

WORKING PAPER

ASSESSMENT OF THE EFFECTIVENESS AND EFFICACY OF SEED VILLAGES IN INDIA

December 2023

The study was commissioned as a collaborative effort between the International Rice Research Institute (IRRI) and the Centre for Research on Innovation and Science Policy (CRISP), as part of the CGIAR Seed Equal Initiative. CGIAR-SEDEQUAL initiative aims to support the delivery of seed of improved, climate-resilient, market-preferred and nutritious varieties of priority crops, embodying a high rate of genetic gain to farmers, ensuring equitable access for women and other disadvantaged groups.

The International Rice Research Institute (IRRI) is an independent, nonprofit, research and educational institute, dedicated to reducing poverty and hunger through rice science; improving the health and welfare of rice farmers and consumers; and protecting the rice-growing environment for future generations.

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Assessment of the effectiveness and efficacy of Seed Villages in India

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ACRONYMS

AEO	Agriculture Extension Officer
AO	Agriculture Officer
ARS	Agriculture Research Station
BGY	Beej Gram Yojana
BPH	Brown Plant Hopper
B.Sc. (Agri.)	Bachelor of Science in Agriculture
DoA & FW	Department of Agriculture and Farmers Welfare
FC	Farmer Club
FGD	Focus Group Discussions
FPO	Farmer Producer Organizations
FPC	Farmer Producer Company
GoI	Government of India
IA	Implementing Agency
ICAR	Indian Council of Agricultural Research
ICAR-IIHR	Indian Council of Agricultural Research-Indian Institute of Horticultural Research
KNM	Kunaram Sannalu
KVK	Krishi Vigyan Kendra
LALL	Live and Let Live
LAMPS	Large-sized Adivasi Multipurpose Societies
MACS	Mutually Aided Cooperative Societies
MoA & FW	Ministry of Agriculture and Farmers Welfare
MOU	Memorandum of Understanding
NABARD	National Bank for Agriculture and Rural Development.
NFSM	National Food Security Mission
NGO	Non-Governmental Organizations
NMAET	National Mission on Agricultural Extension and Technology
NRRI	National Rice Research Institute
NSC	National Seed Corporation
NSKS	Nari 'O' Shishu Kalyan Samitee
OSSOPCA	Odisha State Seed & Organic Products Certification Agency

OSSC	Odisha State Seed Corporation Ltd
OUAT	Odisha University of Agriculture and Technology
PACS	Primary Agricultural Credit Societies
PPP	Public-Private Partnerships
RKVY	Rashtriya Krishi Vikas Yojana
SAP	Situation Actor Process
SAU	State Agricultural University
SDA	State Department of Agriculture
SHG	Self-Help Groups
SMSP	Sub Mission on Seed and Planting Material
SRR	Seed Replacement Rate
SSC	State Seed Corporation
SSCA	State Seed Certifying Agency
SVP	Seed Village Programme

EXECUTIVE SUMMARY

With limited arable land and increasing population, India faces a unique challenge in ensuring food and nutrition security, especially as climate change intensifies. Access to high quality seeds of improved crop varieties is critical for enhancing agricultural production and productivity and ensuring food security. But as access to such quality seeds from the formal sector is limited, many of the smallholder farmers are forced to rely on farmer-saved seeds. The Government of India introduced the Seed Village Programme (SVP) during the early 1960s to enable replacement of existing local varieties and farmer-saved seeds with new high-yielding varieties by empowering local communities to produce and distribute quality seeds. Since then, several other organisations have adopted the SVP and promoted quality seed production.

During 2022-23, as a part of the CGIAR Seed Equal Initiative, the International Rice Research Institute (IRRI) and the Centre for Research on Innovation and Science Policy (CRISP) conducted a study to analyse the effectiveness and efficacy of SVPs. Based on a literature review and fieldwork in Telangana, Tamil Nadu, Odisha, and Karnataka, we identified three distinct models of seed villages for detailed analysis. These include: (1) the ongoing Government of India SVP model implemented through State Departments of Agriculture (SDA) for several years; (2) the National Bank for Agriculture and Rural Development (NABARD) SVP model implemented in Odisha (2008-09 to 2010-2011 and 2011-2012 to 2013-2014) that is known for its lasting positive impact even a decade after programme completion; and (3) the ongoing ICAR-Indian Institute of Horticulture Research (ICAR-IIHR) SVP model, which is notable for its ability to sustain and replicate the model in other states under the institute's purview.

Our objective was to qualitatively assess the effectiveness and efficacy of the SVP models through a comparative case study analysis, and propose policy recommendations to enhance its performance, particularly its ability to provide quality seeds of preferred varieties to women and smallholder farmers.

In the first case, under the Government of India SVP model implemented through the State Departments of Agriculture (SDA), the programme targets clusters of 50-150 primarily responding/willing farmers, with seed supply from the State Seed Corporation. While offering training and subsidies on seeds and storage bins, informal seed exchange is promoted under this model.

In contrast, the SVP in the second case exclusively funded by NABARD and implemented by NGOs in specific districts of Odisha with the support of SDA, operates in clusters with formation of farmer producer organisations, involving small scale farmers. Each cluster covered 30 acres of contiguous land and seed was supplied through the State Seed Corporation. This model emphasizes compulsory seed certification, offers extensive training and financial assistance, and promotes both informal and formal seed marketing through a collective approach.

In the third case, the ICAR-Indian Institute of Horticulture Research (IIHR) implements SVP with farmers identified by it for contract production of seeds of horticultural crops. The institute directly manages seed supply, training, and monitoring with an expert team. A standout feature is its uncompromised emphasis on seed quality. It doesn't provide financial assistance for inputs or post-production expenses but offers a unique 100% buyback system through contracts with farmers who meet the quality standards. This approach ensures farmers a guaranteed income, promoting continuous employment and profitability in farming.

Under diverse operational modalities, the effectiveness and efficacy of the SVP differed significantly across models. While all the SVP models undeniably enhanced farmers' access to quality seeds and their capacities to engage in quality seed production, a notable gap exists in their explicit focus on women. None of the models explicitly target women farmers as beneficiaries of SVP. The NABARD SVP has a focus on engaging smallholders, which was unclear in other models. The ICAR-IIHR model

employs women in skill-oriented activities as women are involved as labour at different stages of seed production in horticultural crops. While all the given models share a common goal of supplying farmers with quality seeds and enhancing their quality seed production capacities, they vary significantly in implementation and effectiveness. Notably, the NABARD-funded SVP has established strong links in the seed supply chain by distributing seeds to farmers, imparting rigorous training for both facilitators and farmers on quality seed production, and providing inputs, seed certification, and market support through FPOs. Among the three models we studied, this model proves to be the most effective and efficacious as it has a commercial objective focused on income-oriented and capacity development activities for smallholders through the formation of FPOs.

Following closely is the ICAR-IIHR model which operates on a contractual mode, ensuring assured income to farmers for producing quality seeds. In this model, farmers are only engaged in the production of quality seeds, and they receive meticulous monitoring and training from ICAR-IIHR experts. However, this model falls short by not providing any direct assistance for covering any expenses incurred by the farmers. The institute is responsible for quality testing and buyback of the seeds for sale. While successful in ensuring an assured income for farmers and empowering them with professional skills in seed production, this contractual approach somewhat withholds farmers from exploring post-harvest activities such as seed processing, marketing and engaging with other actors in the seed value chain, in comparison to the other two models. In Odisha, the SVP implemented by the Odisha State Seed Corporation (OSSC), called

‘Mo Bihana Yojana’, also operates on contract farming approach where OSSC provides seeds to the seed growers and buys back their produce with limited direct assistance for inputs (seeds) or transportation.

Lastly, the SDA-SVP model showed mixed effectiveness and efficacy, lacking full implementation support as was seen in the other two models, except for seed distribution. Despite efforts to promote informal marketing and making seeds available at the village level, inadequate training, weak monitoring, and distribution of certified seeds (instead of foundation seeds in a few cases) have negatively impacted the quality of seed produced. Limited emphasis on the certification process, absence of buyback arrangements for the produce, and lack of post-harvest follow-up have also contributed to the mixed outcome.

This study recommends shifting of SVP implementation from individual farmers to organized groups, such as Farmer Producer Organizations (FPOs) or farmer clubs and SVP to fully cover the cost of quality inputs, infrastructure, training, and marketing. Monitoring and evaluation should be strengthened, encompassing regular quality checks and tracking long-term impacts. The implementation should include buyback arrangements to incentivize seed producers, and coordination among stakeholders should be strengthened to ensure a seamless execution of SVPs. In essence, the SVP transcends its local context to become a transformative solution to India’s food security challenges by significantly improving the quality of farmer-saved seeds and enhancing the smallholder farmer’s access to quality seeds.

INTRODUCTION

Context

The United Nations (UN) Population Fund predicts continuous growth in the global population. By 2030, the world's population is expected to reach approximately 8.5 billion, then to 9.7 billion by 2050, and 10.9 billion by 2100 (UN 2023). This population growth is expected to pose significant challenges for food and nutrition security, particularly due to decrease in available land for cultivation, with the climate change led weather extremes making it even more challenging to meet food security. Therefore, this calls for both technical and institutional innovations that can improve and sustain the productivity of crops.

Amidst these emerging trends, enhancing agricultural productivity is vital for global food security. Enhancing the availability and accessibility of high-quality seeds for farmers especially among smallholders, women, and vulnerable communities serve as a cost-effective approach to enhancing agricultural production without requiring significant land expansion (Suresh 2014; Silva 2018). These seeds, characterized by genetic purity, germinability, vigour, and resistance to pests and diseases, are essential for superior crop quality and overall agricultural productivity (Kumar et al. 2016; Finch-Savage & Bassel 2016; Chauhan et al. 2013). Quality seeds alone contribute to approximately 20% of total crop production, while other crop management practices including timely irrigation, fertilizers, pest and disease control account for 45% (Chauhan et al. 2013).

Promoting high-quality seeds should be a crucial component of broader policies aimed at achieving food and nutritional security. The access to quality seeds by farming communities should be analysed in the context of various seed systems – formal, semi-formal, and informal (Ayenan et al. 2021). While formal seed systems, regulated by the government, have structured processes from seed production to

consumer distribution, semi-formal systems involve farmers' groups and organizations with some independence from formal channels. Informal seed systems among indigenous farmers involve the exchange of native seed varieties without commercial transactions (ibid). Understanding the role of seed quality within these systems becomes crucial in meeting the projected global challenges and ensuring a resilient food supply for the growing global population (Sahu et al. 2020).

The Indian seed sector contributed 4.4% to the global seed market in 2015 and stood as the fifth largest seed market in the world following Brazil with around 6% contribution (Kumar et al. 2018). In 2022, the seed sector in India was worth \$6.3 Billion. Looking ahead to 2028, experts predict that the market will grow to \$12.7 Billion. This means the seed sector is expected to expand at a yearly rate of about 12.43% between 2023 and 2028 (IMARC 2023). With this vibrant development in the Indian seed sector, the seed availability is more than the requirement (Table 1) and there is an increase in the seed replacement rate¹ in the country with respect to the major crops of cereals (39.81% in paddy and 40.30% in wheat), pulses (arhar (pigeonpea) - 48.11%; gram (chickpea) - 37.97%), and oilseeds (groundnut - 80.8%; rapeseed/mustard - 68.03%) (ICAR 2018). The rise in Seed Replacement Rates (SRR) can be largely attributed to a shift in farmers' perspectives, wherein they now view agriculture as a viable business opportunity. This change has been fostered by policy initiatives introduced by the Government of India (Annexure 1) and other development organizations, which places significant emphasis on promoting the production of high-quality seeds. Such policy initiatives collectively aim to enhance the availability and quality of certified seeds, promote high yielding/hybrid varieties, and improve seed production and distribution infrastructure to benefit farmers and boost agricultural productivity in India.

¹ <https://aicrp.icar.gov.in/nsp/enhancement-in-seed-replacement-rate-srr/>

Table 1: Status of quality/certified seeds requirement, availability and distribution in the country for the year 2021-22 (in tons)

Particulars	Requirement	Availability		
		Public	Private	Total
Cereals	25,860	11,155	17,485	28,640
Pulses	3,644	2,333	1,657	3,990
Oilseeds	5,918	2,765	3,334	6,099
Fibre	297	156	174	330
Potato	10,791	155	10,636	10,791
Fodders	27	19	13	32
Grand total	46,536	16,584	33,299	49,883

Source: (DoA&FW 2023)

Despite the increased seed availability (as presented in Table 1), improvement in the SRR in major crops (ICAR 2018) and the efforts to improve the accessibility of good quality seeds through various government initiatives (Annexure 1), studies show that around 80% of the seeds used in total crop production are the ones farmers saved from their previous crops (Seednet 2023; OSSC 2018; Mula et al. 2013; Mandloi et al. 2013). This is mainly because of varied constraints in accessing high-quality seed (Deshpande 2017; Manjunath et al. 2015; Singh & Chand 2011). It has been highlighted that the local seed production and distribution system needs to be strengthened to improve SRR and to enable farmers access better quality seeds (Singh & Agrawal 2018). To address the growing unease in this regard and to upgrade farmer-saved seeds, the Government of India conceptualised the Seed Village Programme (SVP) (Seednet 2023).

Seed Village Programme (SVP)

A seed village is a community where a skilled group of farmers engages in the production of seeds for various crops. They not only meet their own seed requirements but also support fellow farmers within the village and neighbouring villages by providing timely and affordable access to these seeds (TNAU 2016). The SVP has been in implementation since the 1960s under different organizations such as State Departments of Agriculture (SDA), State Agriculture Universities (SAU), Krishi Vigyan Kendras (KVK), Indian Council of Agricultural

Research (ICAR), and others (Bordolui et al. 2020; Khare & Bhale 2016; Sparks 2015; Mandloi 2012; Shanmugasundaram et al. 2010). But the SVP aka Bheej Gram Yojana (SVP/BGY) gained much of its importance and relevance when it began to be implemented under the sub-components of the sub-mission on seeds and planting materials (SMSP) under the National Mission on Agricultural Extension and Technology (NMAET) in the year 2014-2015 and is currently being implemented under the National Food Security Mission (NFSM) since 2018 (MoA&FW 2018).

The implementation status of the Seed Village Programme is given in Annexures 2 and 3. There are 65,732 seed villages formed under the Central Government supported SVP in India, benefitting 3.61 million farmers, with an outlay of \$154.1 million (USD)² (2020-2021). According to data from the Ministry of Agriculture and Farmers Welfare for the year 2018-2019, the total quantity of seeds produced through seed villages was 2.07 million tons (Indiastat 2023). The data claims that nearly half of the quality seed production across all crops in the country was from the seed villages. Perhaps, the seeds produced under the seed villages are not counted in the calculations for the certified/quality seed (Annexure 3), as it is not certified on a mandatory basis under the programme.

Despite the launch of the SVP by the Government of India (GOI) decades ago under various initiatives and pilot projects across

²(USD = 83.26 INR)

several states, not all states are using this scheme efficiently (MoA&FW 2018; NAAS 2018). Furthermore, comprehensive literature on this subject is limited. Most papers (Bhabhor and Makwana 2021; Bordolui 2020; Singh 2018; Joshi et al. 2017; Nongthombam et al. 2015; Mandloi et al. 2012; Rajvendra et al. 2012) focus on detailing the concept, the implementation guidelines, and enumerate the benefits or impacts in terms of farmers' knowledge, attitudes, and perceptions, without delving into a more nuanced analysis of implementation challenges. In this study, our primary objective was to assess the effectiveness of SVP among farmers, including smallholders and women, by exploring the process and activities proposed within the broader framework outlined in the SVP's guidelines. Through an in-depth qualitative case study analysis, we aim to realize its efficacy and generate informed policy recommendations for effective implementation of SVP.

METHODOLOGY

The study adopted an exploratory research design to understand the efficacy of SVP in India. Based on the literature review, the key stakeholders involved in the SVP – as implemented by SDA – were identified and mapped. Initially the study was planned for the state of Odisha, to gain a preliminary understanding of the SVP implemented by SDA. We started the study by exploring the programme's status in Odisha, a state with 304 seed villages benefitting 31,120 farmers in 2019-20. (Annexure 2). We realised that at present Odisha State is not implementing SVP of SDA as a distinct programme on its own. Rather the SVP is merged under Moh Bihana Yojana implemented by the Odisha State Seed Corporation Ltd. (OSSC). However, some of the key informants informed us about the SVP implemented during 2008-09 and 2011-2012 in Odisha supported by the National Bank for Agriculture and Rural Development (NABARD). Further, we found that the SDA model of implementation is followed in Telangana, Karnataka and Tamil Nadu states through key informant interviews, albeit in different modes of implementation. For example, Tamil Nadu State government has two SVPs currently; one supported by the Central Government

and another supported by the World Bank. In Karnataka, like the situation in Odisha, the SVP was merged with the activities of the Karnataka State Seed corporation Ltd. (KSSC). We also found that the ICAR-Indian Institute of Horticulture Research (IIHR) based at Bengaluru is implementing a Seed Village Programme in Karnataka.

The results from the initial exploratory analysis revealed that several SVP models were being implemented by different formal institutions. To better understand the varied SVP models and their process of implementation and implementation challenges, case studies were carefully planned. The unit of analysis for all the cases is the SVP. Given the different implementation models in the states of Odisha, Karnataka, Telangana, and Tamil Nadu, three comparative cases were selected: 1) the ongoing Government of India SVP model implemented through State Departments of Agriculture (SDA) since several years; 2) the National Bank for Agriculture and Rural Development (NABARD) SVP model (2008-09 to 2011-12), implemented in Odisha known for its lasting positive impact even a decade after programme completion; and 3) the ongoing ICAR-Indian Institute of Horticulture Research (ICAR-IIHR) model, notable for its ability to sustain the contractual seed village concept model and replicate it in other states under the institute's purview.

The cases focused on the following overarching question: *"How does the SVP align with the needs of the farmers including smallholders, and women while meeting its defined objectives?"* While answering this question, we also made efforts to assess what works and what does not under different SVP models and drew lessons from the cases to facilitate successful scaling. Data was collected through Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) organised with the varied stakeholders associated with the programme from both implementing agency and farmer's side. The key informants were identified through a snowball method. Semi-structured in-person interviews were conducted following a draft interview guide specifically developed for the study. FGDs were conducted with the participants of the programme to

explore in detail the status of programme implementation, people's perception of the programme, challenges experienced, and programme utility.

The case study analysis involved acquiring insights into the SVP by gathering evidence from primary and secondary sources. Primary data were collected through in-depth discussions with respective stakeholders associated with the SVP and also through field observations. Secondary data were collected through literature review.

The Situation-Actor-Process (S-A-P) framework (Sushil 2000) was employed for the data analysis adopting the interpretative matrix (Yin 2009). The matrix serves to visually represent the nuanced interpretation of relationships among the identified actors and actions within the study. In each case study, the initial focus was on scrutinizing programme evolution and actor-process connections, achieved by constructing interpretative matrices based on the S-A-P framework. The analysis helped to explore the challenges linked to planning and implementation of the SVP. Drawing from the collective discussion of all three cases, the key learning points were identified, and actions were proposed to enhance effectiveness and efficacy of the SVP. Though in the policy literature, the two terms 'effectiveness' and 'efficacy' are used synonymously, in this case we make a slight distinction between them. Effectiveness of a program/policy is a measure of the extent to which the interventions lead to the desired impact and changes. Efficacy, on the other hand, is a much broader conceptualization consisting of the relevance of the objectives compared with the needs of farmers, and the possession of a quality/skill that gives the produced results the potential to lead to an effective outcome (Schünemann et al. 2023).

CASE STUDIES OF SVP

This section presents three distinct models of the SVP implemented in India. The first case study examined the GoI- supported SVP, which is implemented through the State Departments of Agriculture, covering most states in the country. A pilot field study was conducted initially to uncover the current status, operational gaps, and strategies. The study underscores the necessity of collaboration among stakeholders, capacity development, as well as the follow-up actions required to establish a robust decentralized seed production system.

The second case study examined the SVP implemented in Odisha by NABARD. In contrast to the first case, this approach involved collaboration with non-governmental organizations selected for specific districts. The primary objective remains empowering smallholding farmers for quality seed production, but with a different operational strategy.

In the third case study, we examined the SVP carried out by the ICAR-Indian Institute of Horticulture Research (IIHR) in Bengaluru, Karnataka. This programme focuses on promoting individual farmers as seed producers for the varieties developed by ICAR-IIHR. The study explores the strategic process and identifies key issues that must be addressed to establish effective quality seed production through the seed villages.

Before understanding the situation, actor's role and process of each case, let's get an overview of models based on their guidelines under the three institutional frameworks (Table 2).

Table 2: Overview of SVP guidelines under three institutional frameworks

Aspect	SDA	NABARD	ICAR-IIHR
Authorizing authority	State Government	NABARD	ICAR-IIHR
Year of implementation	2014-2015	2008-2009 to 2010-2011; 2011-2012 to 2013-2014.	2009-2010

Implementing agency (IA)	State Department of Agriculture and any other formal institutes authorized by the state government	Non-governmental organisations (NGOs)	ICAR-IIHR
Funding pattern	Central-State: 60:40	100% NABARD	100% ICAR-IIHR
Selection of area for seed production	State Government & Implementing agency (IA)	NGOs identify, NABARD and SDA approve	ICAR-IIHR and farmers
Crop/Variety selection	Crop selection: IA decides together with a panel of state government experts Crop variety selection: IA decides in consultation with farmers of seed villages	NABARD & Department of Agriculture at district level	ICAR-IIHR with panel of experts involving State Seed Certifying Agency (SSCA)
Selection of farmers	IA in consultation with SDA	NGOs	ICAR-IIHR
Participants	Interested and willing farmers (not limited to any specific category of farmers)	Smallholding farmers having banking facility	Custodian (contract) farmers of ICAR-IIHR
Approach	Cluster/Compact area	Cluster	Cluster
Number of farmers per cluster	50-150	Farmers covered under 30 acres contiguous land, no prescribed specification on number of farmers	Varies with market demand for ICAR-IIHR varieties/hybrids
Source of quality seed supply	State Seed Corporation (SSC) to IA	SSC to NGO	ICAR-IIHR to farmers
Kind of seed distributed for multiplication	Foundation/Certified	Foundation	Breeder/Foundation seeds and planting materials of vegetables, fruits, flowers and medicinal crops
Land requirement	0.5-1 acre per farmer	30 acres of continuous land	0.5-1 acre per farmer
Years of support to farmers	Two years	Three years	One crop duration; MoU to be renewed after every crop season
Training	Three one-day trainings provided by IA: One at the time of sowing of seed crop; Second one during flower initiation stage; Third one after harvest and at the time of seed processing.	Before programme implementation, training related to quality seed production is provided for IA on campus at research stations and KVKs. Frequent on-campus and off-campus trainings are provided by IA to the farmers/FPOs in farmers' fields and villages.	Frequent on- and off-campus trainings for farmers and interaction with IIHR scientists

Assistance	Training: INR 15,000 (180.15 USD) ³ given to IA to conduct three trainings; Subsidy on seed cost per acre per farmer: 50% for cereal; 60% for pulses, oilseeds, green manure & fodder crops. Seed treating drums: INR 3500 (approx. \$42.04) per drum of 20 kg capacity and INR 5000 (approx. \$60.09) per drum of 40 kg capacity. Storage bins (one allowed per farmer): SC/ST farmers - @ 33% for 1 ton and 2 ton (subject to maximum of INR 1500 [\$18.02] or INR 3000 [\$36.04]; General farmers - @25% for 1 ton and 2 ton (subject to maximum of INR 1000 [\$12] or INR 2000 [\$24.01]).	Training: 100% expenses covered; Input cost: 50% cost on seeds, fertilizers are covered; Post-production expenses: 100% covered from NABARD.	All costs incurred by farmers, no assistance is given on any inputs or post-production expenses. Seeds are supplied by ICAR-IIHR on cost basis without any subsidy. Only technical support and trainings are provided free of cost for the farmers.
Monitoring	Seeds Division of the Department of Agriculture and Farmers Welfare monitors via quarterly reports shared by the SDA	NABARD, SDA, SSCA does quarterly and fortnightly monitoring; NGO does regular field monitoring	Frequent field monitoring from ICAR-IIHR experts and field technical team
Seed processing and storage	Other than the information about seed processing in one of the trainings and assistance on the provision of seed storage bin, no explicit mention about processing and storage is given.	FPOs collectively procure, process and store the seed with the facilitation of NGOs	ICAR-IIHR does processing and storage of seeds procured from farmers
Regulatory framework	Limited/no emphasis on seed certification	Mandatory to get the seed certified by the State Seed Certifying Agency (SSCA) for the FPO members who produce quality seeds for market	Seeds produced by farmers are subjected to quality testing (purity and germination test) by IIHR for assured payment
Seed marketing	Informal seed exchange/marketing is promoted	Both informal and formal marketing is promoted within the district and state	100% buyback by ICAR-IIHR

More details related to the current situation, actors involved, and processes adopted by each SVP Model is discussed below. This information is intended to enhance comprehension and clarity on models. Assessment of the SVP's condition is based on field observations and interviews with key informants in the states of Telangana, Tamil Nadu, Karnataka and Odisha.

CASE STUDY 1: SDA IMPLEMENTED SVP (Model 1)

Since 2014-15 the Government of India has been implementing the SVP across the country under SMSP of NMAET. Under this model, the SDA acts as the nodal agency responsible for programme implementation. Within

³(USD = 83.26 INR)

the state, SDA decides on the selection of crops and varieties for seed distribution and the approval of agencies to implement the programme. According to SDA officials, the primary objective of the SVP is to impart seed production skills to farmers, enabling them to produce high-quality seeds, and complement the formal seed system. The aim is to enhance the quality of farm-saved seeds by promoting quality seed production at the village level. Both Implementing Agencies (IA) and farmers are required to adhere to the programme guidelines set by the Government of India. However, there have been instances where the IAs have struggled to strictly adhere to these guidelines. During discussions with one of the

key officers of the IA, it was mentioned that the rigid guidelines regarding limited area selection, subsidy on seed cost, limited seed distribution per farmer, number of storage bins to be distributed, have at times, hindered the programme from meeting its expected outcomes.

The planning for programme implementation is carried out by the SDA involving key actors, such as Directors of SSC, Regional Managers of the National Seed Corporation (NSC), and experts from SAUs at the state level. These stakeholders collaborate to determine various aspects of the programme (Figure 1).

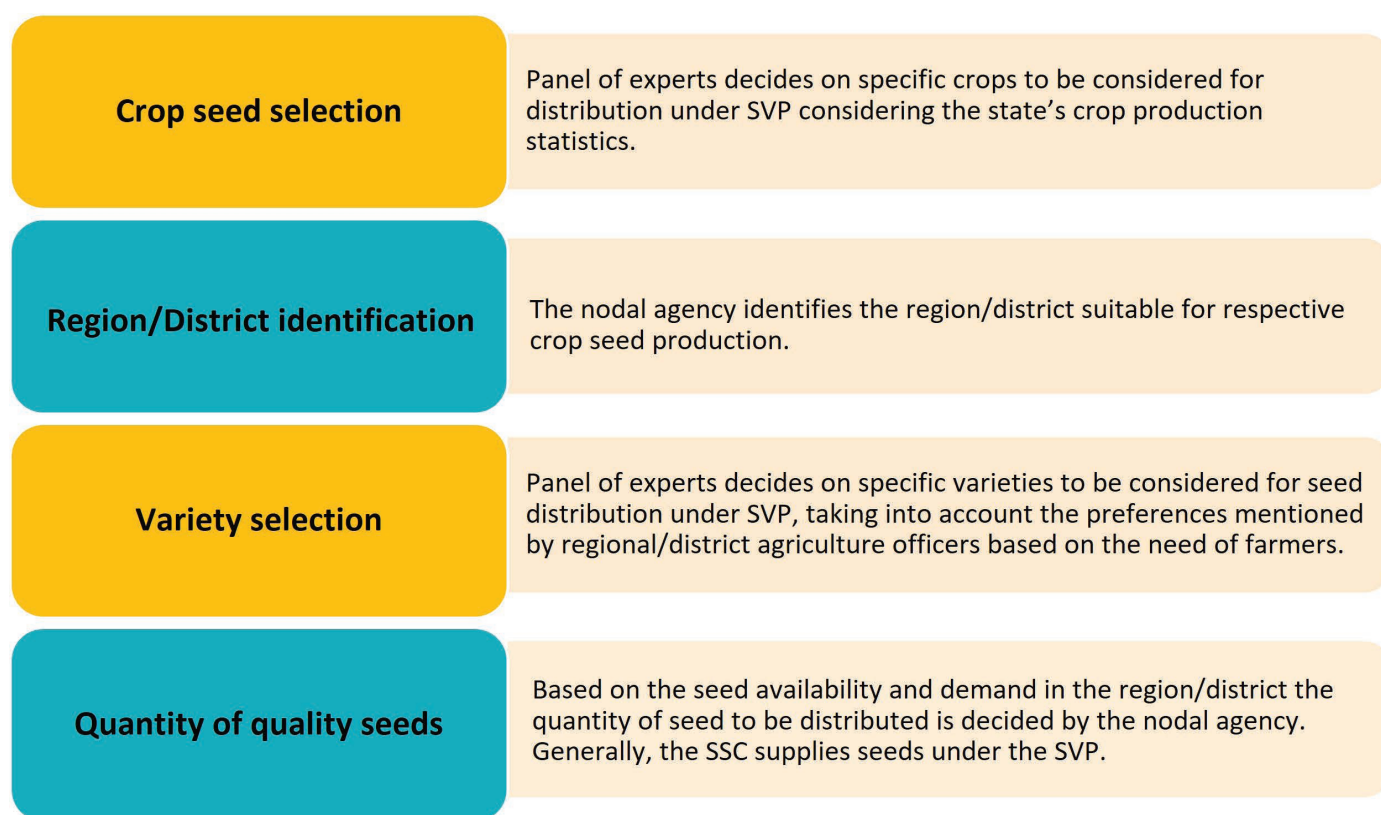


Figure 1: Components of model 1 decided by nodal agency

As presented in Table 2, a seed village extends beyond a single village; it represents a cluster of villages where interested farmers – typically numbering between 50 to 150 – engage in the production of quality seeds of the same crop. Agricultural officers from the respective block/taluk/mandal provide guidance throughout this process. However, the approach to forming these seed villages varies across states. In Telangana and Tamil Nadu, a cluster approach is adopted where 50-150 farmers are mobilized from a village or from 3-4 neighbouring villages to form a cluster, and seeds are distributed to

them to undertake quality seed production. In contrast, Odisha adopts a compact approach due to the region's topography where a specific group of farmers (50-150) whose lands are contiguous are identified and encouraged to collectively engage in quality seed production under SVP. However, the officials in the state indicated that this requirement is adversely affecting the programme's success. The challenges include the absence of favourable conditions for growers, such as the lack of a buyback arrangement, limited land area (limited to one acre), and limited foundation

seed supply. Convincing farmers to register for the programme was difficult due to the limited benefits offered to them in return. Moreover, despite the Central Government's 60% share in the SVP (with 40% at the state level), the returns in terms of quality seed production from the farmers were limited. There was also a restricted support duration of only two years for registered beneficiaries. The limited seed produced by farmers was not either certified or truthfully labelled for marketing purposes. Additionally, the assistance provided to farmers fell short of expectations, where there was delay in seed supply, and subsidy was only 50% on seed cost, with no assistance on any other inputs.

The challenges encountered were not unique to Odisha alone; as KIIs with others involved in SVP implementation in Telangana and Tamil Nadu have also shared about similar challenges. In Tamil Nadu, no funds are released for the IA to support training and purchasing seed storage bins for the last

seven years. The programme has to some extent transitioned into a seed distribution initiative rather than a comprehensive SVP adhering to the programme guidelines. In the case of Telangana, the IA expressed that convincing farmers to get registered under the programme was a major challenge due to no buyback arrangement for their produce, limited quantity of input support to farmers, and poor monitoring of farmers' fields at critical crop stages by experts (beyond Agriculture Officer [AO] or Agriculture Extension Officer [AEOs]).

Despite these challenges, shortly we found that the states of Telangana and Tamil Nadu are implementing the SVP under SDA and there have been some instances of success in Telangana state, whereas in Odisha the programme couldn't be continued through SDA and it is being implemented through the Odisha State Seed Corporation Ltd (OSSC), under the name 'Mo Bihan Yojana' (see Box 1) under their regular mandated activities.

Box 1: Mo Bihana Yojana - OSSC

The Odisha State Seeds Corporation Ltd (OSSC) is currently involved in the implementation of the Seed Village Programme, which is known as 'Mo Bihana Yojana'. This programme aims to produce certified paddy and non-paddy seeds through collaboration with seed growers. As OSSC has been involved in seed production for years, they have a regular list of seed growers who continuously enter into Memorandums of Understanding (MoUs) with OSSC to produce and supply quality seeds to OSSC.

They select the farmers from the available seed growers list. On average around 5-10% addition or exclusion of seed growers happens from the list based on their conduct with regard to the MoU (anecdotal evidence). The farmer produces the seeds following the guidelines given in the MoU based on the standard procedures of quality seed production under the monitoring of OSSC and OSSOPCA. OSSC procures the seeds produced by the concerned seed growers. In addition to procuring seeds from these growers under the SVP, OSSC also sources certified seeds from various entities, including Government Farms, Odisha University of Agriculture and Technology (OUAT), MOU farms, National Seeds Corporation, and other National or State-level Seeds Corporations. These certified seeds encompass different varieties of paddy, pulses, oilseeds, and more. To ensure that farmers have access to high-quality seeds, these certified seeds are made available to the farmers of the state through authorized private dealers of OSSC, as well as by Primary Agricultural Credit Societies (PACS) and Large-sized Adivasi Multipurpose Societies (LAMPS). This distribution is facilitated through the Direct Benefit Transfer (DBT) system, which was implemented by the Government of Odisha starting from the kharif season of 2016 (OSSC 2021).

We observed two sub cases in Telangana State, one involving individual farmers who were beneficiaries of the SVP, and the other involving individual farmers who formed Farmer Producer Organizations (FPOs) during the SVP process. It's worth noting that the guidelines of the SVP remained the same in both cases. However, the impact of the SVP differed for

individual farmers and farmer groups that had formed into FPOs. This examination seeks to shed light on the distinctions between the two scenarios, identify commonalities that were present in both situations, and assess the overall effectiveness of the programme in achieving its objectives among the participating farmers.

Sub case 1: SVP implementation with individual farmers

Implementation

During 2017-18, an Agriculture Officer in Khammam district, Telangana state, formed around 10 clusters under SVP. Each cluster comprised 25-30 farmers identified from 4-5 neighboring villages within the mandal, who had interest and willingness to participate in the programme. There was no specific focus on gender or vulnerable groups in the selection process. Each cluster had 25 acres of land, with each farmer holding one acre for cultivation. The selected farmlands of one acre were situated near to roads and had access to irrigation facilities. As part of the programme, initially the SVP farmers were provided with foundation seeds of paddy, specifically the BPT 5204 variety. Each farmer received one bag of seeds, weighing 30 kg, with a 50% subsidy on the cost of seeds.

The programme included two formal training sessions, covering the entire crop cycle from sowing to harvesting. The Agriculture Officer and team closely monitored the fields throughout the various stages of crop growth. However, the seeds produced by SVP farmers failed to meet the necessary quality standards for seed certification. As a result, the seeds did not pass the seed certification stage and were deemed unsuitable for the regular seed market. During the interview the major reasons listed by the respondents for rejection were: poor crop maintenance during production, pest attack, and provision of certified seeds instead of foundation seeds during the times when foundation seeds were unavailable. When the seeds couldn't meet the standards required for formal marketing, the SVP farmers were encouraged to sell the seeds informally within their own and neighbouring villages, making them available to farmers in need, as indicated by the agriculture officer responsible for implementing the programme.

Farmers' perspectives

The farmers of the SVP recalled their participation during the 2017-2018 season. During this period, they received 30 kg of paddy foundation seeds, specifically the BPT 5204 variety, provided to them once. The SVP

farmers went through demonstrations on various aspects of seed treatment, spacing, and roguing both before and during crop production. The programme also featured regular visits from an Agriculture Extension Officer (AEO) who offered guidance on maintaining the crop at critical stages so as to ensure quality seed production. As a result, they experienced higher yields, typically 5-10 kgs more than their usual harvest. Throughout the cultivation process, agriculture officers provided support until harvesting. Due to their consistent guidance, the SVP farmers successfully marketed their seeds within their network of farmer friends and neighbouring villages though they failed to get their seeds certified and marketed in formal markets. Initially, the seeds produced by the SVP farmers were in high demand locally, allowing them to get good prices for their produce. Even the farmers who used the seeds produced under the programme expressed satisfaction with the quality of the seeds.

For instance, a farmer says, (FGD1),

"I took up seed production under the programme and obtained a yield of 21 quintals per acre, whereas earlier, when I used seeds from the market for cultivation, I used to get 15-16 quintals per acre. I sold it informally among my relatives, my own village, and neighbouring villages. I did not give it away for free; instead, I charged INR 1500 for a 70 kg bag of seeds."

The farmers who participated in the SVP reported significant benefits when selling the quality seeds, they produced. They realized that the prices they received for these quality seeds were almost 30% higher than what they typically earned by selling their produce in the regular market (non-seed production). Based on the responses from the interviewees, it became apparent that the production and sale of quality seeds in the informal network continued for approximately 4-5 years, lasting until 2021 from the initial programme implementation period.

Farmers emphasize that key factors for successful paddy seed production include proper seed treatment, careful management during sowing and transplanting, maintaining

appropriate isolation distances, and providing adequate/proper storage for the harvested produce. While farmers are aware of these practices, they sometimes neglect them due to the additional work and attention required for seed production. This neglect can lead to the production of poor-quality seeds and reduced yields. Therefore, it is essential not to overlook any best practices associated with seed production and storage to ensure success.

After the SVP implementation by SDA

During the COVID-19 pandemic, this informal seed exchange system proved to be highly effective. Farmers could sell their seeds to other farmers through local fertilizer shops, making it an access point for quality seeds during COVID times. This kind of selling became a point of pride for farmers. Additionally, SVP farmers took on the role of training and educating fellow farmers in the village about quality seed production.

Once recognized as a seed village in the mandal, private companies began approaching these seed village farmers for paddy seed production. Farmers and companies entered into MoUs in which a fixed price was assured for farmers. The farmers' role was to produce the crop according to the company's requirements and guidance. The company took care of the harvesting and packaging process, utilizing their own labourers. Payment to the farmers was made within a period ranging from one week to 15 days, effectively eliminating the risks associated with finding a market and transportation. As beneficiaries of the SVP, these farmers gained recognition as seed producers and are now involved in producing paddy and cotton seeds for private companies during the season. Training in cotton seed production has also been provided to the farmers by the private company.

Issues experienced by individual farmers

Quality and quantity of seed supply:

Although farmers are interested in producing quality seeds, the distribution of certified seeds at times, rather than foundation seeds, resulted in deterioration of seed quality and yield levels over a period of time.

"I have received seeds under the SVP programme for two seasons. However, they

used to provide only one bag of 25 kg seeds per acre. In one of the seasons, they gave certified seeds. Using the certified seeds, the quality of seeds I could produce was not appreciable, and the quantity of seeds given was limited to just one bag. The yield was also poor over a period, and I couldn't take the seeds to the market or sell them among my neighbours/ friends due to their low quality. This disheartened my expectations regarding the programme". (FGD1)

Seed availability and accessibility: Even with the supply of foundation seeds under SVP, there were issues related to seed availability to sustain the quality seed production activity.

"The seeds we saved from SVP served our purpose for 4-5 years. Later, their viability decreased, and yields were also low. This led us to a challenge of obtaining quality seeds from the market. In the market, we faced issues with getting quality seeds for seed production; instead, we found only commercially branded seeds that can be used for one or two crop seasons. The availability of quality seeds is a significant issue." (FGD1)

Reliance on local input dealers: During the programme, for almost 3-4 years, the SVP beneficiaries were able to produce seeds and sell them among themselves. However, when the quality of seeds reduced, they had to rely on local input dealers for seeds.

"As an individual farmer, I had an interest in quality seed production, and I produced paddy seeds under SVP. However, after 4-5 years, the seeds produced by me started to decline in quality. I had to rely on external sources for seeds again because foundation seeds were not available. I had to obtain seeds from nearby input dealers because the Department of Agriculture had no quality seeds available. Even with certified seeds, I can hardly rely on them for a year or two, and the seeds available in the market also lack the quality needed for complete seed production." (FGD1)

No market assurance/buyback: As per the guidelines of the SVP, there is no buyback of farmer produce. This is the major hurdle preventing many beneficiaries from getting enrolled under the programme, especially small and marginal farmers.

No monitored storage facility: Though there is provision under the guidelines to facilitate the beneficiaries with storage bins, it is observed that it was not diligently taken care of.

“Agriculture officers supported us until harvest, but after processing when our produce failed to get certification, we struggled to find a good market. Nobody would easily trust the quality of our produce, making it difficult for us to access the local market, which posed a significant challenge. Poor storage facilities at the individual level led to spoilage of stored produce. Support for marketing or an assured market will certainly encourage more farmers to join the programme.” (FGD1)

Trust and survival of farmers in the seed market: The seeds produced by farmers are not trusted by any buyers with regard to quality. The acceptance rate for the seeds produced by individual farmers under the programme was only for 70-80% of the produce and not 100%. So, it is a challenge to identify a reliable market for individual farmers. Even if the seeds get certified, it is challenging for a farmer alone to enter the seed market. This is because farmers’ varietal preferences change over time, and competitive private

markets introduce new varieties every year, claiming their new varieties yield better than the prevailing ones. Or, in other words, the varietal selection for cultivation is purely the decision of the farmer, which is dynamic in nature.

Sub case 2: SVP implementation in a farmer’s group

Implementation

During the 2016-2017 crop season, the AO of Chinnapendyala mandal in Warangal district of Telangana state identified 10 farmers from Rajavaram village interested in producing quality paddy seeds. They registered under the SVP and were provided with foundation seeds of Kunaram Sannalu (KNM 118) variety, with each farmer receiving one bag (25 kg) per acre. The seeds were subsidized, with farmers paying only half the amount, which was INR 600. The AO closely monitored the fields to ensure quality seed production. Unfortunately, out of the ten farmers, only three succeeded due to various challenges faced during the process, including poor seed quality received from the government, field infestation with brown plant hopper (BPH), and poor quality of seeds produced.

Box 2: Reasons for individual farmers failure in SVP

- Initially, when the seeds provided by the department failed to germinate, the agriculture officer received complaints from farmers. Subsequently, another batch of foundation seeds was provided resulting in better germination. However, the delay in obtaining the new batch of seeds led to lower yields than expected. Despite this, since the seeds supplied were foundation seeds, the quality of the produce remained good, and the yield quantity was almost the same as usual.
- One farmer experienced severe crop infestation by brown plant hopper (BPH), compounded by untimely rainfall, resulting in nearly 80% crop loss. While this was a natural event, the farmer did not receive any compensation or crop insurance under the programme.
- The seeds produced by the farmers did not meet certification standards and were of poor quality, preventing them from selling the seeds in the market independently.

To address these challenges and raise awareness about quality seed production, the farmers formed a farmer producer company (FPC) with the support of NABARD. In 2017, they established the FPC, naming it

Rajavaram Farmer Producer Company. The FPC was registered under the Mutually Aided Cooperative Societies (MACS) Act, 1995, with the objective of establishing a local seed market.

Box 3: Rajavaram Farmer Producer Company Limited

The FPC began with 10 members, all of whom were beneficiaries of SVP, and each member initially contributed INR 200 to establish the group. Subsequently, they continued making monthly deposits of INR 500 per member. Currently, the FPC has an annual turnover ranging from INR 6 to 7 lakhs (600,000 to 700,000). Over time, the FPC’s membership has grown, and they currently have 500 members. To expand their network, the FPC adopted a chain system. They have 10 members on the board of directors

with three women among them, and each board member is responsible for introducing another nine members to the FPC, with the same pattern extending to these new members. For every ten members, there is one head. Initially, the company was focused on seed production and marketing, but it later expanded its operations. With the assistance of NABARD, it established a fertilizer shop, initiated tailoring services for women, and ventured into pulse processing mills. Additionally, they have a proposal for the installation of a paddy processing unit.

With the FPC formation, the farmers of FPC were given 25 bags of foundation seeds initially, with each bag weighing 25 kgs. The FPC independently selected 25 farmer members who are reliable and capable in producing quality seeds for the company. The company purchased the seeds produced by its members, had them processed at a nearby facility and sold them within and around the village under the brand name 'Rajavaram Farmer Producer Company'. This brand name became synonymous with quality seed production and marketing, and this process continued for nearly five years. SVP provided support to the FPC only once. After SVP's support ended, the FPC began sourcing breeder seeds from the Agriculture Research Station (ARS) in Warangal. They multiplied these seeds, processed, certified them, and sold them through the FPC to meet the demand for quality paddy seeds from farmers in their mandal. However, the FPC was unable to sustain its seed production activity due to difficulties in obtaining quality seeds, whether foundation or breeder. This situation prompted them to diversify their activities.

Presently, they are not engaged in seed production per se. Instead, they are selling seeds sourced from private companies through their fertilizer/input shop under the FPC.

Farmers' perspectives

Need for Foundation Seeds: The farmers of FPC emphasized that those participating in any quality seed production programme should have access to breeder or foundation seeds from the government for 4-5 years. This would enable them to engage in seed production effectively for 3-4 years, either individually or as groups. By providing foundation seeds to groups, quality seed can be produced and made available in the local market under the group's name.

Support and Trainings by Agriculture Officer (AO): During the FPC formation, the

AO organized training sessions for farmers covering various farm technologies and conducted regular field monitoring and evaluation. In addition to SVP components, the AO facilitated a paddy harvester on rent basis from the nearby village and collaborations were established between the FPCs, NABARD, Agriculture Research stations, SAUs and other farmer groups within and neighbouring villages. The AO also facilitated the FPCs in obtaining seed certification licenses for seed production and marketing. This kind of support significantly contributed to enhancing the farmers' skills in scientific seed production and the sustainability of their institutions.

The two cases presented above underscore the pivotal role played by Mandal AO/AEOs in executing the processes outlined in the SVP guidelines, as illustrated in Figure 2. Beyond the pivotal role played by the AO, several other actors also contributed to the success of the initiative (Table 3). Some of these processes have proven ineffective in achieving their intended goals, leading to sub-optimal performance among beneficiaries. Successful programme implementation within such stringent guidelines demands a combination of technological expertise and management capabilities from the relevant implementing agencies in the field.

Issues faced by the FPC farmers

The FPC faced difficulties when the foundation seeds became old, leading to a decrease in seed purity and quality resulting in reduced yields over time, and the FPC could no longer effectively produce, process, and sell these seeds.

A farmer (FGD 2) shared his experience thus:

"I received foundation seeds, followed the AO's guidance, and achieved a good yield during the initial days of SVP. I obtained the seeds at a subsidised rate and I continued seed production for two years, covering four

seasons. I sold the seeds only to our FPC and also conserved some seeds for the next season, sharing some of it with my relatives. I didn't purchase any seeds from the market for those two to three years. However, in later years I had to buy seeds from the input/fertilizer shop of our FPC due to a decline in yield from the conserved seeds."

Information gap on sources of quality seeds:

During the discussion, it became evident that there was an information gap regarding the availability of quality seed sources. The FPC members were willing to produce and sell quality seeds, but due to this information gap, the FPC opted to partner with private companies to sell their certified seeds instead of producing it themselves.

Lack of follow-up and ongoing support:

Once the two-year programme period was completed, there were no follow-up visits or

continued support from the government. This led the farmers to ponder over continuing quality seed production, which consumed lot more of their time and energy, with no certainty about the market for their produce.

Intervention of other government

agricultural schemes: When farmers do not perceive significant benefits from such programmes, they seek out alternative opportunities for growth. The presence of other government schemes targeted at farmers can lead to deviation and confusion among farmers. For example, the ongoing mini kit seed programme for various paddy varieties and the Telangana State Oil Palm Mission, both implemented in Telangana with substantial subsidy benefits. Such other developmental programmes implementation at the same period influences farmers to shift from seed production activities.

Table 3: Key processes and actors' interplay in model 1

Process	Actors	Remarks
Submission of proposal from Implementing Agency (IA)	State Department of Agriculture, Central Department of Agriculture and Farmers Welfare	Proposals submitted two months before the sowing season, discussed at zonal seed review meetings, and approved at the central level for implementation of the programme.
Identification of IA	SDA (Nodal agency)	Ensure demarcation of project areas, prevent overlap with similar programmes, and avoid fund misappropriation.
Identification of area/locality for SVP	Nodal agency and IA	Panel formed by nodal agency for area confirmation.
Seed supply	IAs and State Seed Corporations	50% subsidy on seed cost
Identification of farmers and formation of clusters	IAs, mainly AOs/AEOs	Farmer awareness created through village visits, gram sabhas, and panchayat meetings; No exclusive focus on women or any vulnerable communities.
Training on seed production and seed technology	AO/AEOs	IA officers provide training three times during various crop stages. Convergence with experts lacking during training.
Supply of storage bins	IAs	Insufficient storage capacity often overlooked at field level (only 1 bin per farmer).
Monitoring of the scheme	IA and Seed certification officers	Weak monitoring and follow-up, need more rigorous oversight and correction of unscientific farmer practices.

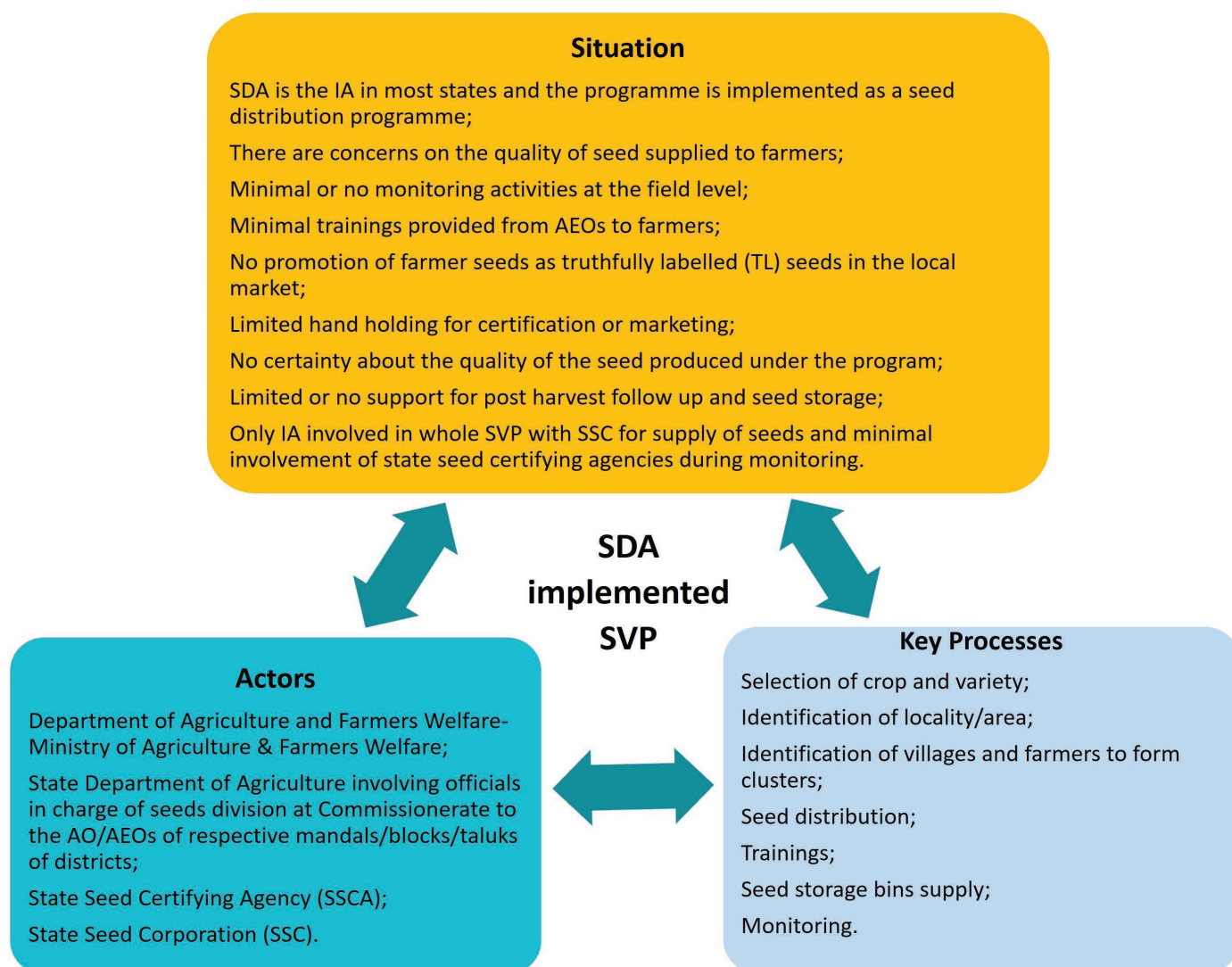


Figure 2: Situation-actor-process interplay of model 1

Effectiveness and efficacy of SDA implemented SVP

The SVP of SDA appears to have mixed effectiveness and efficacy, with varying outcomes for individual farmers and those who formed Farmer Producer Companies (FPCs). Table 4 presents the effectiveness of SVP when it is implemented at individual farmers' and at FPC level by SDA.

Table 4: Effectiveness of SVP in model 1

Parameters	Individual farmer	Farmer group/FPC	Remarks
Seed Quality Improvement	↑	↑	The quality of farm-saved seeds increased in both cases reflecting the enhanced effectiveness of the programme. But the impact lasted only for a short time, till the seeds conserved by the farmers from SVP lost its viability. Due to lack of reliable access to foundation seeds the farmers had to rely on input dealers for certified seeds.
Training Impact	—	↑	Under the FPC case, master trainers have emerged where the farmers took on the role of training and educating fellow farmers in FPC about quality seed production. But this is not the case when the SVP was implemented at individual farmer level, where only one to two trainings were conducted by the AO alone.

Market Access	↑	↑	Informal markets are formed.
Private Sector Engagement	↑	↑	Private sector seed companies approached a few of the individual farmers for quality seed production by entering into MoUs with farmers after the programme. At FPC level, the FPO collaborated with private dealers to procure and sell quality seeds.
Diversification in livelihood activities	—	↑	The FPCs started fertilizer shops, tailoring services, pulse processing mills, etc., to generate extra income in addition to quality seed production activity. However, this is not the case with individual farmers who are engaged in SVP.
Networking	—	↑	Networking among farmers got strengthened in both cases. But the FPCs have established a strong network with SDA and seed production agencies under both private and public sectors.
— : Neutral; ↑ : Increase			

The effectiveness of the SVP implemented by SDA in improving seed quality is limited especially due to lack of continued supply of foundation seeds and challenges in meeting the certification standards. However, the programme was effective in creating informal seed markets within the villages, which is the main purpose of the programme, and this helped farmers to deal with seed supply during situations such as the COVID-19 pandemic. The efficacy of the programme was more pronounced when farmers formed FPCs. The support provided by the agricultural officer to set up the FPC led to significant improvements in market access, diversification of activities, and sustainability of seed production efforts. The FPO was able to establish a brand name and engage with private companies, demonstrating a higher level of programme efficacy. This suggests that the programme's effectiveness is enhanced when it encourages and supports the formation of organized farmer groups that can play a pivotal role in achieving and sustaining the programme's objectives.

CASE STUDY 2: NABARD IMPLEMENTED SVP (Model 2)

The SVP implemented under the NABARD model followed the guidelines given in Table 2. Our preliminary field visits revealed the programme's pertinence, particularly during its inception in 2008-09 in Odisha

State. This initiative engaged functional Non-Governmental Organizations (NGOs) in every district across the state during the period of implementation. The programme's primary aim was to establish quality seed production and distribution as a sustainable business venture at the district level in the state. This model was operational in 22 districts of the state involving 20 NGOs actively working towards SVP implementation in two periods, i.e., 2008-2009 to 2010-2011 and 2011-2012 to 2013-2014. Given the active involvement of key NGOs from the NABARD SVP programme, such as Nari 'O' Shishu Kalyan Samitee (NSKS) and SPARSHA (formerly known as Modern Youth Club) in Balasore, Live and Let Live (LALL) in Jagatsinghpur, and Pragathi in Koraput district, we have engaged with them through KII and FGDs to gather operational information and gain a comprehensive understanding of the NABARD implemented SVP's impact.

Implementation

The NGOs entered into MOUs with NABARD for the implementation of the SVP under the same set of guidelines, which required them to identify villages, land areas, and patches, and to motivate and mobilize farmers to participate in the programme (Table 2). They adopted a cluster-based approach, distinct from the one observed in Model 1. As per one of the NGO's explanations, in this model a cluster encompasses a relatively compact area, typically comprising one (or at most two)

Gram Panchayats, depending on the physical scope of the programme and the distribution of villages. The key focus is on avoiding fragmented landholdings among farmers, with a strong emphasis on having a contiguous land area.

For instance, in Balasore, the cultivation of various crops such as paddy, green gram, black gram, groundnut, and mustard was prevalent. Since paddy constitutes a significant portion of the cultivated area, the distribution of paddy seeds was the primary focus for seed production. Furthermore, seeds of green manure crops like dhaincha and horse gram, which do not undergo the seed certification process, have also been included in the selection.

The seeds provided by NABARD were distributed among the SVP farmers by the NGOs. One of the NGOs emphasized that if a particular variety recommended by NABARD during the pilot project proves to be popular across different districts, blocks or well-suited for specific geographical conditions (e.g., low-lying areas like Swarna sub-1, Ranidhan, Varshadhan), it will receive priority for seed multiplication. This prioritization is due to its widespread acceptance and demand among farmers throughout the district. The implementing agency possesses the flexibility to propose such popular variety requirements for multiplication.

When selecting the seed villages, the NGOs were tasked with ensuring that the necessary facilities were available within the chosen seed village. They were also instructed to exercise caution while identifying suitable seed production patches within the village.

"All the selected patches should have supplementary irrigation facilities during the kharif season to ensure irrigation during prolonged dry spells, if any. It is also quite possible that most of the areas may take up seed production for any one of the identified lead crops in the project during the rabi season as well. We explored this option well before the rabi season so that seed planning for various crops during rabi could also be organized, making these villages perpetual seed producers." (R3).

For instance, in one of the NGOs, a situation arose wherein farmers expressed the desire to multiply different varieties under the programme. However, NABARD's guidelines specify the 'one patch, one variety' concept. Nevertheless, the programme does allow for the formation of multiple patches within the villages based on the willingness and interest of the farmers. But, one of the NGOs mentions that,

"Even though we work at the ground level and have been collaborating with farmers for several years, convincing the farmers within the identified patch posed a significant challenge. Coordinating and motivating all the farmers in a single patch with information about the programme's benefits was not an easy task." (R5)

Similarly, another NGO highlighted,

"If farmers within the project wish to produce seeds of varieties not recommended in the project, for instance groundnut during the rabi season, and these seeds are not needed or in demand in the Balasore district but are needed in other districts, it is considered as a loan-cum-grant model. In such cases, the entire cost of inputs is borne by the seed growers and if NABARD's assistance is sought, it will be given primarily in the form of a loan. The cost of training and capacity-building activities, however, would be considered as fully grant-funded." (R3).

These reflect the inherent flexibility available in the programme guidelines. The strict monitoring of the project at different levels resulted in eliciting some of the impacts of programme. In the case of any NGO failing to perform well or meeting expectations, it was indicated that the Implementing Agencies should refund all the amount released under the project to NABARD within the stipulated time.

"If we cannot implement the programme as originally intended, leading to its failure to achieve the desired success, we must refund the entire amount released by NABARD for the programme, along with any interest or other penal charges that NABARD may choose to impose for this purpose." (R4).

This model placed significant emphasis on extension activities, that went beyond traditional training. The primary focus was on establishing Farmer Producer Groups, which later evolved into Farmer Producer Companies and cooperatives, all with the central goal of enhancing the quality of seed production. This also involved conducting field demonstrations in the farms of progressive farmers who were part of these groups. Furthermore, farmers were taken on exposure visits to neighbouring blocks and districts to facilitate knowledge sharing. The promotion of seed melas, active participation in seed fairs, and engagement in agriculture exhibitions where quality seeds produced by farmers were showcased were also encouraged.

In addition to farmer training initiatives, the staff of the implementing agencies underwent training themselves. The individuals responsible for monitoring activities in the fields and providing information and support to farmers were primarily graduates in Agriculture (BSc [Agri.]) hired by the NGOs involved in the project. They received refresher training at institutions such as Odisha University of Agriculture and Technology (OUAT), Krishi Vigyan Kendras (KVKs), and occasionally at the National Rice Research Institute (NRRI), Cuttack.

Marketing the seeds produced is often a major challenge in many such programmes. However, in this model, NABARD took a comprehensive approach that encompassed both quality seed production and marketing. The facilitation from seed processing units and the involvement of Farmer Producer Organizations (FPO) groups, under the guidance of the IAs, enabled farmers to effectively sell their seeds not only within their districts but also to other districts. To ensure a smooth marketing process, when the produce was nearing readiness for market, the IA mapped out certain marketplaces where they could sell their seeds. The seeds produced were even supplied to organizations, such as OSSC and other private dealers, at a rate of INR 24/kg. As part of the programme, the IA identified a seed dealer within each village, who was one of the beneficiaries of the project. These seed dealers collected produce from all the farmers and transported it to the project's

processing unit, where the seeds were carefully processed and packaged. For example, the farmers of NSKS sell their produce in the name of 'Sanjibani' brand. The farmers of LALL sell their produce under the brand name of 'LALL', supporting the farming community in the respective districts and state. In addition, these NGOs were also involved in training the other actors involved in quality seed production in the state with their technical and field expertise. Generally, the seeds produced through the programme are mostly used within the respective districts where the NGOs are working.

Post-project implementation phase

The programme concluded in the fiscal year 2013-2014, and with its end, all forms of assistance were terminated. Nevertheless, the Farmer Producer Organizations (FPOs) and some of the Non-Governmental Organizations (NGOs), such as NSKS and LALL, continued to operate in quality seed production as a business. FPOs and Farmer Producer groups that were established during the project's duration continued to function using the same operational procedures of the model under the guidance of the NGOs.

Following the operational procedures of NABARD implemented SVP, there were quality seed production initiatives from women groups. For instance, NSKS formed the women's cooperatives for seed production and marketing, involving 1200 women farmers, taking up the learning from their participation in the NABARD SVP model. This initiative stemmed from the success of the cooperative-based seed production and marketing practices of the SVP-FPOs. These women are actively engaged in seed production, processing the seeds through Self-Help Group (SHG) federations. Among them, seed dealers have emerged, aggregating the produce and selling it under the brand name 'DISHA' through NSKS. Notably, 200 women farmers among the 1200 beneficiaries of women cooperative were part of the SVP programmes before cooperative formation. Alongside 'Sanjibani', 'DISHA' is another brand that has emerged and continues to thrive in the seed business.

Regrettably, some of the FPOs that were formed during the project period were closed due to non-functioning of respective NGOs and a few have diversified their activities into other developmental projects of the state. Presently, 'Sanjibani' and 'DISHA' seeds of NSKS and 'LALL' seeds of LALL NGOs are providing quality seeds in their respective districts in Odisha, competing effectively with others in the market.

There remains a substantial demand for quality seeds in the district, and these NGOs formed FPO groups and then made strides towards addressing this need. Their technical experts conduct weekly visits to seed plots to monitor crop health and prescribe solutions. Additionally, the block coordinators of the IAs organize monthly meetings with field technical officers.

A noteworthy development has been the enhancement of marketing strategies. Instead of merely selling quality seeds, the groups have adapted to the market by offering treated seeds. This move has improved the quality of seeds to the extent that only 10 kilograms of seeds are now sufficient for cultivating one acre of paddy, compared to the previous requirement of 20 kilograms.

Economically, this initiative has empowered the participants. Initially, FPOs – like the one formed under NSKS – had a gross turnover of around INR 3-3.5 million. All the farmers were also business partners in this model where they bear fifty percent of the transaction costs involved from seed production to marketing. They receive INR 4 more than the Minimum Support Price (MSP) and share profits equally among members. Last year, each member received a profit of INR 4750 more than MSP through the FPO. According to farmers' experiences, their financial condition has improved by five to six times through this project. Consequently, the relationship between the farmers and banks has improved, also fostering financial literacy among the farming community. Memberships under FPOs have significantly increased over the years. For instance, under NSKS, there were 2500 members in 2012, but the membership has risen to 4000 currently. The success of this SVP

model has prompted expansion of this model to Bhadrak and Kendrapara districts, along with Balasore.

Farmers' perspectives

The insights gained from the focus group discussion with the beneficiaries of the NABARD implemented SVP project provided us with a deep understanding of the model's core strengths. The programme has effectively extended its support to both seed production and the marketing of agricultural produce. Importantly, it ensures not only quality assurance but also market assurance under its umbrella.

What further amplifies the strength of this model is the one-on-one support provided to farmers within the group. Their collective commitment to cultivating the same crops offers a vital source of moral support to individual farmers. This unity of purpose is clearly reflected in their ability to collaboratively address and find solutions to the challenges they encounter.

"With NSKS support, we meticulously executed our marketing strategy, including harvesting, aggregating, processing, and seed marketing. NSKS assisted in seed certification. Initially, before 'Sanjibani' brand formation, we actively marketed certified seeds through seed melas, farmer exchanges, and farmer club meetings with NSKS guidance. We later introduced seed dealers, enrolling farmer groups through NSKS. We explored village-level 'seed banks' for local supply, but funding and knowledge challenges hindered this approach. In contrast, the seed dealer concept thrived. While group efforts solved marketing challenges, securing an individual market for a farmer all by him/herself remained daunting." (FGD 3)

The knowledge and networking of farmers with respect to quality seed production is enhanced.

"During the project, we underwent 6-7 training sessions where SPARSHA and KVK staff imparted valuable knowledge on seed testing, roguing, harvesting, and processing techniques. Our FPO leaders were also taken on field visits to different districts, where they learned about scientific seed production and marketing methods employed by FPOs in those regions."

These visits were organized by external experts who conducted meetings to inform us about necessary changes to enhance our production and marketing practices, ultimately promoting our FPOs. By adopting their strategies and building connections with new farmers from other districts, we managed to sell our produce directly to them a few times, even without branding.” (FGD 4)

Space for collaboration and networks

“Numerous exposure visits and meetings greatly expanded our network of NGOs and farmers. Additionally, we established connections with officers from KVK Baliapal and OUAT and were able to access technical information and expertise.” (FGD 4)

Cooperative mode of seed production

“We all cultivated the same variety, ‘Pratiksha’, in a single patch using a cooperative approach. We followed the production activities as recommended by NSKS. This approach instilled a sense of responsibility among all the seed farmers in the patch, both individually and collectively. We adopted uniform seeds, production methods, harvesting techniques, and processing procedures, eliminating the need for individual testing and certification. Collaborating on our crops from sowing to marketing created peer pressure among us, which turned out to be beneficial. Through this collective effort, we built mutual trust, developed cooperative skills, shared production costs, and enjoyed equal share in profits.” (FGD 3)

Issues experienced under model 2

Availability of like-minded farmers:

Identifying like-minded farmers within the designated patch posed a significant challenge for the IAs. Having members with varied interests resulted in occasional conflicts among group members.

Seed storage: Ensuring proper seed storage was equally vital for quality seed production. In cases where adequate storage facilities were lacking, arrangements for storage were made on a rental basis (as reported from FGD 4, SVP farmers). In the initial stages of their quality seed production journey, they have experienced issues related to improper storage

facilities resulting in loss of produce due to moisture and fungal growth leading to distress sale.

Human resource for training: Securing trained personnel to educate and monitor seed-producing farmers was a formidable challenge. For an emerging business-oriented initiative, field level training and monitoring play key roles in success of the enterprise. One of the IAs noted that absence of well-trained personnel at the field level resulted in poor quality seed production which is a risk for the individual farmer as well as for the organisation that has committed to procuring the produce. Natural risks: Unpredictable factors such as droughts, floods, or other climatic changes often compelled farmers to engage in forced or distress sales, further complicating the situation.

“Over the years, we have had both successful seed businesses, and at times, encountered forced or even distress sales. Despite close monitoring, there have been instances where we’ve received poor-quality seeds that had to be sold instead of storing it at home. Additionally, there have been occasions when excess produce led to distress sales due to storage constraints.” (R3)

Affecting the trust factor in adverse

conditions: Despite long-established rapport and relationships cultivated over the years, trust between facilitators and farmers can be significantly eroded when promised yields fail to materialize due to adverse climatic conditions/less skilled field officers. In such unfortunate circumstances, facilitators may even face the anger of producers, occasionally escalating into physical confrontations. This observation is based on the experience of one of the IAs.

Based on the above discussions, it’s evident that NABARD, in collaboration with the SDA and NGOs, played a pivotal role in empowering farmers to engage in quality seed production, with the overarching goal of establishing sustainable seed business ventures. Table 5 provides an overview of the NABARD supported SVP programme processes and actors, while Figure 3 illustrates the interplay among these actors, the situation, and the processes involved.

Table 5: Key processes and actors' interplay in model 2

Processes	Actors	Remarks
Identification of IAs	NABARD and SDA identify NGOs based on their active functioning in the state of Odisha	The IAs are NGOs that operate in one or more districts and are actively engaged with farmers and have a good rapport with them.
Identification of village/ locality for SVP implementation	NGOs identify villages after considering the availability of basic facilities such as transport, irrigation, and accessibility to the place	NGOs implement the programme based on the guidelines prescribed by NABARD.
Seed supply	Odisha State Seed Corporation is the major sources of seeds under the programme	NGOs procure foundation seeds from OSSC and supply to the farmers
Identification of farmers and formation of clusters	NGOs identify small farmers having bank account with their consent and willingness to participate in the programme	NGOs conduct awareness campaigns and meetings in the village before the programme starts. They use display boards and posters to create awareness about the importance of quality seed production among farmers. They identify progressive small farmers to mobilize other small farmers in the village under the programme. The farmers who do not have bank accounts are allowed to create one and participate under the programme. However, there is no gender focus in this programme.
Trainings given at several stages of seed production and marketing phases	OUAT/NRRI - provided trainings to NGOs; NGOs - facilitate training for farmers/FPOs; KVKs - act as experts in the training sessions.	Both IA and farmers received trainings
Supply of inputs	NGOs - Supply relevant crop inputs such as seeds/fertilizers to the doorsteps of farmers	50% subsidy on input expenses provided by NABARD during the programme period
Monitoring of the scheme	NABARD, Odisha State Department of Agriculture, Odisha State Seed and Organic Products Certifying Agency (OSSOPCA) conduct quarterly physical monitoring of the field; NGOs monitor field activity every month with their team, and their field staff monitor the field activity on a weekly basis.	Frequent monitoring was observed with a team of actors ranging from NABARD to field staff of IA

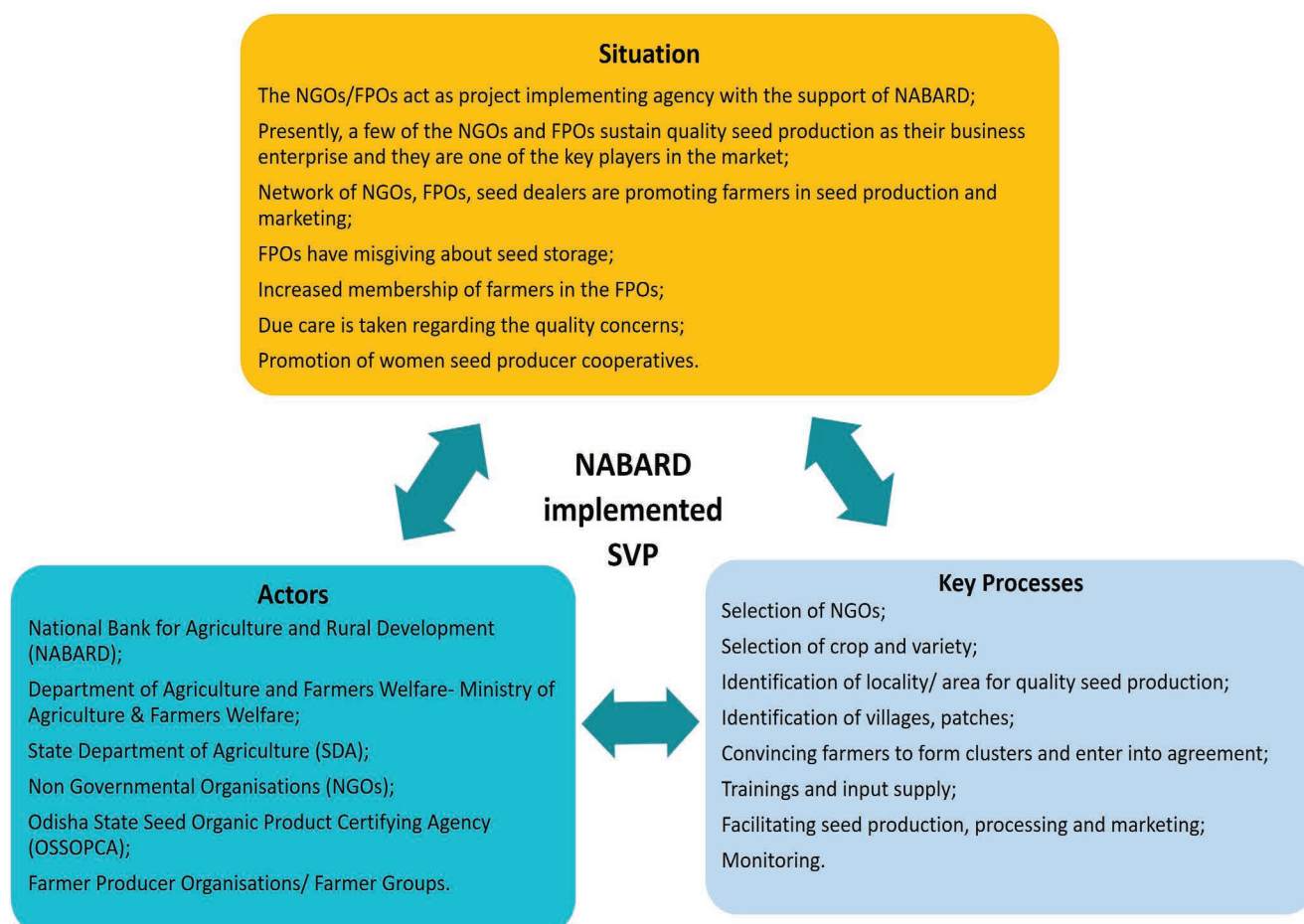


Figure 3: Situation-actor-process interplay of model 2

Effectiveness and efficacy of NABARD implemented SVP

The SVP introduced by NABARD in collaboration with various NGOs has proven to be highly effective on several aspects (Table 6).

Table 6: Effectiveness of SVP in model 2

Parameters	SVP	Remarks
Seed availability with farmers	↑	The business perspective in seed production due to the formation of FPOs, with the support of NGOs, resulted in enhanced seed quality and seed availability.
Formation of FPOs/FPGs	↑	Farmers have formed FPOs to engage in quality seed production and the FPOs have expanded their intervention to seed marketing in formal markets with their own brand names such as 'LALL', 'Sanjibani'.
Empowerment	↑	Farmers have experienced financial and social empowerment. Institutions like NSKS, which support quality seed production, also focus on empowering farm women.
Training Impact	↑	More emphasis has been placed on creating awareness, conducting field demonstrations, on-field training, organizing exposure visits, holding frequent informal group meetings, and other extension activities. All these have resulted in improved quality seed production.
Market Access	↑	Market access has been promoted among farmers through FPOs. Awareness about market dynamics has been created, enhancing the potential for identifying markets.
Networking	↑	This model has introduced FPO members to almost all the value chain actors involved in quality seed production.

— : Neutral; ↑: Increase

Overall, the SVP under this model has been effective in increasing seed availability, improving seed quality, empowering farmers, enhancing market access, and fostering collaboration and networking. Further, the experiments of FPOs with varied seed marketing strategies to compete in the market with other private players and replicating the model in districts of Odisha, and also taking a lead in the formation of women FPOs after programme completion have resulted in high efficacy of the NABARD supported SVP model. All these factors have contributed to the programme's success in addressing the challenges related to seed production and distribution in Odisha.

CASE STUDY 3: ICAR-IIHR IMPLEMENTED SVP (Model 3)

The ICAR-IIHR Seed Village concept primarily operates through a MoU-based arrangement between the institute and farmers, with specific standards for seed production of horticultural crops. The institute has a wealth of experience in quality seed production. They have a group of farmers referred to as custodian/contract farmers. These farmers are extensively trained in the skills required for quality seed production of horticultural crops, primarily focusing on IIHR varieties within their seed villages.

ICAR-IIHR enters into agreements with farmers for seed production. For each crop cycle, new agreements are drafted without renewing the old ones. There is an option for adding or removing 5-10% of farmers from the directory that the institute maintains based on the performance of farmers under the programme.

Our discussion was conducted with the officer in charge of the SVP at IIHR, where we explored the current conditions imposed on seed producers, as well as the support provided for quality seed production and marketing.

Implementation

The entire Seed Village concept operates on an MoU between an individual farmer and ICAR-IIHR, following the conditions outlined in it. All expenses are incurred by the farmers, who are provided with seeds of horticultural crops (fruits, vegetables, medicinal, flowers) by IIHR. These seeds are expected to be cultivated and then sold back to IIHR, provided the produce

meets the required quality standards. Technical support is extended by ICAR-IIHR through both on-campus and on-field trainings conducted by the institute's scientists and field technical officers. Monitoring of seed production activities takes place monthly and quarterly at the field, depending on the specific crop variety and its critical stages. Additionally, regular monitoring is conducted by the field technical officers.

Presently, ICAR-IIHR is involved in the seed production of 13 fruit crops, 26 vegetable crops, 10 flower crops, and five medicinal crops in various regions of Karnataka. It's worth noting that seed production is also undertaken by ICAR-IIHR in states other than Karnataka. In such cases, the seed production and monitoring processes are managed by pre-identified and trained seed agencies. The production agents from these seed agencies provide seeds to the farmers, collect seeds from them, and then deliver them to IIHR. However, these production agents and agencies are required to follow the guidelines for seed production established by ICAR-IIHR.

In this model, the seeds produced by farmers are procured in one go, and there is no allowance for procurement in fragments or splits. Currently, 4-5 farmers are selected per village, and on an average, around 40-50 farmers are selected from about 20 villages for seed production. Similar to model 1 (SVP implemented by SDA), the villages and farmers in this model are scattered. However, the reserved area designated by the farmer for seed production must be isolated and meet all the necessary conditions for high-quality seed production.

What intrigued us about this model is its purely contractual nature, where farmers receive no incentives or assistance, whether in the form of subsidies or subsidised inputs. The seeds provided to farmers are not free or subsidized; instead, farmers must bear the cost of the seeds. Compliance with the instructions provided by the IIHR technical team in seed production is mandatory, and IIHR does not compromise on seed quality.

It was truly impressive to learn that due to their rigorous monitoring and the dedication of loyal and committed producers, the rejection of seed

lots is exceedingly low, perhaps only 1-2%. This success can be attributed to the stringent monitoring efforts made by individuals involved in the process.

"Breeder's accompanied by the production officer make two to three mandatory visits during the seed production process to assess quality. The production officers at the production units located in seed-producing villages are highly trained and qualified in seed technology, ensuring effective management of seed production activities throughout the cropping period. This meticulous approach ensures that there are minimal to no compromises in terms of quality in the field." (R7)

There have been instances where the entire produce has been rejected due to quality issues. Only 80-85% of the produce receives the predetermined payment but 100% of the produce is procured. The produce is not collected from the farmer's field; rather, the farmer is responsible for transporting it to ICAR-IIHR. The produce undergoes germination and viability tests, and only after passing these tests and receiving a quality certificate, is the payment made.

"Initially, a germination test is conducted on the procured produce, followed by a grow-out test. If the produce passes these tests, payment is made directly to the farmer's bank account. However, in case of failure, the seeds are rejected without any payment. For example, in the case of brinjal seeds, a requirement of 400 plants per line is specified. If it is found that there are more than 2% mixtures in that line, the payment will not be processed, and the entire produce lot will be rejected." (R7)

In the event of rejection, both farmers and production agents identified by ICAR-IIHR are prohibited from selling the produce under the IIHR brand. If this is discovered, legal action will be taken against the responsible producer. The rejection certificate provided to the farmers at the time of rejection serves as documentation in case of any defaults or brand/varietal patent issues.

The seed production locations in some cases are very far from the ICAR-IIHR, and this poses challenges for farmers in transporting their produce. In such cases, under certain conditions, IIHR arranges for the lifting of the produce from the farmer's field or provides transportation, with the associated charges being borne by the farmer. If not, during the final payment, the seed cost, transportation costs, and other miscellaneous expenses incurred on seed production for a particular farmer by IIHR are deducted and then payment will be made to the farmers. While this may appear as a loss for the farmers, the situation is explained by a respondent as follows,

"The price for the produce is determined considering the farmers' cultivation costs, processing charges, and packing charges. Data from the National Seed Corporation (NSC) and State Seed Corporation (SSC) is also factored in to establish a fair market price. In situations where the market price increases, only those crop prices are slightly adjusted (typically by 5-10%) to ensure a win-win situation for the farmers. Once the procurement rate is fixed, IIHR enters into an agreement with the farmers, and the seed procurement cost is reviewed annually." (R8)

The farmer's role concludes after delivering the produce to IIHR. Subsequently, the seeds obtained from IIHR undergo processing, packaging and labelling in their dedicated processing unit and are then sold under the IIHR brand. This unit is equipped with a 50-ton cold storage facility, a seed grader, a gravity separator, as well as both smaller and larger versions of gravity separators.

For an individual to establish a seed processing unit, along with a cold storage facility, the initial establishment costs would amount to approximately INR 15 million (0.1803 million USD)⁴. These activities would pose a significant challenge for a farmer to undertake and sustain at an individual level. Having such facilities at an institutional level not only serves the purpose but also benefits the farmers.

SVP impacts

The programme from the institute operates independently of external funding support.

⁴USD = INR 83.26

More than 65 labourers are employed in this initiative. Approximately INR 70 million (\$0.8396 million) were realized from seed production under the Seed Village concept last year, covering 13 fruit crops, 26 vegetable crops, 10 flower crops, and five medicinal crops.

Typically, farmers who engage in seed production become regular and loyal seed producers for ICAR-IIHR. These targeted farmers have a consistent source of income and are well-versed in meeting ICAR-IIHR's quality requirements. One significant impact of this effort is the creation of employment opportunities, particularly for women in villages. Hybrid seed production, which involves labour-intensive tasks such as emasculation and pollination, has been especially beneficial in this regard.

The institute has plans to replicate this model in other states through their regional stations, involving the respective state horticulture departments and seed certifying agencies. They also aim to engage in collective seed production through Farmer Producer Organizations (FPOs), involving more farmers. A few farmers under this model are also acting as invited speakers at various institutes, including ICAR-IIHR, to raise awareness about the technical skills involved in seed production of horticultural crops.

Farmers' perspectives

Enhancement of technical skills: The seed village concept has influenced farmers to develop skill sets oriented towards the production of quality seeds in horticulture crops.

"Engaging in the seed production of horticultural crops requires a higher level of technical skill compared to seed production in other crops. These skills are acquired through training provided by the scientific staff at ICAR-IIHR. Even if we are not regularly involved in seed production activities with ICAR-IIHR, we can apply the skills we've learned in seed production for our own purposes." (R10)

Preference to women: Customarily, farmers employed women for skill-oriented activities in quality seed production such as seed treatment, roguing, hand pollination (for crops

like cucumber, tomato, squash, pepper and others), seed extraction (e.g., tomato/brinjal and others), as well as post-harvest handling of seeds involving cleaning, drying, processing, packing, storage and so on. However, it is not mandatory to employ women. But, under this model, it was observed that the farmers who are into high quality seed production exclusively prefer women over men for these skill-oriented activities.

Social and economic empowerment: Despite the ICAR-IIHR Seed Village concept not providing incentives, the income generated by farmers through seed production under this model is higher than what they earn through their regular production activities. Furthermore, because of the skills they have acquired, these farmers enjoy social recognition within their own villages and neighbouring communities as skilled seed producers.

"I have ventured into amaranthus seed production, yielding 3-4 quintals per acre and generating a net income of \$500 to 600. Producing raw greens comes with more risks. Firstly, finding a market is uncertain, and even if I do, there's price volatility. Additionally, perishability is a significant concern with vegetables and fruits. Small-scale farmers like me cannot afford cold storage facilities, making it risky to store produce after harvest. On the other hand, entering into an agreement with IIHR yields higher income. The only challenge is adhering to their instructions and maintaining quality. For a passionate and professional farmer like me, this shouldn't be an issue." (R11)

Issues experienced under model 3

No significant issues were observed in the entire process, as it proceeds with the mutual consent of both parties. The only concerns raised are related to payment and the procedures involved during the procurement process. Farmers do not receive immediate payment; instead, they must wait for the produce to pass a quality test. This payment clearance process can take almost a month or longer.

From the preceding discourse, it becomes clear that ICAR-IIHR, in formal agreement with farmers who produce or are willing to produce

horticultural seed crops, empower farmers to partake in quality seed production. The overarching objective is to empower farmers and produce quality seeds to meet the market demand. Table 7 furnishes a summary of the

primary programme processes and actors, while Figure 4 elucidates the dynamic relationships among these participants, the context, and the processes involved.

Table 7: Key processes and actors' interplay in model 3

Processes	Actors	Remarks
Identification of crop varieties to multiply the seeds	ICAR-IIHR (Panel of Directors and experts)	This is decided based on the market demand for ICAR-IIHR varieties.
Identification of village/farmers and locality for SVP implementation	ICAR-IIHR	Based on the inventory of a farmers' list available with ICAR-IIHR, the farmers are identified and their fields inspected by the field technical team. The farmers could be either men or women and there are no specific reservations or focus on any gender.
Seed supply	ICAR-IIHR	Only ICAR-IIHR varieties need to be produced. So, the institute is the only source for seeds.
Trainings	ICAR-IIHR	Training sessions, both on-campus and off-campus are conducted 4-5 times, and these facilitates interactions between scientists and farmers.
Support with input resources during production and post-production	Farmers	All the costs related to production and post-production (e.g., transportation) are borne by the farmers.
Monitoring	ICAR-IIHR and State seed certifying agency	Regular monitoring was done by the ICAR-IIHR field technical staff and breeders involving the state seed certifying agency.
Procurement of produce	ICAR-IIHR	100% of the produce procured from farmers
Processing and marketing	ICAR-IIHR; State Department of Horticulture	The produce was processed and marketed under the ICAR-IIHR brand name (ARKA). State Department of Horticulture helps in promoting the brand and facilitating product marketing.

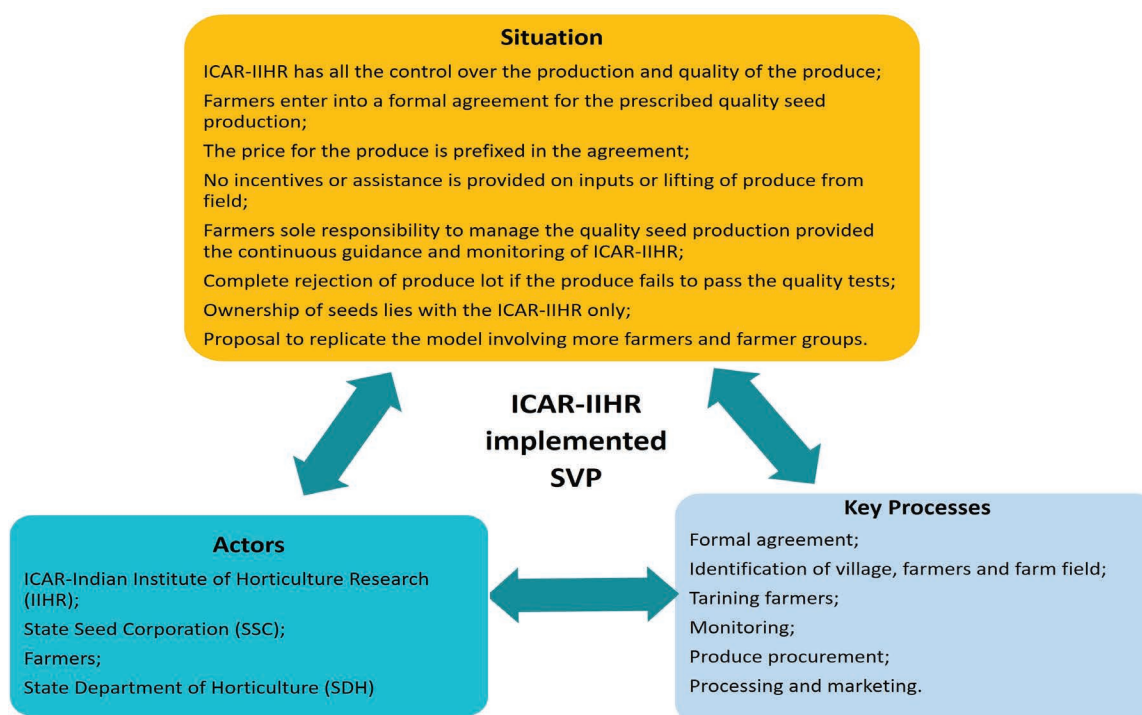


Figure 4: Situation-actor-process interplay of model 3

Effectiveness and efficacy of ICAR-IIHR implemented SVP

The seed village concept under this model appears to be an effective and successful programme aimed at promoting quality seed production of horticultural crops. The programme is implemented through a contract-based arrangement between ICAR-IIHR and selected farmers, and it involves several key components that contribute to its effectiveness (Table 8).

Table 8: Effectiveness of SVP in model 3

Parameters	SVP	Remarks
Enhanced Seed Quality	↑	Seeds that meet high quality standards (seed industry standards) are produced
Empowerment	↑	Farmers have been economically empowered, earning more than their regular crop production income. They also present themselves as invited guest speakers and resource persons on quality seed production, indicating their social empowerment. Women are employed mainly in skill-oriented activities during quality seed production.
Training Impact	↑	The focus on scientific, skill-oriented on-campus and off-campus training has resulted in farmers providing high-quality seeds to the institute.
Expansion and Replication	↑	The model has been expanded to other states such as Odisha through the formation of FPOs
Networking	—	Since this is a closed one-to-one model (farmer to institute), there is equal opportunity for all farmers associated with the institute to establish a wider network with most actors in the value chain.

— : Neutral; ↑: Increase

The SVP based on this model has been effective in generating income, empowering farmers – especially the socially and economically weaker ones – with training. Its efficacy lies in imparting quality seed production skills, maintaining high seed quality, low rejection

rates, assured income, and scalability potential. This model serves as a successful example of a contract-based approach to seed production and has the potential to benefit farmers and promote sustainable agriculture in various regions.

DISCUSSION

The seed village concept has two main objectives, namely (a) to produce quality seeds locally to complement the formal seed system (and increase productivity), (b) to improve the income of farmers who take up seed production (and also enhance their skills in quality seed production). SVPs have definitely enhanced farmers' access to quality seeds and also enhanced their capacities to undertake quality seed production. It also promoted seed entrepreneurship at the decentralized level. But the effectiveness and efficacy of the SVPs varied across the given models due to their differing implementation processes (Table 9).

Table 9: Differences among SVP models in terms of their contribution to achieving effectiveness and efficacy

Key features	SDA SVP	NABARD SVP	ICAR-IIHR SVP
Quality Seed production	The focus on enhancing quality seed production without giving much importance to the quality of seeds produced by the farmers affected the effectiveness of the programme. Despite the farmers being involved in quality seed production, poor monitoring and limited training, coupled with a shortage of expertise among staff on seed production have impacted the efficacy of the programme resulting in moderate effectiveness.	The primary focus under this model was to develop viable seed business ventures through FPOs composed of small farmers. Therefore, the seed production process was thoroughly monitored to maintain quality and obtain seed certification for marketing. Additionally, frequent field trainings and extensive extension activities at the village level, including campaigns, group meetings, exposure visits resulted in effective quality seed production and marketing. This enhancement in quality seed production skills improved the efficacy of the SVP by empowering farmers in both quality seed production and marketing.	The key objective here is to produce high-quality seeds of horticultural crops, ensuring an adequate supply to meet demand. This not only guaranteed farmers with a fixed price for the seed produced but also contributed to the overall effectiveness of the SVP. SVP effectiveness is further enhanced through a combination of frequent training sessions, interactions between farmers and scientists, and vigilant monitoring of seed production fields and farmers' activities by the technical team. This approach not only resulted in quality seed production meeting the desired standards but also empowered farmers with the technical skills required for quality seed production in horticulture crops.
Seed processing and storage	Farmers processed and stored the seeds on their own and many of them experienced losses due to unscientific and poorly monitored practices. Knowledge-oriented trainings are provided without subsequent guidance during the actual process.	Farmers successfully processed, stored and marketed the seeds with minimal loss due to constant guidance from NGOs and skill-oriented trainings on seed harvesting, cleaning, packing, storing, and processing. Additionally, members received training on the operation of processing equipment and machinery.	Farmers had no further role in seed processing and storage after the procurement of produce by the ICAR-IIHR, which is handling the storage and processing at the institute, using a well-established processing and storage unit, resulting in minimal loss of quality seeds.
Value chain actor coordination	Informal farmer network was promoted	Farmer producer organisation formed, and farmer groups networked with other value chain actors with the support of SDA, NABARD, NGOs, Seed dealers, Seed corporations, KVKs and Seed certifying agencies.	Assured buyback arrangement resulted in limited value chain coordination and management by farmers.
Market	Informal marketing was promoted	Commercial marketing was promoted	Income-oriented assured marketing was promoted

Gender focus	No exclusive focus on gender	Learning from the experiences under the NABARD SVP model, the NGO 'Nari and Sishu Kalyan Samittee' (NSKS) organised women cooperatives exclusively for quality seed production under the name 'DISHA', adopting the operational procedures of NABARD-SVP.	Women employed for skill-oriented activities in quality seed production, such as seed treatment, roguing, hand pollination (for crops like cucumber, tomato, squash, pepper and others); seed extraction (e.g., tomato/brinjal and others), post-harvest handling of seeds involving cleaning, drying, processing, packing, storing and others. However, it is not mandatory to employ women.
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While all the given models share a common goal of supplying farmers with quality seeds and enhancing their quality seed production capacities, they vary significantly in implementation and effectiveness. Notably, the NABARD-funded SVP has established strong links in the seed supply chain – from the distribution of seeds to farmers, rigorous training for both facilitators and farmers in quality seed production, and provision of inputs, seed certification, and market support through FPOs. By providing a commercial orientation to seed enterprise development through capacity development of smallholder collectives, this model proves to be the most effective and efficacious among the three models we studied.

Following closely is the ICAR-IIHR model which operates on a contractual mode, ensuring assured income to farmers for producing quality seeds. In this model, farmers are only engaged in the production of quality seeds, and they receive close monitoring and training from ICAR-IIHR experts. However, this model falls short in providing any direct assistance to cover any expenses incurred by the farmers. The institute is responsible for quality testing and buy back of the seeds for sale. While successful in ensuring assured incomes for farmers and empowering them with professional skills in seed production, this contractual approach, to some extent, withholds farmers from exploring post-harvest activities such as seed processing, marketing

and engaging with other actors in the seed value chain, in comparison to the other two models. In Odisha, the SVP implemented by the Odisha State Seed Corporation (OSSC), called 'Mo Bihana Yojana', also operates like a contract farming scheme where OSSC provides seeds to the seed growers and buys back their produce with limited direct assistance on inputs (seeds) or transportation.

Lastly, the SDA-SVP model showed mixed effectiveness and efficacy, lacking full implementation support as seen in the other two models, except for seed distribution. Despite efforts to promote informal marketing and making seeds available at the village level, inadequate training, weak monitoring, distribution of certified seeds (instead of foundation seeds in a few cases) have negatively impacted the quality of seed produced. Limited emphasis on the certification process, absence of buyback arrangements for the produce and lack of a post-harvest follow-up have also contributed to the mixed outcome.

Under diverse operational modalities, the effectiveness and efficacy of the SVP differed significantly across models. While all the SVP models undeniably enhanced farmers' access to quality seeds and their capacities to engage in quality seed production, a notable gap exists in their lack of any explicit focus on women and vulnerable groups. The NABARD SVP model stands as an exception, engaging smallholders,

which was unclear in other models. However, none of the models distinctly target women farmers for access to quality seeds and income-generating opportunities in quality seed production. The ICAR-IIHR model employs women in skill-oriented activities, but it is not mandatory. There is also inadequate data to capture the impact of these models, particularly on women farmers.

Recognizing the key challenges in SVP a more inclusive focus in implementation of SVP is necessary, especially in targeting women farmers.

KEY CHALLENGES IN SVP MODELS

- 1. Availability of foundation seeds:** Farmers are willing to produce quality seeds, but they require access to foundation seeds at least once every two to three years. In many cases, certified seeds are distributed, leading to deterioration of seed quality and yield levels in later years. The unavailability of foundation seeds over a period force farmers to depend on certified seeds from the market or use their own poor-quality saved seeds for seed or grain production, thus affecting yields. This challenge is prominently expressed by the farmers of the SDA-SVP model.
- 2. Limited/no long-term support:** It was found that the SDA implemented SVP is providing seeds for half an acre to one acre for two years and there is no assured buyback of the seed produced. Seed certification is also optional, depending on the farmers' interests. Even if a farmer wishes to produce seed on a larger scale, additional quantities of foundation/certified seeds are not provided, discouraging farmers from seed production enterprises. In the case of NABARD-implemented programme, though end-to-end support is extended to farmers through FPOs, maintaining quality of seeds during storage in the initial years of the programme was a challenge. Under the ICAR-IIHR programme, though the institute identifies the farmers and takes up production through MoUs that are renewed every season, farmers are uncertain about their long-term engagement in seed production through the programme. The absence of adequate support could also be a further deterrence to individual smallholders or women farmers to get into seed production.
- 3. Seed marketing:** Farmers need an assured market for their produce. For individual farmers, it is a huge challenge to market the seeds they produce and secure a place in the highly competitive seed market without any institutional support. Increasing competition from private players in the market involves the adoption of new marketing strategies, including offering exclusive discounts, showcasing seeds at various regional/national/international events, and providing seeds tailored to customer needs by way of variations in packet size or seeds that are neem coated, or treated with fungicides, insecticides, etc., based on specific customer requirements. This kind of market situation presents a significant challenge to both FPOs and individual farmers in selling seeds produced on their own under the SVP. Specifically, women farmers tend to face even bigger challenges in accessing both input and output markets, further limiting their engagement in seed production.
- 4. Farmer-produced seeds falling short of seed certification standards:** Many farmers struggle to meet the quality standards required for seed certification, which go on to become a barrier to entering the competitive seed market. Limited scientific/technical skills in seed production among the staff of implementing agencies and poor skills among farmers with respect to quality seed production and storage of seeds are further contributing to this situation, which was markedly apparent in the SDA-SVP model.
- 5. Capacity:** Knowledge and skills related to quality seed production, storage, certification, conservation and marketing must be enhanced among the staff implementing SVP and also among farmers. To enhance the skills of farmers, the facilitating field officers from the implementing agencies must have adequate and updated knowledge on quality seed production, post-production activities, certification, marketing, and also on all the

guidelines and actors who are directly or indirectly involved in the programme. This was found to be lacking in most of the SVP actors in the case of SDA SVP where the programme has been completely or partially stopped at a few places.

- 6. Value chain actor coordination:** There is a need to promote coordination among the wide range of actors (Table 10)

involved in the seed value chain. While this is mentioned in the guidelines, it was not observed in practice in the SDA implemented SVP. Under the ICAR-IIHR model, due to its contractual nature, the farmers have a limited role in coordinating with value chain actors under the SVP. The NABARD model tried networking relevant value chain actors with the FPO.

Table 10: Proposed SVP value chain with key actors and their roles

Value chain functions	Roles	Actors
Seed procurement and distribution to farmers	Ensure timely supply of foundation seeds	National Seeds Corporation (NSC), State Farms Corporation of India (SFCI), State Seeds Corporation (SSC), and State Seed Farms (SSF)
	Conduct needs assessment and place intended for seed procurement	Implementing Agency (IA)
	Mobilise farmers (small and marginal farmers/women/vulnerable communities) into groups	IA, NGOs/ FPOs
	Awareness creation about SVP	SDA, IA, NGOs
Seed production	Timely provision of assistance in the form of resources, trainings and other extension activities	SDA, IA, NGOs
	Conduct regular monitoring	IA
Harvesting, processing and storage	Assist in seed certification process	IA, State Seed Certifying Agency (SSCA)
	Provide support for infrastructure facilities such as processing plant, warehouses and packaging	IA, SDA, NABARD
Marketing	Facilitate market access by helping farmers in establishing market linkages	IA, NGOs, FPOs Private seed companies
	Ensure buyback arrangement	IA
	Promote farmer to farmer (informal) marketing	IA, NGOs
Business development services	Awareness and networking	Nodal agency, IAs
	Business consultancies	Financial institutes, private sectors, SDA, IA, KVKs, public-private incubation centres, development organizations
	Provision of technical consultancy	University, research institutes, KVKs, training institutes, experts from public or private sectors and other development organizations
Enabling environment	Creating an enabling environment is the responsibility of all the actors in the value chain who coordinate and converge in the necessary actions to promote quality seed production	All concerned actors from start to end

RECOMMENDATIONS AND THE WAY FORWARD

Food production will need to increase by 50% to feed the world's population which, by 2050, will reach 9.7 billion (FAO 2018; Grafton et al. 2015). Access to quality seeds of improved crop varieties is critical for enhancing food production and that can lead to better food and nutritional security (Nabuuma et al. 2022; FAO 2022; Chauhan et al. 2016; GoI 2017). Though India has made significant progress in developing and promoting improved varieties in all the crops, access to quality seeds at the right time in sufficient quantities continues to be a challenge (Sundareswaran et al. 2023; Vernooy et al. 2020; Paroda 2018; Singh & Agrawal 2018).

Governments at both the Centre and States recognise the importance of seeds and have been implementing several programmes to enhance the production and distribution of breeder, foundation, and certified seeds including distribution of seed mini kits among farmers under various schemes. Every state has mechanisms for testing the quality of seeds, as well as agencies that certify seeds for their quality and seed processing facilities. The private sector is also playing a very important role in production and marketing of seeds. Seed production is also an important activity in which Farmer Producer Organisations are currently engaged.

SVP is one of the many programmes in the seed sector 'aimed at upgrading the quality of farmer saved seeds which is about 60-65% of the total seeds used for crop production' (DoA&FW 2023). Its performance depends primarily on the quality of seeds supplied for seed production, the quality of trainings imparted to farmers, inspection during different stages of seed production by the programme implementation agency, and the financial incentives provided for seeds, seed drums and seed storage mechanisms. While distribution of seeds at 50% subsidy is followed in all cases, other related tasks are not implemented in full scale and spirit, and this has been affecting the implementation of the programme.

There is a lot of scope to improve the effectiveness of SVPs. Above all there is an urgent need for promoting the decentralized production of high-quality improved seeds by strengthening the seed value chain in SVP. Some of the ways forward are as follows:

1. Implement SVP through farmer groups

Shift the implementation of SVPs from individual farmers to farmers organized under FPOs, Farmer Interest Groups/Farmer Clubs, or existing farmer groups promoted by IAs as observed in the NABARD SVP model. There is a need to increase the focus on engaging smallholders, women and women's collectives in seed production to promote timely access to quality seeds by these categories of farmers (Nanavaty 2022; Puskur 2021).

2. Enhance provision of funding for quality seed production

In the cases we looked at, there is partial funding or in some cases no provision of funding for inputs (seeds, fertilizers), infrastructure (storage facilities, seed processing, transportation), marketing (information on market, regulatory frameworks such as certification, licensing and market access), human resources (exclusive staff for implementing SVP), and training for both implementers and farmers including provision of updated educational materials, workshops, and refresher trainings. The kind of end-to-end support observed in the NABARD model was found to be missing in SDA SVP and ICAR-IIHR. There is a need to review the funding for SVP on different components, and there should be specific allocations for funding infrastructure, marketing, human resources, capacity building and inputs under SVP.

3. Distribute foundation seeds

Considering the dissatisfaction of farmers with the quality of certified seeds received under the programme (under SDA-SVP model), it is recommended that only foundation seeds be distributed in the SVPs. Certified seeds tend to lose vigour year after year more rapidly in comparison to foundation seeds. Moreover, commercially available certified seeds may not be suitable

for ensuring quality seed production by farmers. So, there is a need to make sure that only foundation seeds are distributed among farmers for seed production.

4. Strengthen monitoring and evaluation (M&E)

Regular monitoring of SVP during production and post-production processes by the IAs, like the one followed in the NABARD and ICAR-IIHR SVP models, is critical for quality seed production. Currently, Monitoring and Evaluation (M&E) only focuses on seed distributed, seed produced, and number of seed villages formed during the implementation year (maximum of two years in a location). M&E of SVP programmes should also include assessment of the sustainability and viability of seed enterprises. Furthermore, this should include tracking the growth of new seed entrepreneurs who expand their seed production to multiple crops beyond the implementation period.

5. Ensure buyback arrangement

Ensuring buyback of quality seeds produced will ensure quality training and supervision, as well as incentivise farmers to engage in quality seed production. This was clearly observed in the ICAR-IIHR model. In the case of the NABARD SVP model, the FPO is responsible for buyback. Such arrangements are critical for ensuring the success of SVP.

6. Improve coordination of value chain actors

Improving coordination among various actors engaged in implementation, training, monitoring, certification, marketing, etc., (as discussed in Table 2) can ensure seamless execution of SVPs. Such coordination can also ensure that women and farmers from other vulnerable social groups are equally supported with access to quality seeds and capacity development opportunities.

7. Mapping sources of quality seed and creating linkages for seed producers

Mapping sources of quality seeds, especially foundation seeds, at the block level and making them available to seed producers through local institutions such as Gram Panchayats and Department of Agriculture offices can be very beneficial. This is not happening currently, but the need for such an arrangement was pointed out by several stakeholders during our interactions, as this can ensure that seed producers, particularly women and smallholder farmers, have access to seeds even after the seed supply from IA stops at the completion of the programme.

8. Inclusive quality seed production

Currently, women are not specifically targeted by SVPs. The implementation guidelines do not mention the role of women as seed producers or the need to enhance their capacities. SVP guidelines should be revised to explicitly indicate measures to be implemented so that women farmers and women FPOs are intentionally supported under the SVP.

It is envisioned that the effectiveness of the Seed Village Programme can be enhanced through the provision of better access to foundation seeds for farmers, better market linkages, improved monitoring and evaluation frameworks, better mapping of the sources of quality seeds, improved coordination among the various actors of the seed system, and by applying a gender-responsive approach to the entire programme. This holistic approach would be a valuable contribution to seed systems and could bring in greater social equity through improved nutrition and economic security to agri-food systems as a whole.

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Annexure 1

Government initiatives for quality seed production

The Central Sector Scheme 'Development and Strengthening of Infrastructure Facilities for Production and Distribution of Quality Seeds' has been in operation since 2005-06. Its main objective is to enhance and reinforce the existing infrastructure for the production and distribution of certified and high-quality seeds to farmers. The scheme includes several components, such as providing assistance to boost seed production in the private sector, implementing the Seed Village Scheme, offering transport subsidies for seed movement, establishing and maintaining seed banks, ensuring quality control arrangements for seeds, supporting the creation and strengthening of infrastructure for seed production and distribution, focusing on human resource development, promoting seed export, encouraging the use of biotechnology in agriculture, and boosting the production of hybrid rice seeds. These initiatives aim to empower farmers with better access to quality seeds and contribute to the overall growth and improvement of the agriculture sector in the country.

The other government schemes covering various components related to seed production and distribution for different crops are given below (Seednet 2023).

- **Macro Management through State Work Plan for Rice and Wheat:** Provides subsidies on the certified seed for rice and wheat at Rs. 500/per quintal or 50% of the cost, whichever is less. For Bajra, Jowar, and Barley, the subsidy is Rs. 800/per quintal or 50% of the cost for certified seed. Hybrid Bajra and Jowar seeds get Rs. 1000/per quintal. Additionally, assistance is given for production and distribution of hybrid rice seeds.
- **Integrated Scheme on Oilseeds, Pulses, Oil Palm, and Maize:** Offers support for all oilseeds, pulses, and maize, including the provision of financial assistance for foundation and certified seed production, certified seed distribution, seed mini kits of high-yielding varieties, and oil palm sprouts.
- **Technology Mission on Cotton:** Provides financial assistance for foundation and certified seed production, certified seed distribution, and seed treatment for cotton seeds.
- **Technology Mission on Jute and Mesta:** Offers financial assistance for foundation seed production, certified seed production, and certified seed distribution for jute and mesta crops.
- **National Food Security Mission:** Supports certified hybrid rice seed production and distribution, certified high-yielding varieties seed distribution, and seed mini kits for rice and wheat crops. For pulses, it provides assistance for foundation and certified seed production, as well as certified seed distribution.
- **Seed Village Programme (SVP):** Aims to improve the quality of farmer-saved seed by providing financial assistance for distributing foundation/certified seeds, training farmers on seed production and technology, and encouraging farmers to develop storage capacity for seeds.
- **Transport Subsidy on Movement of Seeds to North-Eastern States, Himachal Pradesh, Jammu & Kashmir, Uttarakhand & Hill Areas of West Bengal:** Offers transportation subsidies for certified seeds, excluding potatoes, being transported from outside the state to the identified state capitals or district headquarters.
- **Hybrid Rice Seed Production:** Assists in hybrid rice seed production and distribution.
- **Creation and Strengthening of Infrastructure Facilities:** Provides financial support to create and strengthen infrastructure facilities for seed cleaning, grading, processing, packing, and storage for all crops in the public sector.
- **Rashtriya Krishi Vikas Yojana:** Includes all activities related to seed infrastructure facilities for various crops.

Annexure 2

Selected state-wise number of seed villages created, seed distribution and farmers benefited under SVP (Beej Gram Yojana) in India (2019-2020 to 2021-2022-up to 21.12.2021) (In number)

States/UTs	2019-2020			2020-2021			2021-2022 - upto 21.12.2021		
	Seed Distribution (In tons)	Seed Village Created	Farmers Benefitted	Seed Distribution (In tons)	Seed Village Created	Farmers Benefitted	Seed Distribution (In tons)	Seed Village Created	Farmers Benefitted
Andhra Pradesh	836.3	1353	33825	859.7	1224	30600	-	-	-
Assam	2285	3559	533850	7744.5	3595	1078675	-	-	-
Bihar	235.4	236	75727	-	-	-	-	-	-
Chhattisgarh	3256.1	6496	90893	2901.2	6570	78369	1712.6	6570	37805
Gujarat	311	376	7301	738.5	266	15984	-	-	-
Himachal Pradesh	4674.8	1950	227866	4533	4640	226665	-	-	-
Jammu & Kashmir	5006.3	1400	189873	6059	2319	231846	-	-	-
Karnataka	230.2	430	8968	147.3	234	7241	-	-	-
Madhya Pradesh	8275.6	6688	328538	8709.1	7446	672275	2260.4	2946	147300
Maharashtra	16874.3	24732	572292	3972.7	10851	125798	840	557	28004
Nagaland	181.8	67	8759	226.6	166	8900	226.6	166	8900
Odisha	616.5	304	31120	-	-	-	-	-	-
Puducherry	-	-	-	0.20	46	101	-	-	-
Rajasthan	1945.5	1398	71280	3557.9	3004	139438	-	2032	203201
Sikkim	2.6	100	5500	0.42	11	715	-	-	-
Tamil Nadu	10161.9	5736	572390	14024.3	10264	685753	3703.8	2497	204162
Telangana	1410.2	2342	58550	402.6	809	20225	-	-	-
Uttar Pradesh	6207.2	11449	193536	3989.7	4486	114416	-	-	-
Uttarakhand	3900.2	6560	139887	2954.9	8223	101957	36.7	276	3065
West Bengal	0.32	7	350	-	-	-	-	-	-
Central Agency	1140.2	2351	44538	2196.4	1578	74598	-	-	-
India	69695.5	77534	3195043	63023.6	65732	3613556	8780.1	15044	632437

Source: Press Information Bureau India, 21.12.2021

Annexure 3

Physical progress of SVP in India (2006-2007 to 2019-2020-up to 27.12.2019)

Year	No. of Seed Villages Organized	Quantity of Seed Produced (In million tons)
2006-2007	10778	0.2296
2007-2008	18121	0.4007
2008-2009	35212	0.5801
2009-2010	69127	0.7956
2010-2011	101067	1.6155
2011-2012	89244	1.9928
2012-2013	78943	1.1671
2013-2014	68101	1.4448
2014-2015	48004	1.9371
2015-2016	29249	0.9182
2016-2017	24093	0.5699
2017-2018	100735	1.2665
2018-2019	102631	2.07
2019-2020 (upto 27.12.2019)	18740	0.3988

Source: Ministry of Agriculture & Farmers Welfare, Govt. of India. (ON2298) & Past Issues

Note1: The progress from most implementing agencies is yet to be received after crop harvest.

Note 2: The complete data in the annexure are extracted from Indiastat agri. The data in source was given in lakh quintals (<https://www.indiastatagri.com>).

