be measured by using the indicators/ variables like forest cover, soil quality, water quality and air pollution etc.

Economic Efficiency Index (EEI)

It describes how well a system or community can consistently create goods and services. The use of various strategies to employ the available resources optimally so that the farm gets maximum benefit over a longer period of time. It can be measured by using the indicators/ variables like net grown area, food grain yield, labour productivity and fertilizer consumption etc.

Social Equity Index (SEI)

It refers to the measure of distributional equity in terms of proper healthcare, educational, and gender equity provisions, among other aspects. The ability of a society to build up processes and structures which not only meet the needs of its current members but also the needs of the future generation. It can be measured by using the indicators/ variables like distribution of assets, electricity access, female literacy, infant mortality and digital connectivity etc.

Steps for constructing SLSI

Step 1: Indicators should be normalized by following formulae

Equation for normalization of indicator which has positive effect on sustainability

$$\mathbf{X_j} = \frac{Xi - \min(Xi)}{\max(Xi) - \min(Xi)}$$

Equation for normalization of indicator which has negative effect on sustainability

$$\mathbf{X_j} = \frac{\max(Xi) - Xi}{\max(Xi) - \min(Xi)}$$

where $\mathbf{X_i}$ = indicator of either ESI, EEI, SEI; $\mathbf{X_j}$ = Normalized indicator of ESI, EEI, SEI

Step 2: Weights were calculated by using Iyenger and Sudarshan (1982) method

$$\boldsymbol{Wj} = \frac{C}{\sqrt{Var}Xj}$$

where, $\boldsymbol{C} = \frac{1}{{}^{1}/_{\sqrt{Var\ X1}} + {}^{1}/_{\sqrt{Var\ X2}} + {}^{1}/_{\sqrt{Var\ X3}} \ldots\ldots\ldots\ldots + {}^{1}/_{\sqrt{Var\ Xij}}}$

Step 3: The calculated weights were multiplied with the respective normalized indicator values and then added to get the indices of each three dimensions of sustainability livelihood security

$$\mathbf{Y} = W_1X_1 + W_2X_2 + \ldots\ldots\ldots + W_{jk}\ X_{jk}$$

where, W = Weight of either ESI, EEI, SEI; X= Normalized indicator of ESI, EEI, SEI and 'Y' being either overall mean index of ESI, EEI and SEI

Step 4: The overall sustainable livelihood security index was calculated by taking simple average of three indices

$$\mathbf{SLSI} = \frac{\mathrm{ESI} + \mathrm{EEI} + \mathrm{SEI}}{3}$$

Step 5: Based on the values of SLSI, it was categorised into four categories by using cumulative square root frequency method as less sustainable, moderately sustainable, sustainable and highly sustainable.

Advantages of SLSI

- It can be used to generalised for a district, state or a country
- It can be context specific and flexible
- It can be applicable at different level starting from household level.

Drawbacks of SLSI

- Mainly selection of indicators/variables and components are subjective in nature.
- SLSI measurement was relative in nature i.e., helps in ranking only.
- Quantitative measurement is not possible by SLSI method.

CONCLUSION

SLSI is an effective technique for determining the prerequisites for sustainable development in a functional unit of development planning. Few indicators are as high female literacy can improve the social sustainability, increase in fertilizer consumption, productivity of crops, labour availability can increase the economic sustainability, and increase in forest cover can improve ecological sustainability of the country. The studies on sustainability can consider the range of economic, social, and ecological components of sustainability while keeping in mind the particular requirements of the state or area. Therefore, SLSI can serve as an educational and policy instrument to encourage planners, administrators, and development workers. Construction of SLSI utilising time series data can help in development of various interventions over a time that focused sustainability in general and livelihood security in particular.

REFERENCES

Chambers, R. (2011). Sustainable livelihoods: An opportunity for the World Commission on Environment and Development.

FAO. (1991). Sustainable agriculture and rural development in Asia and Pacific. Regional Document No.2, Conference on agriculture and environment, Netherland.

Iyenger, N.S., and Sudarshan, P. (1982). A method of classifying regions from multivariate data. The Economic and Political Weekly, 17(51): 48-52.

Sadler, B. (1998). National capital and borrowed time: The global context of sustainable development. Institute of North American West, Victoria, B.C. Canada.

Swaminathan, M.S. (1991). Sustainable agricultural systems and food security. Outlook on agriculture, 20(4): 243-249.