Are Farmer-Based Seed Enterprises Profitable and Sustainable? Experiences of VBSEs from Afghanistan

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Abstract

Farmers are the main producers and users of seed for the millennia. Empirical evidence shows ample experiences of farmers' knowledge of on-farm seed management practices such as plant and/or seed selection, cleaning, treatment and storage for own use or local exchange. Traditionally, grain production and seed production is an integrated activity at the farmer level. This still continues for many crops in the developing world where the introduction of modern agriculture; classical plant breeding coupled with mechanization, fertilization or commercialization is yet to be widespread. Along this evolutionary path from traditional to modern agriculture, emerged the first farmer entrepreneurs who took up seed as a secondary business, planting the embryonic stage of organized seed industry. Over time these local farmer entrepreneurs (seed producers, users and sellers) within the community evolved into small-scale seed enterprises, with sole interest in seed business gradually developing into medium and later to larger seed companies. In this transitory phase from seed producers/ users/ sellers are still a plethora of community seed producers of different shapes and sizes involving farmers and supported by a variety of development organizations throughout the developing world. To date, it is common to see a multitude of community seed production schemes operating across countries in areas where the formal sector is absent. In broader terms these community seed production activities can be collectively called farmer-based seed production and marketing schemes with many variant names and arrangements. In this paper, ICARDA's experience in organizing village-based seed enterprises (VBSEs) underpinned by sustainability will be presented using examples from Afghanistan and elsewhere in the Central West Asia and North Africa region.

Key words: Afghanistan, village based seed enterprises, profitability, sustainability

1. Introduction

In 2002, Afghanistan emerged from more than two decades of conflict and since then, rehabilitation of the agricultural sector has become a priority for ensuring national food security and improving farmers' livelihoods. ICARDA (the International Center for Agricultural Research in the Dry Areas) led the Future Harvest Consortium to Rebuild Agriculture in Afghanistan (FHCRAA) supported by USAID (United States Agency for International Development). The ICARDA-led need assessment on crop improvement and seed supply situation in 2002 showed that most farmers were growing "obsolete" improved or farmer's varieties of barley (*Hordeum vulgare* L.), rice (*Oryza sativa* L.), maize (*Zea mais* L.), chickpea (*Cicer arientum* L.), and potato (*Solanum tubrosum* L.) except for irrigated wheat where 45% use improved varieties (FHCRAA 2002, Kugbei *et al*., 2005). Moreover, a country-wide survey revealed that the informal sector provided more than 92% of the planted seed (FHCRAA 2002). Lack of quality seed of improved varieties was cited as one of the most important agricultural production constraints by farmers.

In the absence of functional organized formal sector, a feasibility study was conducted to assess the potential of village-based seed enterprises (VBSEs) as alternatives for seed production and delivery. The results showed that at prices prevailing then, successful enterprises would breakeven at about 7.5 hectares and that considerable economies of scale would be earned at the optimum farm size of 20 hectares for wheat and rice. Enterprises that would be capable of expanding their cultivated area and sell all the seed they produce would benefit even more.

Cognizant of this, ICARDA, under the Rebuilding Agricultural Markets Program (RAMP, 2003/4–2005/6) and Alternative Livelihoods Program–Eastern Afghanistan (ALP-E, 2005/6–2007/8), initiated an alternative approach of establishing farmer-led VBSEs to ensure rapid access to quality seed of new crop varieties (Bishaw and van Gastel 2008, Srinivas *et al*., 2010). The RAMP project was implemented in Ghazni, Helmand, Kunduz, Nangarhar and Parwan provinces whereas the ADP-E project was focused in Nangarhar, Laghman and Kunar provinces in eastern Afghanistan. Apart from Afghanistan, the VBSE concept operated in other countries that include Algeria, Eritrea, Morocco, Pakistan, Palestine, Tunisia and Yemen with appropriate adjustments to each country's situations. However, this report will only concentrate on work done in Afghanistan.

2. Why VBSEs?

In many developing countries, with exception of a few major food crops such as wheat, rice and maize and in favorable environments, the performance of the formal seed sector is disappointing in terms of varietal choices and seed supply. The majority of farmers still depend on farm-saved seed and local varieties. Farmers save their own seed for many reasons: (i) security – seed is available and accessible when they need it; (ii) economic – low or no transaction costs for seed acquisition; (iii) trust – they have confidence in the quality of their own seed.

There is a dilemma as neither the public sector nor the private sector is able to provide small-scale resource-poor farmers in less favorable environments and remote areas with a diverse choice of varieties and seeds for most food security crops. On one hand, the liberalization and privatization of the seed sector have substantially reduced seed production and marketing by the public sector. On the other hand, the private sector has limited interest in providing seed to subsistence farmers because of low profit margins for most food security crops. A flexible alternative seed delivery is therefore required to cater to the needs of these farmers. Bottom-up approaches involving farmers appear to be more appropriate because they have the potential of building upon existing traditional knowledge, skills and experience. To date there is a plethora of community seed producers of diverse form involving farmers and supported by a variety of development organizations throughout the developing world (Thijssen *et al.* 2008). In broader terms these community seed production activities can be collectively called farmer-based seed production and marketing schemes with many variant names and arrangements (Yonas *et al.* 2008).

3. What are VBSEs?

The VBSEs are farmer-based seed production and marketing schemes that undertake seed business with view to make profit (Bishaw *et al*., 2008; van Gastel *et al*., 2008)). They are farmer groups or individuals operating at local level to ensure availability and access of varieties and seeds to farmers in the absence of formal sector or in less favorable environments and remote areas. VBSEs tend to compliment the formal sector and focus on crops neither handled by the public sector nor the private sector. The VBSEs are characterized by the following:

- Participatory – mobilize and involve small farmers in target environments;
- Decentralized – multiply well adapted and farmer preferred varieties at local levels;
- Business oriented – production is linked to seed demand from local and nearby communities;
- Cost effective – lower transport, marketing and distribution costs, thus reducing seed prices;
- Relevant quality – adopt seed quality standards appropriate to farmer requirements;
- Appropriate technology – use low-cost cleaning/treatment equipment to improve seed quality;
- Sustainability – ensure farmers' empowerment and ownership in seed business;
- Evolution – develops into small, privately owned small to medium scale seed enterprises.

4. Methodological Approaches

The methodological approach for establishing VBSEs as alternative seed delivery option was described by Bishaw and van Gastel (2008), its conceptual and organizational approaches and the linkages and support required from formal sector institutions elaborated.

4.1. Status of seed supply in target regions

In both projects a baseline survey was carried out to collect information on household characteristics, production practices and constraints with particular reference to crops, varieties and seeds. The main objective was to determine farmer's practices and preferences and demand for varieties and seeds as well as for recording benchmark indicators for measuring project achievements.

In 2005, a baseline survey showed that overall, 94% of respondents cultivated wheat, 59% onion, 46% tomato, 29% potato, 23% mung bean, and 18% rice in five target provinces (Table 1). The majority of farmers (69%) are using seed from the informal sector: i.e. 49% own saved, 12% from neighbors, 8% from local markets. Based on area under improved varieties, it was estimated that average household effective seed demand was 116.7 kg for wheat, 80 kg for rice, 9.8 kg for mung bean and 321 kg for potato. Unavailability of quality seed and lack of access to credit for quality seed and fertilizers were identified as major constraints for crop production.

Table 1. Farmers' seed sources (%; n = 675) in Afghanistan (2005)

Seed source	Kunduz	Nangarhar	Ghazni	Helmand	Parwan	Total
Own source	44	28	44	80	75	49
Neighbors	6	18	9	17	2	12
Markets	27	13	7	1	2	8
NGOs	6	18	17	1	5	12
ICARDA	10	21	22	1	11	16
FAO	4	1	1	0	4	2
Government	4	1	0	0	1	1
Total	100	100	100	100	100	100

In 2006, a similar baseline survey was also conducted in eastern Afghanistan. In terms of area coverage, wheat was a major crop followed by rice, potato and mung bean. The informal system was the major seed supplier across all provinces and crops, i.e., 44% own saved, 16% other farmers and 14% local markets (Table 2). The majority of wheat (91%), potato (70%), rice (36%) and mung bean (26%) farmers were interested to buy seed of improved varieties. The effective average demand for improved seed per farm household was estimated at 133, 100, 22, and 1,073 kg for wheat, rice, mung bean and potato seed, respectively. However, unavailability of seed and high cost and lack of credits reported as constraints for crop production.

Table 2. Farmers' seed sources (%; n=480) in eastern Afghanistan (2006)

Seed source	Wheat	Rice	Mung bean	Potato	Total
Own-saved	53	61	44	18	44
Other Farmers	20	28	10	5	16
Local market	7	3	10	38	14
Seed traders	1	1	29	34	16
MAIL	1	0	0	1	0.5
NGOs	18	7	7	4	9
Total	100	100	100	100	100

4.2. Formation of VBSEs

A rapid analysis of seed system was conducted to assess whether access to varieties and seeds was a real constraint and if there would be a market for seed produced by the enterprises in target districts. This was coupled with a simple feasibility study of the enterprises. The outcome of the study and the initiative of enterprise formation were shared with farmers in local communities and key stakeholders. Those well experienced and progressive farmers, who showed interest in working together and had the minimum resources such as land, irrigation water, prior experience in seed or crop production etc., were organized to form an enterprise.

In each target province, four major crop producing districts were selected and VBSEs were established both under RAMP and ALP/E projects. In total, 21 VBSEs under RAMP and 17 VBSEs under ALP/E were supported (in Nangarhar, five former VBSEs established by RAMP were also retained, bringing the total to 17 VBSEs). Under ALP/E project, VBSEs in each province were grouped into Provincial Agricultural Companies, *viz.,* Nangarhar Agriculture Company (NAC), Laghman AC and Kunar AC. All VBSEs had been registered under the umbrella of the provincial agricultural company as legal entities with the Ministry of Agriculture, Irrigation and Livestock (MAIL) and Afghanistan Investment Support Agency (ASIA) within the cooperative law to operate as enterprises, receive government support and access financial credit.

4.3. Provision of seed, inputs and facilities

Each VBSE was provided with initial inputs and seed for multiplication and marketing of well adapted improved varieties. Under ALP/E, VBSEs were also provided with farm machinery (tractors, threshers, sprayers) and mobile seed cleaning and treating equipment.

VBSE members were responsible for seed production, processing, storage and marketing operations with technical advice from ICARDA and the MAIL. Seed production fields were inspected and harvested, cleaned and treated and packaged. The seed lots were tested for quality (physical, physiological, health) to meet Quality Declared Seed (QDS) standard (FAO 1998) and stored until planting time. Each VBSE marketed quality seed directly to other farmers, development agencies, government and NGOs in their districts and beyond.

4.4. Capacity strengthening

Several trainings were conducted at regular intervals throughout the project period to enable VBSE member farmers to manage their seed enterprises and for professionals from partner institutions, such as MAIL (research, development, extension, and quality control), NGOs, and donors to provide the appropriate technical support required by a particular VBSE.

In technical sessions, the emphasis was on principles and techniques of seed production (varietal choice, source seed, land selection, planting, fertilization, weed control, roguing), seed processing (cleaning, treatment, packaging), seed storage (spraying, fumigation) and quality assurance (field inspection, seed testing, labelling). In financial and enterprise management sessions, emphasis was given to business planning, record keeping, promotion and marketing.

4.5. Seed demand survey

Seed demand surveys were also carried out to determine the demand for improved seeds on the basis of which production operations of VBSE could be adjusted. The majority of farmers are aware of improved wheat varieties compared to that of rice, potato and mung bean. Most farmers used own saved seed, but also source seed from other farmers, local markets, government programs and NGOs and reported availability as constraints for use of quality seed and adoption of improved varieties of target crops (wheat, rice, potato and mung bean). The demand of seed and farmers willingness to pay for quality seed is an opportunity of local seed production by farmer groups.

4.6. Business plan preparation

The project supported VBSEs in the preparation of business plans where VBSE representatives and members participated actively. VBSEs used these business plans in conducting their operations. Separate business plans were also prepared for the three Agriculture Companies before the start of each cropping season

4.7. Monitoring operation of VBSEs

After formation of VBSEs, an operation calendar was developed and monitoring system installed and implemented during seed production and marketing. All field operations (land selection, planting, fertilization, weed control, rouging, harvesting, threshing), seed processing (cleaning, treatment, packaging), seed storage (spraying, fumigation), quality control (field inspection, seed testing, labelling), and seed marketing were documented, monitored and evaluated.

4.8. Analysis of performance and profitability

The overall performance of the enterprises can be measured by the amount of quality seed produced and marketed and profits made by VBSEs. To assess the performance of the VBSEs, both technical and financial data were collected throughout the year. Hence, technical performance (quantity and quality of seed) and profitability analyses were conducted for consecutive years of seed business operations.

5. Steps for establishing VBSEs

The approach to initiatives involving farmers is often top-down, based on the assumptions of development agencies rather than critical appraisal of existing situations. Below a number of steps are given, to be followed for successful establishment of a VBSE (Figure 1).

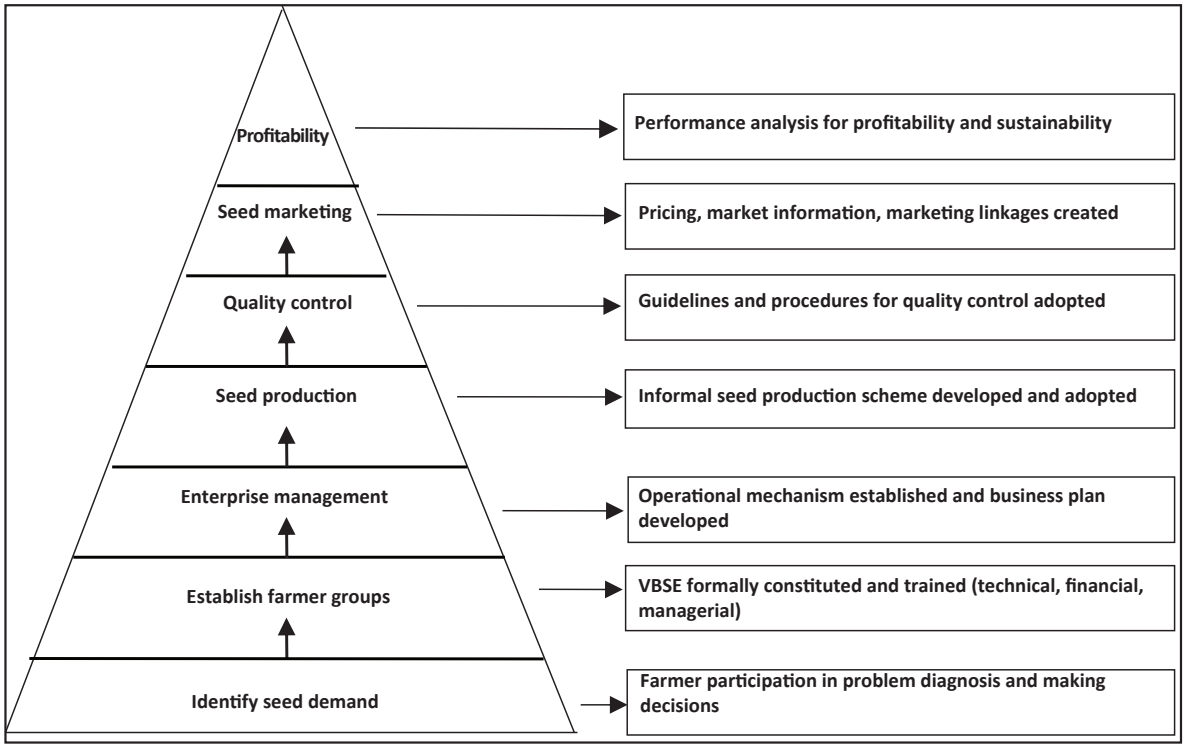

Figure 1. Steps in establishing village-based seed enterprises (from Bishaw et al.*, 2008)*

- Seed system analysis: The seed system analysis should be conducted before establishing VBSEs to assess whether there is a seed demand or 'seed gap'. A simple feasibility study would be useful to see the profitability of seed business.
- Stakeholder's consultation: Have a stakeholder's consultation to identify those interested supporting VBSEs; and determine their roles and responsibilities in implementations.
- Identifying target areas: VBSEs should target (a) farmers lacking access to improved crop varieties and seeds, (b) less favorable, remote and isolated areas with limited infrastructure, and (c) resource-poor small-scale farmers with limited opportunities.
- Selecting farmers: Participating farmers must be interested and committed to setting up seed business; and must have reputation in the community, experience in farming and seed production, relatively bigger/better land holdings, possession of key facilities, entrepreneurial skills and financial resources.
- Forming seed producer groups: Farmer participation and empowerment are key elements of the VBSE program. Farmers should take responsibility and leadership and elect their own leaders whereas partners facilitate, provide guidance and advice.
- Selecting seed production sites: The land selected must be suitable for quality seed production: better/fertile soils, reliable rainfall (or irrigation), low incidence of diseases, pests and parasitic weeds, proximity and accessibility to main roads/facilities.
- Preparing a business plan: Develop a business plan that serves as a guide to the enterprise—products (crops, varieties), potential markets, costs, sales and profits. It also includes risk assessments and details of ownership, management, legal structure, staff, equipment, and the budget.
- Producing and marketing seed: All seed production and marketing operations are carried out by the members of the VBSE. Promotional efforts and marketing are prerequisite to ensure success.

6. Performance of VBSEs

6.1. Technical and financial performance

Under the Rehabilitation of Agricultural Markets Program (RAMP), 21 VBSEs were established in five target provinces over a three-year period. Each VBSE allocated on average, more than 20 ha of land and produced more than 100 tons of quality seed of four major food crops (wheat, rice, mung bean, and potato) for income diversification (Table 3).

Table 3. Amount of seed produced and marketed by VBSEs (t) from 2004-2006 under RAMP in Afghanistan

Year	Active VBSEs	Wheat	Rice	Potato	Mung bean	Total
2003 /04	6	753	525	-	-	1,278
2004 /05	17	2188	651	752	325	3,916
2005 /06	21	3,533	2,352	3,784	186	9,855
Total	21	6,474	3,528	4,536	511	15,049

Assessment of profitability demonstrated a total net income of US$ 0.85 million for 17 VBSEs in 2004/05 and US$ 2.3 million for the 21 VBSEs in 2005/06 through production and marketing of quality seed. The marginal rate of return (%) for wheat, potato, rice and mung bean was 239, 193, 163 and 190, respectively (Table 4).

Table 4. Area cultivated, seed production and revenues by VBSEs in 2005/06 under RAMP in Afghanistan

Item	Wheat	Potato	Rice	Mung bean
Number of active VBSEs	17	14	9	7
Total area (ha)	542	45	139	264
Total production (t)	2,188	752	651	325
Average production (t/ha)	4.04	16.7	4.7	1.23
Average price (farm gate Afs/t)	17,000	8,946	17,460	21,300
Gross revenues (Afs/ha)	68,680	149398	82062	26,199
Production cost (average Afs /ha)	20,205	51,000	31,190	9,025
Net average marginal income (Afs/ha)	48,475	98,398	50,872	17,174
% Marginal income	239	193	163	190

Under ALP/E project, 17 VBSEs (including 5 retained from RAMP project in Nangarhar) were established in three provinces in eastern Afghanistan. They collectively produced about 3,856 tons of quality seed over the three year period (Table 5). In terms of technical performance, from total area planted an average of 85% was approved for wheat, rice, mung bean and potato during field inspection. The average cleaned seed recovery was 95% for all crops. For example, in 2007/8, the average purity and germination of VBSE seed samples were 98.1 and 91%, respectively, showing that VBSEs are capable of producing high quality seed for marketing.

Table 5. Amount of seed produced and marketed by VBSEs (t) under ALP/E project in Afghanistan

Crop year	Active VBSEs	Wheat	Rice	Mung bean	Potato	Total
2005/06	6	626	-	-	-	626
2006/07	15	955	94	11	-	1,060
2007/08	17	1,445	593	91	41	2,170
Total	17	3,026	687	102	41	3,856

The profitability analysis showed that the net profit margin was US$315,531 for 15 VBSEs in 2006/07 and averaged US$ 21,035.4 per VBSE. In 2007/8, the net margin for 17 VBSEs was US$1,311,060 from seed business and services with an average of $77, 121 per VBSE. The marginal rate of return (%) for wheat (QDS), Wheat (CS), potato, rice and mung bean was 504, 259, 269, 278 and 251, respectively (Table 6).

Table 6. Area cultivated, seed production and revenues by VBSEs in 2007/08 under ALP/E in Afghanistan

Item	Wheat (QDS)	Wheat (CS)	Potato	Rice	Mung bean
Number of active VBSEs	15	6	6	12	15
Total area (ha)	261	59.6	3.7	102.2	48.3
Total production (t)	1224	220.7	41.5	593.1	91.1
Average production (t/ha)	4.7	3.7	11.4	5.8	1.9
Average price (farm gate $/t)	800	850	230	446	714
Gross revenues (US $ /ha)	4107	3692	2610	2893	1570
Production cost (US $ /ha)	680	1029	707	766	447
Net marginal income (US $ /ha)	3427	2663	1903	2127	1123
% marginal income	504	259	269	278	251

Note: QDS=quality declared seed; CS=Certified seed

7. Elements for VBSE success

The number of VBSEs and the quantity of seed produced increased over time during the project period. Some VBSEs established by the two projects developed into small- to medium-scale seed enterprises on their own right through follow-up projects. Some VBSEs organized under the umbrella of provincial seed association and joined the Afghanistan National Seed Organization and continue to operate as seed producers and suppliers.

There are a number of prerequisites for the establishment and successful operation of VBSEs:

- Regular seed demand: from farmers within the community, neighboring villages or districts;
- Reasonable seed price: the margin should be affordable by farmers and profitable for producers;
- Appropriate seed quality: Farmers produced consistently higher quality seed than farm-saved or locally exchanged seed;
- Enterprise ownership: farmers should take the responsibility in managing and operating the enterprises;
- Business plans: developing tailor-made business plans based on demand survey and analysis;
- Crop and enterprise diversification: Enterprises with more crops minimized risks and earned better returns from the seed business;
- Sustainability: Farmers make a profit which enabled them to continue with seed business without external support

8. Creating linkages and supporting VBSEs

The strategy of involving stakeholders and encouraging them to work towards an annual business plan based on demand-led production is critical to develop sustainable, financially profitable seed production and marketing enterprises. Key aspects of partner support are described below and shown in Figure 2:

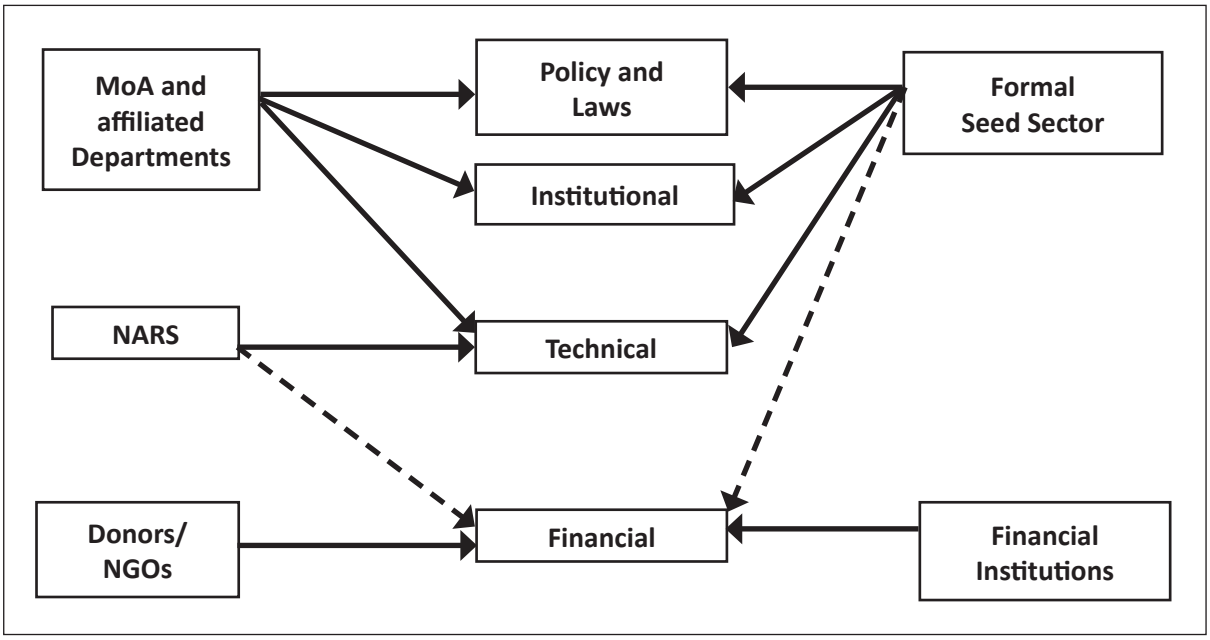

Figure 2. Key stakeholders supporting village-based seed enterprises (modified from Bishaw and van Gastel, 2008)

- Sourcing seed and other inputs:
- Partners help VBSEs to source early generation seed of the varieties most adapted to their areas from NARS, the formal sector or participatory breeding programs. Similarly, partners assist VBSEs to source the inputs (such as fertilizers and pesticides) required for quality seed production.
- Producing seed: Partners provide training, guidance and assistance to ensure that VBSE members have the skills and knowledge necessary to produce seed that meets quality standards.
- Processing and storing seed: VBSEs assisted to ensure that they are able to acquire simple low-cost mobile cleaner and treater prototypes which can then be easily copied and modified locally. Partners will also help VBSEs to build appropriate central seed storage facilities.
- Ensuring seed quality: Partners will train VBSE members to carry out field inspections and simple seed quality tests or through provision of services by the formal sector.
- Marketing seed: The marketing strategy includes promotional activities through on-farm demonstrations of new varieties, organizing field days for neighboring farmers, branding and market information provided through ministries, extensions services, and NGOs.
- Accessing credit: VBSEs need access to credit for purchasing field equipment, inputs (e.g. source seed, fertilizers and pesticides) and seed-handling equipment (e.g. cleaning, treatment, and packaging).
- Building capacity: Training will be implemented to build, step-by-step, farmers' technical (planting, harvesting, cleaning, treatment, testing and storage), financial and enterprise management skills (day-to-day operation of seed enterprises, record keeping, developing business plans).
- Establishing network of VBSEs: VBSEs are assisted to establish a network to link with input providers, facilitate information exchange and sharing experiences.
- Linking with local agro-industries: Linkages between grain producers and local agro-processing industries stimulates the use of better technology, creating demand for the use of quality seed.
- VBSEs continue to operate the seed business on their own right and some of them have been transformed into the private seed enterprises and are functioning as members of the national seed association (Samadi and Aziz, 2014).

A detailed work plan and timetable should be developed for the implementation of VBSEs. The commitment of all partners to the work plan and timetable will ensure timely and successful execution.

9. Conclusion

The following conclusions can be drawn from the establishment and operation of VBSEs in Afghanistan:

- The provision of adequate facilities, training and linkage to key stakeholders are prerequisites for the formation of business-oriented small-scale VBSEs which ensure long-term sustainability.
- The concept of organizing village based low-cost production and marketing seed enterprises to optimize seed delivery and diffusion of new varieties as an alternative, yet complementary to formal seed systems has proven feasible and effective for reaching poor farmers in marginal areas where the formal public and private sectors are not supplying quality seed.
- VBSEs should be flexible and have the freedom to operate informally, without the need to comply strictly with the stringent requirements of the regulatory and quality assurance agencies of the formal sector.
- VBSEs produced consistently higher quality seed than farm-saved or locally exchanged seed and provided seed at reasonable price creating continuous demand from the farming communities.
- VBSEs take the responsibility in managing and operating the enterprises by developing tailor-made business plans and diversifying crops to minimize risks and made profit to ensure sustainability.

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