

Extended Abstract

Please do not add your name or affiliation

Paper/Poster Title	Assessment of the sustainability of agricultural systems a cross-comparison of the two farming systems in Punjab, India
---------------------------	--

Abstract prepared for presentation at the 97th Annual Conference of the Agricultural Economics Society, The University of Warwick, United Kingdom

27th – 29th March 2023

Abstract	<i>200 words max</i>
<p>An effective assessment of economic, social and environmental condition is essential for the achievement of sustainability in the agricultural system, which requires a set of scientifically and self-validated indicators for the holistic measurement. The present study aims to develop a composite index to measure and compare the sustainability of conventional and organic farming systems in Punjab, India. A cross-sectional study based on primary survey of 348 wheat growers (143 organic and 205 conventional) was done to assess the sustainability of two farming systems. A multi-stage random sampling technique was used to collect the data. Based on the OECD index construction methodology, a total of 25 economic, social and environmental indicators were determined to construct the composite sustainability index (CSI), economic sustainability index (ESI), social sustainability index (SSI) and environmental sustainability index (EnSI). The empirical results of CSI show that organic agriculture is more sustainable as compared to conventional agriculture, whereas ESI is higher in the case of conventional farming. Moreover, the results were statistically significantly different between the two groups of farming. The findings of the current study will be helpful in developing policies and future plans to increase agricultural sustainability in Punjab.</p>	
Keywords	Sustainability, Assessment, Indicators, Composite Sustainability Index
JEL Code	Q01, Q15, Q18, Q56
Introduction	<i>100 – 250 words</i>
<p>The concept of sustainability is increasingly garnering support in agricultural policy debates globally. The growing population, rapid pace of climate change, exploitation of natural resources, and shrinking agricultural land have become the prominent challenge to agriculture in modern times. The adverse environmental impacts associated with input-intensive conventional farming have further questioned the sustainability of the agricultural system. Hence, to ensure agricultural sustainability, the inevitability of precise measurement and evaluation arises. Sustainability measurement provides a way to understand the long-term impact of current agricultural practices on the environment, economy, and social well-being.</p>	

However, there are an ample number of studies that have been conducted to measure the sustainability of agricultural systems in India, but very few primary studies have compared the sustainability of organic and conventional farming systems. Therefore, this study is an attempt to determine indicators and assess the sustainability of organic and conventional farming in Punjab, India. Thus, the outcome of this study significantly contributes towards sustainable agriculture policy formulation in India.

Methodology

100 – 250 words

A cross-sectional primary study through multi-stage sampling was conducted in the Indian state of Punjab from July 2021 to September 2021. Punjab is divided into three geographical regions, viz. Majha, Malwa, and Doaba; hence, three districts were purposively selected from each of these three regions, namely Gurdaspur, Ferozepur, and Hoshiarpur, respectively. The reason for the selection of the mentioned districts was the presence of a significant number of organic farmers. A total of 348 farmers (including 143 organic and 205 conventional farmers) were surveyed. The data were collected through a semi-structured questionnaire. The questionnaire consists of two sections. In the first section, data related to demographic profiles were asked, and in the second section, data related to sustainability indicators were collected. Following the OECD (2008) guidelines, a composite index has been developed for data analysis to measure and compare the agricultural sustainability of organic and conventional farming. Based on the analysis of the existing literature and biophysical characteristics of the study area, 25 indicators were determined from the three dimensions of sustainability, namely: economic, social, and environmental. Further, spider web diagrams have been used to show the graphical representation of the results. The frequency analysis of sustainability scores under three dimensions was also done. Additionally, a t-test was applied to check the statistically significant difference in the sustainability index between the two groups of farming.

Results

100 – 250 words

The results of the Composite Sustainability Index (CSI) show that organic farming is more sustainable as compared to conventional farming since CSI for organic farming (0.63) is higher than conventional farming (0.49). Although the Economic Sustainability Index (ESI) of organic farming (0.45) is lower than conventional farming (0.49), the difference is not much significant. Further, the Environmental Sustainability Index (EnSI) for conventional farming is very low (0.38), which shows that conventional farming in Punjab is environmentally very unsustainable. The Social Sustainability Index (SSI) for both farming is high, but comparatively, it is greater in the case of organic farming. Moreover, the results of the t-test revealed that there is a statistically significant difference between CSI, ESI, EnSI, and SSI of both farming. The frequency analysis of CSI scores shows that nearly 8 percent of total conventional farmers lies under the unacceptable range (0.2-0.4) of sustainability, whereas approximately 88 percent and 4 percent of conventional farmers achieved a moderate (0.4-0.6) and acceptable (0.6-0.8) sustainability scores, respectively. On the other hand, CSI frequency analysis for organic farming shows that no organic farmer is working under an

unacceptable range of sustainability. Approximately 60 percent of organic farmers working under an acceptable range, and one percent of organic farmers have achieved an ideal (0.8-1.0) sustainability score.

Discussion and Conclusion

100 – 250 words

On the basis of the findings, the study concludes that overall organic farming is more sustainable than conventional farming, therefore, the need for relevant policy support from the policymakers arises for the greater promotion of organic farming in the region. Although ESI for organic farming is lower compared to conventional farming, it may be due to lesser yield during initial periods since the majority of the farmer have been practicing organic farming in recent years (i.e., less than 2 years). The study has also observed that the EnSI of conventional farming is very low; it may be due to the overuse of agrochemicals and prevailing wheat-rice “monoculture” in Punjab, India. On the other hand, the majority of organic farmers perform sustainable agricultural practices like crop diversification and intercropping, which are more environmentally sustainable in comparison to conventional farming. Hence, this study provides a way to understand the long-term impact of current agricultural practices on the environment, economy, and social well-being to policymakers for sustainable agricultural development policies.