UN Inter-Agency Task Force on Social and Solidarity Economy

Agricultural Sustainability through Solidarity Groups in Organic Farming

Implications on the Sustainable Development Goals

Nilojyoti Koner
University of Burdwan
India

Arindam Laha
University of Burdwan
India

June 2019

Draft paper prepared in response to the
UNTFSSE Call for Papers 2018

Implementing the Sustainable Development Goals: What Role for Social and Solidarity Economy?

Abstract

This paper examines the role of social and solidarity groups formed under Participatory Guarantee System (PGS) in achieving food security, improving in the income of small farmers and promoting agricultural sustainability (SDG 2). Empirical evidences presented in this paper are exclusively based on the functioning of two such PGS groups (i.e. a non-functional group from Burdwan district and a functional group from Purulia district) in West Bengal. An assessment in compliance with SSE principles (viz. participation, solidarity and innovation, voluntary involvement and autonomy, collective dimension) reveals that these groups embedded SSE principles in their operation, and thereby can be considered as a part of SSE ecosystem. However, an in-depth analysis reveals that the PGS group in Purulia performed better than the other group in Burdwan in three specific dimensions (i.e. participation and solidarity & innovation and collective dimension), which can explain long term sustainability of the group in Purulia. While assessing the socio-economic impact of organic clusters in addressing targeted development goals it is found that formation of clusters do not ensure food availability of farmer households. However, participation in PGS group ensured higher income level of the beneficiaries in Purulia vis-à-vis beneficiaries in Burdwan.

Keywords

Organic Farming, Agricultural sustainability, PGS group, Regional Council, SDGs

Bio

Nilojyoti Koner, M.Com works as a State-funded Research Scholar at the Department of Commerce, The University of Burdwan, West Bengal, India.

Arindam Laha, Ph.D (Economics) has been teaching Economics at the Department of Commerce, The University of Burdwan, West Bengal since the last 9 years. He has written three books and has published a number of research articles in internationally reputed journals of Social Science, as also in various edited volumes published by Routledge Publication (London and New York), Cambridge Scholars Publishing (UK), *IGI Global (USA).*

Introduction

In the last decade organic farming has emerged as an alternative farming system and attracted the interest of many because of its potential to eliminate the problems relating to agricultural sustainability[1]. A rising level of concern over environmental hazards and food security due continuous degradation of natural resources has led to the quest for a sustainable agriculture system. This alternative approach of sustainable agriculture can contributes to long-term welfare by providing goods and services in ways that are environmentally sound, economically viable and socially acceptable (Lampkin, 1999). Organic agriculture has the potential to become a key strategy in achieving all of the sustainable development goals (SDGs) and targets (Setboonsarng and Gregorio, 2017). Organic agriculture is considered to be a key strategy in achieving food security and promoting sustainable agriculture (SDG 2). Organic farming practices follows more diversified cropping system and thereby, ultimately improves food security by reducing the risk of income losses associated with seasonal variations and crop failures (Scialabba and Caroline, 2002). In addition, organic crops have a better nutrient value than non-organic food, hence improving the health of organic farming households with the same food intake (target 2.1) (Worthington, 2001). Besides, due to the lower input costs and enhanced productive bases with organic agricultural practices, productivity of organic farmers are high (target 2.3) (Setboonsarng and Gregorio, 2017). In addition, a combination of higher market prices for organic produce and lower production costs generally results in higher profitability of organic farmers (target 2.3). Moreover, due to its resilient nature, organic agriculture poses a key solution to improving yields in a sustainable way in marginal areas with no irrigation and access to external inputs(Setboonsarng and Gregorio, 2017); further organic cultivation practices improves soil fertility, promotes biodiversity and ensures sustainability of agricultural production (Kilcher, 2007) (target 2.4). Therefore, a well-designed organic farming system with the assistance of various stakeholders can play a pivotal role in solving the problem relating to agriculture sustainability and in near future it may be the only way to go about.

In an effort of realizing doubling of farmers income (target 2.3), Indian experience in the path of transforming agriculture rooted in a Chayanovian perspective of co-operatively organized peasants community in addressing their socio-economic issues. Implementation of 'Paramparagat Krishi Vikash Yojana' (PKVY) in India signifies a policy reversal away from 'biologically centred green revolution' to 'eco-friendly sustainable agriculture'. This alternative approach of developing a sustainable agriculture (especially organic farming) essentially calls for integrating the process of natural environmental processes into the 'agro ecology system' so as to make it more 'environmentally-friendly' (Migliorini and Alexander, 2017). One of the important requirements of organic farming is that it cannot be practiced in isolation; it is essential to develop cluster approach for the success of organic farming to exploit the economic advantage of fostering interdependence among organic farmers. Considering the disadvantages of third party certification system, the PKVY scheme of the Government of India embraces 'Participatory Guarantee System'[2] (PGS) certification. PGS is essentially built on some basic elements of social

[1]Pretty (2007) while defining agricultural sustainability identified four key principles i.e. integrating biological and ecological processes, minimizing the use of non-renewable inputs, making productive use of the knowledge and skills of farmers, thus improving their self-reliance and substituting human capital for costly inputs and making productive use of the people's collective capacities to work together to solve common agricultural and natural resource problem.

[2]Participatory Guarantee System (PGS) is a process in which people in similar situations (in this case small holder producers) assess, inspect and verify the production practices of each other and take decision on organic certification (NCOF, 2015). In other words, it is a quality assurance initiative that is locally relevant,

and solidarity economy, such as participation, shared vision, transparency, trust and horizontality of decision making. In most situations PGS is formed when a group of people come together to provide a framework through which group marketing and various community building activities can be facilitated. A PGS can provide an affordable way to certify their organic products so as to sell their products locally (usually a farmers' market or a retail outlet).

In the existing literature, few empirical studies were made in evaluating the role of SSE initiatives in promoting organic farming. While evaluating the SSE value chain of Kishan Swaraj Welfare Society (KSWS) in West Bengal, a focus group discussion of all the stakeholders of KSWS in five key dimensions of SSE reported a 'gradual onset of a sustainable SSE value chain, incepting at the village level' (Purkayastha, 2013). Some other studies made an attempt to measure the impact of organic farming in achieving the SDGs (Setboonsarng and Gregorio, 2017). In fact, there is a significant gap in the existing literature in systematically analysing contribution of these SSE actors in sustainable development, particularly in the context of organic cultivation. The present study aims to fill this gap of knowledge. In this context, the main objective of the study is to explore the group dynamics of solidarity organizations (viz. PGS groups) in the light of SSE principles (e.g. participation, solidarity &innovation, voluntary involvement & autonomy and collective dimension). Interestingly, this research objective is pertinent in the context of our empirical setting, which is characterised byone functional group (in Purulia) and one non-functional group (in Burdwan) in rural West Bengal. In this context, one research question may arise: whether these group dynamics (or core functionality of the group) has an impact on sustainability (or viability) of the group in practice? In addition, the study evaluates the role of these PGS groups in implementing SDGs (specifically food security and income generation of small farmer households) in the rural setting of our study region.

Data Sources and Methodology:

The study is mainly based on primary survey evidences. Under the scheme of PKVY, around 10000 organic clusters (out of which 120 in West Bengal) have yet been formed in all over India. In the empirical survey, the study considers two PGS groups (i.e. 'Muktipur Aromatic' of Burdwan district and 'Dungrigora Harambaba Gaota' of Purulia district) out of those 120 clusters in West Bengal. Multi-stage sampling technique is used for the selection of districts and PGS groups. In the first stage, the selection of the districts for conducting sample survey is done on the basis of number of organic clusters as a proportion of 1lakh hectare of sown area of the districts of West Bengal. Considering the state average (4.10) in this relative indicator, the district of Purulia district (10.03) is chosen as better performing district, whereas Burdwan district (1.53) shows poor performance in the formation of PGS clusters. In the second stage, one PGS group from each of the selected districts is chosen based on their nature of functionality (i.e. one functional group and one non-functional group is chosen from the above two selected districts). Based on this criterion 'Muktipur Aromatic' PGS group is chosen from Burdwan district as a non-functional group and 'Dungrigora Harambaba Gaota' PGS group is chosen as a functional group from Purulia district (Table 1).

Table 1: Selection of PGS Groups

District	Burdwan	Purulia

ensure participation of stakeholders (including producers and consumers) and operate outside the framework of third party certification. For operational structure of PGS group see Figure A.1

No. of PGS Groups	7	22
Selected PGS Groups	Muktipur Aromatic	Dungrigora Harambaba Gaota
Villages	Muktipur	Khairipihira
Regional Council	Jalpaiguri Vivekanand Education Society	Jalpaiguri Vivekanand Education Society

Source: PGS of India (https://pgsindia-ncof.gov.in/LGList.aspx)

In order to assess the potentiality of PGS organic clusters in implementing shared SSE vision, we have constructed an assessment grid based on four key dimension of SSE, namely, participation, solidarity &innovation, voluntary involvement& autonomy and collective dimension (following Gonin et al. 2013; Quinones, 2013). The key dimensions of SSE framework were essentially built upon responses collected on different attributes belonging to the shared SSE vision. These attributes were used as performance indicators with an aim to measure the coherence between ideal situations and concrete practices. In this way, a total of 11 common indicators as grouped under four dimensions are selected. They are, namely:

1. Participation (D1): participation in decision process, participation in annual meeting.
2. Solidarity and Innovation (D2): engaging full fledge participation of marginal farmers, participation in profit sharing, meeting the livelihood of members, evaluation of activities carried out, making changes in group structure or operation to match with the changing environment.
3. Voluntary Involvement and Autonomy: voluntary participation, autonomy in decision making.
4. Collective Dimension: meeting commonly shared needs, and sharing resources.

After that a scorecard is prepared by assigning each of the performance indicators on a scale of 0-2 (0- not practiced, 1- weak practiced and 2-strong practiced). A comparison of performance scorecard between two groups can also identify the better performing group. In evaluating the performance of the groups, the following cut-off levels are determined: 0-0.66- weak SSE model, 0.67- 1.33 -moderate SSE model, 1.34- 2- strong SSE model.

In order to assess the socio-economic impact of organic clusters on targeted development goals the study employs 'Quasi-experiments with constructed controls' design. The design basically involves comparing the attainment of development goals among individual households within the clusters to that of households that are not member of the organic clusters within the study region. Among the different types of quasi-experimental designs that can be used to assess development impacts, we have used 'differences-in-differences' (DID) method. The method basically involves five steps. In the first step, relevant performance indicators (i.e. per capita marketable surplus and total income per acre) are selected. The next step involves the selection of time period. In our study, an assessment on the impact of cluster between 2014 (the year before the clusters were formed) and 2015 (the year of clusters formation) is estimated. The third step deals with collection of data pertaining household consumptions, production, cost of cultivation, income from agriculture and other characteristics such as number of members in the family, size of land holdings etc. The next step deals with construction of control group. In this step equal numbers of representative households who are not part of the clusters but reside within the study area (i.e. comparable to the member households of clusters) are selected as control groups. The final step deals with the estimation of impact. The basic objective of this step is to estimate whether the member households in the PGS groups are more likely to enhance food security and income than a comparable control groups (i.e. non-member households) households in control groups in the study region.

Compliance with SSE Principles:

The primary objective of this study is to explore the group dynamics of the selected PGS groups (see table A.1) in the light of SSE principles. The study has also made a critical analysis of performance of both PGS groups in terms of four key dimensions of SSE framework. Document analysis on the current practice of SSE cases provides an opportunity in identifying the gap between the shared vision and current practices of the organizations.

Table 2: PGS Group wise Assessment Grid on SSE Principles

Dimension and Indicators	Purulia	Burdwan
	Mean score	Mean score
Participation (D1)	1.94	1.6
1. Participation in decision process	1.88	2
2. Participation in annual meeting based on 'one person one vote principle'	2	1.2
Solidarity & Innovation (D2)	0.88	0.64
1. Engaging a full-fledge participation of the marginalized farming communities	1	0
2. Participation in profit distribution	1	1.2
3. Meeting the livelihood of group members	1.06	0.4
4. Evaluation of activities carried out	0.76	1.2
5. Change in group structure/operation	0.59	0.4
Voluntary Involvement & Autonomy (D3)	1.62	1.7
1. Participation on voluntary basis	2	2
2. Decision process not being influenced by the involvement of any govt. authority	1.24	1.4
Collective Dimension (D4)	1.18	1
1. Formation of group due to commonly shared needs	1.71	2
2. Operating methods reflecting collective dimension	0.65	0
Total	13.89	11.8
Average	1.41	1.24

Source: Author's own calculation based on primary survey evidences, 2018-19

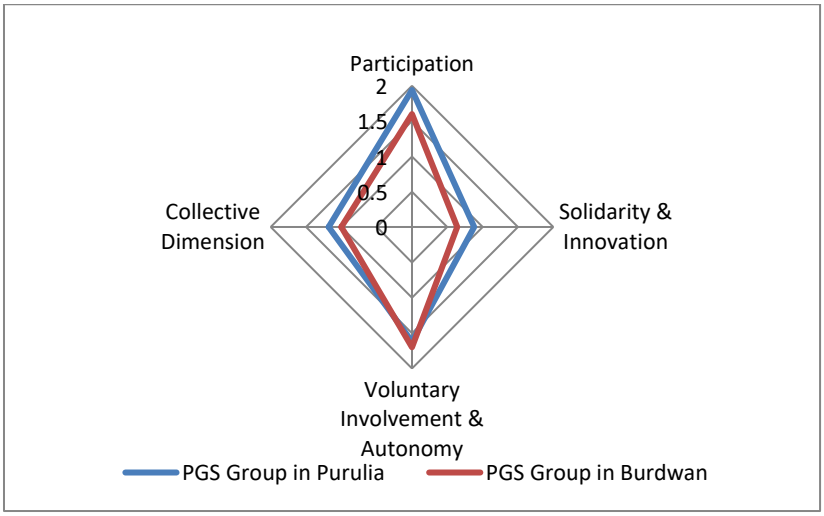

Figure 1: Comparison of the Score of the PGS Groups in the SSE Principles

Evaluation result on first dimension (i.e. participation) reveals that the group in Purulia conducted more annual meetings with greater participation of its members than the group in Burdwan. The regular arrangement of such meetings played a significant role in promoting interaction among the group members in Purulia. As a result of such regular interactions, the members were able to use their knowledge of each other and it also helped them to engage in peer monitoring in their conduct of organic operation. Overall it can be said that, the participation of members in Purulia in various group activities, annual meetings and in decision processes resulted in building trust among members which in turn strengthened the group and the community.

Regarding the second dimension (i.e. solidarity and innovation), evidences reveals that the group in Purulia ensured the full-fledged participation of poor and marginalised farmers in the locality. This participatory strategy of inclusion of poor and marginalised farmers into their group activities played a major role in not only meeting livelihood of the members but also in economic uplifting of local community in Purulia. However, no such evidences on inclusion of marginal and small farmers were found for the group in Burdwan; rather this group is comprised of medium and large farmers.

Regarding the third dimension of SSE framework (i.e. voluntary involvement and autonomy), evidences shows no significant difference between the two PGS groups. Findings of the primary survey reveal that members of the both groups joined voluntarily and they had complete autonomy over the various decisions taken.

Regarding the fourth dimension (i.e. collective dimension), evidences reveals that both of the groups were formed in meeting the commonly shared needs of the members. However, PGS group in Purulia reflected a stronger pattern of cooperative behaviour among the group members than the other group in Burdwan. As most of the members of the group were poor with limited resources, they placed greater emphasis on sharing the available resources among themselves.

The overall assessment in table 2 shows that the SSE model in Purulia (1.41) has obtained a 'strong performance score' (the actual range being 1.34 –2), whereas the other SSE model in Burdwan (1.24) got a 'moderate performance score' (the actual range being 0.67 –1.34). Thus SSE model in Purulia district did comparatively better than the other SSE model in Burdwan district. Interestingly, PGS group in Burdwan is still weak on three dimensions (participation, solidarity and innovation, collective dimension) in comparison to group in Purulia (figure 1).

Assessing the socio-economic impact of organic clusters in addressing targeted development goals

Organic Farming and Food Security

Organic farming can play a crucial role in addressing SDG 2: eliminating hunger, achieving food security and improved nutrition, and promoting sustainable agriculture. Organic farming practices follows more diversified cropping pattern, which reduces the risk of income losses associated with seasonal variations and crop failures, and thereby improves food security. In addition, organic crops contain a better nutrient value than non-organic food (target 2.1). However, to ensure success of organic farming it is essential to adopt a cluster approach (Naik and Nagadevara, 2010). Formation of cluster in nearby organic farms can facilitates in converting chemical farming to organic farming. In this section we have tried to examine whether the participation in organic clusters ensure food security of the farmers in the study region. While measuring food security[3]

[3]Swaminathan Research Foundation Report (2008) identified three important dimensions of food security i.e. availability, affordability and usability of food.

of the sample farmer households in the study region we have only focused on the availability of food dimension which can be measured by the per capita availability of food from home production and public distribution system. In order to proceed with this analysis first we have calculated availability of food of the farmer households by the indicators of per capita marketable surplus[4] for both cluster and non-cluster members covering a period of both before and after formation of cluster (table A.2). Then difference-in-difference method is applied to measure the impact of cluster formation on food security of the sample farmers.

Considering the non-cluster members as the control group, change in per capita marketable surplus of the cluster members (i.e. treatment group) in Purulia district is also examined. Change in per capita marketable surplus of treatment group (e.g. decrease by 32.32 kg.[5]) is compared with the change in per capita marketable surplus of the control group (e.g. increase by 42 kg.) by calculating difference-in-difference estimator (table 3). Overall it can be seen that, organic cluster members of the study region has to suffer a reduction of marketable surplus as a result of their decision to convert into organic farming by forming cluster, whereas the non-cluster members have experienced an increase in per capita marketable surplus in the same period. The relative loss of marketable surplus (the difference-in-difference of the changes in per capita marketable surplus) is 74.32 kg. It has been reflected by the negative DID estimator.

Table 3: Difference-in-difference estimates of Per Capita Marketable surplus (in kg.) before and after 2015 in Purulia District

Farmers	Before adoption of Organic farming (2014)	After adoption of Organic farming (2015)	Change
Within Group (Treatment)	129.35	97.03	-32.32
Outside Group (Control)	124.52	166.52	42
Difference	4.83	-69.49	-74.32

Source: Author's own calculation based on primary survey evidences, 2018-19

On the other hand, a decreasing trend in per capita marketable surplus is observable after formation of clusters in Burdwan (table 4). Difference-in-difference estimator is calculated by considering the change in per capita marketable surplus of treatment group (e.g. decrease by 444.33 kg.) is vis-à-vis the control group (e.g. decrease by 13 kg.). Analysis revealed that there has been a significant reduction in per capita marketable surplus for cluster members in post in comparison to that of non-cluster members in the study region. It has been reflected by the negative DID estimator which indicates a relative loss (i.e. difference-in-difference of the changes in per capita marketable surplus) of 431.33 kg.

Table 4: Difference-in-difference estimates of Per Capita Marketable surplus (in kg.) before and after 2015 in Burdwan District

Farmers	Before adoption of organic farming	After adoption of organic farming	Change

[4]Availability of food can be measured by the extent of marketable surplus (i.e. production of foods - requirement of foods). Even though it is a measure of availability of food, but an increase in marketable surplus may result in corresponding increase in affordability of the farmer.

[5]The kilogram is the base unit of mass in the International System of Units (SI), having the unit symbol kg.

	(2014)	(2015)	
Within Group (Treatment)	512.57	68.24	-444.33
Outside Group (Control)	495.55	482.55	-13
Difference	17.02	-414.31	-431.33

Source: Author's own calculation based on primary survey evidences, 2018-19

From the above analysis it is found that the cluster members of both groups have suffered a loss in terms of per capita marketable surplus as a result of their decision to convert into organic farming as compared to their the non-cluster counterparts. This relative loss of per capita marketable surplus is reflected by the negative DID estimators. However the magnitude of loss differs: the extent of such loss in Purulia is found to be moderate, whereas, the group members in Burdwan incurred a severe loss. Though the members of both of the groups have reported lesser yield for their organic crops compared to their non-organic crops in the year of conversion (i.e. 2015), the extent of such reduction of yield for the group in Burdwan was found to be substantially higher. This is mainly due to their decision to grow a single crop (i.e. amon rice) in the kharif season in the fear of losing resilience property of the land. Previously, under chemical farming system, they used to cultivate both aman rice (in kharif season) and boro[6] rice (in rabi season). As a result, members of PGS group in Burdwan experienced significant reduction of per capita marketable surplus (i.e. 444.33 kg).

Organic Farming and Income Generation

The existing literature suggests that organic agriculture has the potential to enhance the income of small farmers (target 2.3) by lowering input costs and offering premium price for produce. However, the realization of premium price for organic produce depends on the certification of their produce (it requires spatial isolation of organic farms so that non-organic practices do not affect organic operations). Besides, formation of such cluster can significantly contribute towards reduction in cost of output mainly by exploiting the advantage of fostering interdependence due to geographical contiguity, input and output market access, application of appropriate technology at local level. Keeping in mind these advantages, formation of organic clusters can be considered as an economically viable strategy.

In this paper, we have examined the contribution of forming organic clusters on income generation of farmer households. In order to find out this fact, first, total per acre income of both cluster and non-cluster members is calculated covering a period before and after formation of cluster (table A.3). Then difference-in-difference method is applied to measure the impact of cluster formation on income (table 5, 6).

Considering the non-cluster members as the control group, a change in total income of the cluster members (i.e. treatment group) is also examined. A general trend of increasing total income is noticeable after the formation of clusters in Purulia. Change in total income of treatment group (e.g. increase by Rs.1204) is compared with the change in total income of the control group (e.g. increase by Rs.217) by calculating difference-in-difference estimator (table 5). The relative gain (the difference-in-difference of the changes in total income) is Rs. 987. Overall, it has been seen that change in total income of organic cluster members is more significant in comparison to the

[6] It is a special type of rice cultivation on residual or stored water in low-lying areas after the harvest of amon rice (grown in the kharif cropping season). While conducting sample survey, it is observed that before the formation of PGS groups, the members of both groups was growing amon rice whereas, boro rice (grown in the rabi cropping season) was only grown by the group members of Burdwan district.

income change for non-cluster members in the study region. It has been reflected by the positive DID estimator. So it can be said that the farmer's decision to convert into organic farming by forming organic clusters resulted in significant increase vis-à-vis non-cluster members in Purulia.

Table 5: Difference-in-difference estimates of total income (per acre) before and after 2015 in Purulia District

Farmers	Before adoption of organic farming (2014)	After adoption of organic farming (2015)	Change
Within Group (Treatment)	13900	15104	1204
Outside Group (Control)	3970	4187	217
Difference	9930	10917	987

Source: Author's own calculation based on primary survey evidences, 2018-19

In contrary, a decreasing trend in total income is observable after formation of clusters in Burdwan (table 6). Difference-in-difference estimator is calculated by considering the change in total income of treatment group (e.g. decrease by Rs.18931) vis-à-vis the control group (e.g. decrease by Rs.1434). In other words, change in total income of cluster members is more significant in comparison to the income change for non-cluster members in the study region. It has been reflected by the negative DID estimator which indicates a relative loss (the difference-in-difference of the changes in total income) of Rs. 17497. So it can be said that the farmer's decision to convert into organic farming by forming organic clusters resulted in significant decrease of total income vis-à-vis non-cluster members in Burdwan.

Table 6: Difference-in-difference estimates of Total Income (per acre) before and after 2015 in Burdwan District

Farmers	Before adoption of organic farming (2014)	After adoption of organic farming (2015)	Change
Within Group (Treatment)	34188	15257	-18931
Outside Group (Control)	32634	31200	-1434
Difference	1554	-15943	-17497

Source: Author's own calculation based on primary survey evidences, 2018-19

Overall, the analysis revealed that the cluster members in Purulia have experienced significant increase in total income (per acre) as compared to that of other non-cluster members in the study region. This is mainly possible due to significant reduction of cost of production by substituting chemical inputs to homemade and govt. supplied inputs. In addition, financial assistance from govt. also played a crucial role in realizing profitability in organic cultivation. This change in income has been reflected by the positive DID estimator which indicates a relative gain (the difference-in-difference of the changes in income) of Rs. 987. On the other hand, evidences suggest that organic cluster members in Burdwan have experienced significant decrease in income (per acre) as compared to that of other non-cluster members in the study region. This is mainly due to the incidence of huge loss in rice yield just after conversion to organic cultivation. Agrarian crisis magnified as there is no significant reduction in cost of production and absence of premium

price for organic produce. As a result the DID estimator (negative) indicates a relative loss (the difference-in-difference of the changes in income) of Rs17497. So it can be said that the farmer's decision to convert into organic farming in Burdwan resulted in significant decrease of income (per acre) of the farmer households.

Long-term Sustainability and Its Determinants

The entire study revolves around the performance of two PGS groups in rural West Bengal. Evidences from primary survey suggest that the PGS group in Purulia is still continuing its organic farming activities; on the other hand, the other group in Burdwan discontinued its operation after two years of practice. In this section, we have tried two identify the factors that might have an impact on the long-term sustainability of the PGS groups.

First, the group dynamics[7] of both SSE actors has been critically analysed. A comparative analysis on the dimensions of SSE framework[8] between the two PGS groups is also carried out to understand how these factors affect their long term sustainability. As mentioned earlier, empirical evidences reveals that the PGS group in Purulia performed better than the other group in Burdwan in all three dimensions (i.e. participation and solidarity & innovation and collective dimension), which can explain long term sustainability of the PGS group in Purulia. Evidences also suggest that mainly due to the establishment of common bond among members and their ability to act collectively to improve the well-being of their community, the PGS group in Purulia is still continuing to survive.

Secondly, long term sustainability of the SSE initiatives in organic farming can also be explained by the socio-economic condition of the study region. Evidences brings out the fact that before the formation of organic cluster, the members in Purulia were already practicing a low external input based farming by mainly using their family resources (such as, homemade fertilizers and family labour) and getting almost similar yields[9] like organic farming for their cultivated crops. But when the group was formed, the members were able to get agricultural inputs such as fertilizers and pesticides at free of cost and also received financial assistance from the govt. on a regular basis, which, in turn, reduced their cost of cultivation and thereby contributed in increasing income. As a result this group remains economically viable and is still carrying out organic farming activities. On the other hand, an opposite scenario has been observed for the group in Burdwan. The members of organic cluster in Burdwan used to practice chemical farming and getting more yields for their cultivated crops. But when the organic group was formed, the members have experienced a significant reduction in yield corresponding with no significant reduction in cost of cultivation. In addition, the members of the cluster were not able to get price premium for their organic crops.

[7]Hellin et al. (2009) advocated that sustainability of such farmers' group can be ensured given the right group dynamics.

[8]The study has explored the group dynamics of both PGS groups in the light of SSE principles. For this purpose it has taken into account four important dimensions of SSE framework i.e. participation, solidarity & innovation, voluntary involvement & autonomy and collective dimension. These four dimensions are essentially built on SSE governance principles such as mutual benefit, democratic decision making, inclusion of the most disadvantaged population, cooperative behavior etc. (UNIDO, 2017).

[9]The yield behaviour of farms during conversion period is largely depends upon the agricultural practices followed before conversion. Conversion from a traditional low external input system of cultivation rarely results in lower yields. However, when switching from external input intensive forms of agriculture, the yield may decline significantly, at least in the initial years of conversion– until the natural soil tilth and fertility are sufficiently developed. After that it may stabilize at a comparable, lower or even higher level depending on the efficacy of organic management, quality of organic fertilizers applied, etc. (Das, 2007).

As a result, this group was not economically viable and hence, they stopped operating after two years of practice.

Conclusion and Policy Implications:

In the context of organic cultivation, PGS groups can be considered as an important element of SSE eco-system as it essentially embraces SSE principles in their operational procedure. In this backdrop, the study has selected two such PGS groups (i.e. a functional group from Purulia district and a non-functional group from Burdwan district). The main objective of this paper is to compare the performance of these PGS groups in the light of SSE principles (participation, solidarity & innovation, voluntary involvement& autonomy and collective dimension). In the assessment grid of evaluating the performance of SSE initiatives, PGS groups secured 'strong' and 'moderate' performance scores in the district of Purulia and Burdwan respectively.

The study also evaluates the role of these PGS groups in achieving food security and increasing income of the small farmers (SDG 2) in the rural setting of our study region. Evidences suggest that cluster members of both groups have suffered a loss in terms of per capita marketable surplus as a result of their decision to convert into organic farming, whereas the non-cluster members in the same regions have experienced an increase in per capita marketable surplus in the same period. Therefore, empirical evidences raise serious doubt on achieving higher availability of food through clustering of organic farms. However, empirical evidences strongly suggest that clustering of organic farms can play an important role in income generation of the farmers in Purulia vis-à-vis farmers in Burdwan.

Looking at the differences between the functioning of two groups, the study has made an attempt to provide insights to the policy makers into the challenges and factors leading to a successful organic farming cluster. First of all, evidences suggest that success or failures of the PGS groups can be explained by their compliance with the social governance principles of SSE. Specifically, better functioning of PGS group in Purulia in the SSE shared principles bears a positive impact on long term sustainability of this group. Secondly, long term sustainability of the group is also conditioned upon the interplay of various socio-economic factors (such as economic conditions of the members, traditional agricultural practices, yield and cost of cultivation, subsidy from the government and absence of market premium for organic produce).

The study has also made some policy recommendation for the long term sustainability of the organic clusters. In the design of an appropriate policy on organic farming, selection of crops and targeted farmer households (small farmers' community practicing a low external input based farming) needs priority in accordance with the agro-climatic condition of that particular region. Considering the role of group dynamics for the effective functioning of the groups, Regional Councils (RCs) may be called for regular monitoring of the different aspects of group dynamics (with special emphasis on aspects like participation, democratic decision making, mutual benefit, inclusion of the poor & marginal farmers, meeting livelihood needs and collective action). Besides the role of SSE ecosystem, government measures are required in linking organic producers with the market, implementing price support mechanism, and the provision of other forms of assistances (disbursement of subsidy element, technical assistance on organic operation and certification procedure, supply fertilizers and pesticides) to ensure smoother transition into organic farming.

Appendix

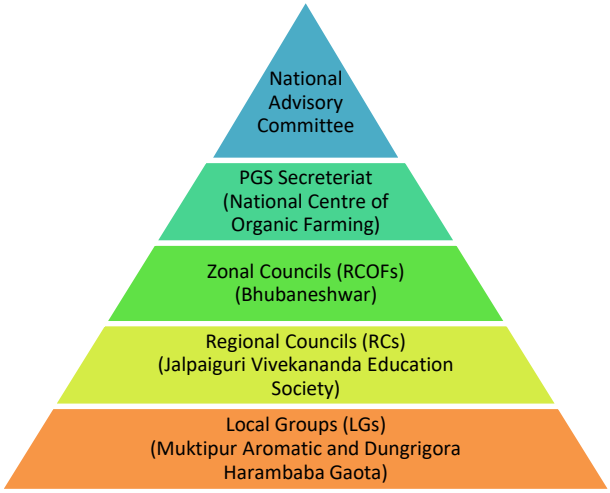

Figure A.1: Schematic operational structure of the PGS groups in our study region[10]

Table A.1: Details of selected PGS Groups

Name of the PGS Groups	Muktipur Aromatic	Dungrigora Harambaba Gaota
Location	Muktipur, Raina I, Burdwan, West Bengal	Khairipihira, Hura, Purulia, West Bengal
Starting year of operation	2015	2015
No. of members	50	42
Regional Council	Jalpaiguri Vivekananda Education Society	Jalpaiguri Vivekananda Education Society
Nature of Regional Council	N.G.O	N.G.O
Zonal Council	Bhubaneshwar	Bhubaneshwar
Scale of operation	50 acres of land	50 acres of land
Activities carried out	Organic farming	Organic farming
Funding opportunity (External and Internal)	Funded from 'Paramparagat Krishi Vikash Yojana' of Govt. of India and members' own sources	Funded from 'Paramparagat Krishi Vikash Yojana' of Govt. of India and members' own sources

[10] For a hierarchical operational structure of PGS India, see NCOF (2015), p.13.

Table A.2: Per capita marketable surplus of farmers in Purulia and Burdwan district

District		Farmers	Per capita production[11][1]	Per capita Requirement[12][2]	Per capita marketable surplus[1-2]
Purulia	Before cluster	Within	464.15	334.8	129.35
		Outside	462	337.48	124.52
	After cluster	Within	431.83	334.8	97.03
		Outside	504	337.48	166.52
Burdwan	Before cluster	Within	827	314.43	512.57
		Outside	823	327.45	495.55
	After cluster	Within	382.67	314.43	68.24
		Outside	810	327.45	482.55

Source: Author's own calculation based on primary survey evidences, 2018-19

Note: All figures in the table indicating quantity of food (in kg.) and Farmers are categorized as within and outside clusters

Table A.3: Total income and cost of cultivation[13] of farmers in Purulia and Burdwan district

Farmers	Purulia				Burdwan			
	Before cluster		After cluster		Before cluster		After cluster	
	Within	Outside	Within	Outside	Within	Outside	Within	Outside
Ploughing & Land Preparation	38	2200	38	2500	2300	2250	2500	2500
Seed Bed	0	280	0	325	330	300	350	375
Seed	544	600	544	675	625	605	0	650
Sowing	76	1500	76	1625	2650	2708	2533	2817
Weeding	0	1500	0	1500	2850	2875	3450	3450
Irrigation	96	0	96	0	2500	2520	2667	2750
Fertilizers	300	750	13	813	2600	2575	2567	2825
Pesticides	104	700	0	750	2000	1950	750	2200
Harvesting & Transportation	470	4950	470	5500	8000	7958	8517	8467
Maintenance	72	125	72	125	290	292	292	350
Total Cost (Rs.) (per acre)	1700	12605	1309	13813	24145	24033	23626	26384
Total Revenue (Rs.) (per acre)	15600	16575	15588	18000	58333	56667	38333	57584
Total Income (per acre)	13900	3970	14279	4187	34188	32634	14707	31200
Total Income (per acre) (incl. subsidy)	13900	3970	15104	4187	34188	32634	15257	31200

Source: Author's own calculation based on primary survey evidences, 2018-19

[11] The production of foods is measured in terms of rice production as the sample farmers were producing rice only.

[12] There is no change in total food requirement as the sample farmers did not report any changes in consumption pattern over the study period.

[13] While calculating cost of cultivation only explicit costs are taken into account.

References

Das, Kasturi. “Towards a Smoother Transition to Organic Farming.”*Economic and Political Weekly* (2007): 2243-2245.

Hellin, Jon, Mark Lundy, and Madelon Meijer. "Farmer organization, collective action and market access in Meso-America." *Food Policy* 34, no. 1 (2009): 16-22.

Kilcher, Lukas. "How organic agriculture contributes to sustainable development." *Journal of Agricultural Research in the Tropics and Subtropics, Supplement* 89 (2007): 31-49.

Lampkin, Nic. "Organic Farming and Agricultural Sustainability." *Agriculture and the Environment: Challenges and conflicts for the new millenium* (1999): 146-154.

Migliorini, Paola, and Alexander Wezel."Converging and diverging principles and practices of organic agriculture regulations and agroecology.A review." *Agronomy for sustainable development* 37, no. 6 (2017): 37-63.https://doi.org/10.1007/s13593-017-0472-4

Naik, Gopal, and VishnuprasadNagadevara."Spatial Clusters in Organic Farming: A Case Study of Pulses Cultivation in Karnataka." *IIM Bangalore* Research Paper, No.316 (2010)

National Centre of Organic Farming. “Participatory Guarantee System for India: Operational Manual for Domestic Certification.” Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India (2015).url:https://pgsindia-ncof.gov.in/pdf_file/PGS-India%20Operational%20Manual.pdf

Pretty, Jules. "Agricultural sustainability: concepts, principles and evidence." *Philosophical Transactions of the Royal Society B: Biological Sciences* 363, no. 1491 (2007): 447-465.

Purkayastha, Rajanita Das. "Social, Economic and Environmental Sustainability as Reflected in a Case of Rural Community in West Bengal, India." In *Quezon city: 5th RIPESS International Meeting of Social Solidarity Economy*(2013):15-18.

Setboonsarng, Sununtar, and Elsbeth E. Gregorio."Achieving sustainable development goals through organic agriculture: empowering women to build the future", ADB South-East Asia working paper series, No. 15, November 2017 (2017).url: https://www.adb.org/sites/default/files/publication/384836/swp-15.pdf

Scialabba, Nadia, and Caroline Hattam, *Organic agriculture, environment and food security*.No. 4. Food & Agriculture Org., 2002.

United Nations Industrial Development Organization.The Role of the Social and Solidarity Economy in Reducing Social Exclusion, Budapest conference report, 2017.url: https://www.unido.org/sites/default/files/files/201712/UNIDO_Budapest_Conference_Report_2017.pdf

Quiñones, Benjamin R. "Are Mental Models Shaping SSE Reality? Conceptualizing, Measuring and Evaluating SSE Performance."UNRISD think piece (2013).url:http://www.unrisd.org/thinkpiece-quinones

Gonin, Michael, J-ChrZuchuat, Nicolas Gachet, and Laurent Houmard."Toward a statistically robust assessment of social and solidarity economy actors.Conceptual development and empirical validation." In *EMESSOCENT Conference Selected Papers*. 2013.url: https://serval.unil.ch/resource/serval:BIB_71FEE763094B.P001/REF

Worthington, Virginia. "Nutritional quality of organic versus conventional fruits, vegetables, and grains." *The Journal of Alternative & Complementary Medicine* 7, no. 2 (2001): 161-173.